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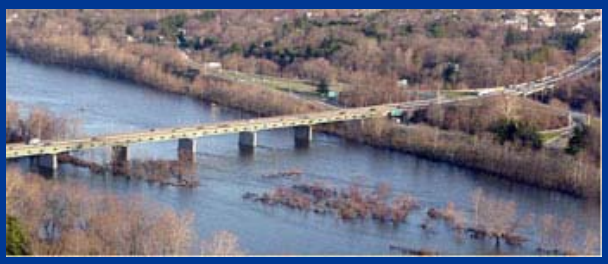

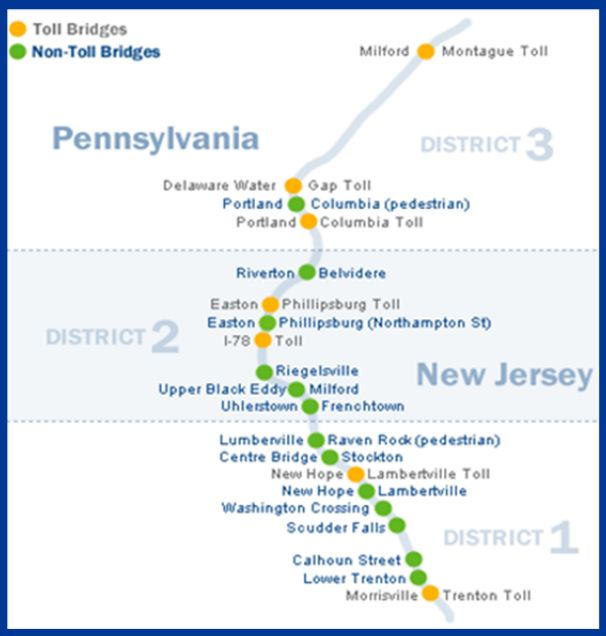

Submitted to:

Delaware River Joint Toll Bridge Commission

Long Term Traffic and Revenue Report

Existing Toll Bridges & Scudder Falls Bridge

February 7, 2017

Submitted by:

Jacobs Engineering Group Inc.

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EXECUTIVE SUMMARY

Jacobs Engineering Group, Inc. ("Jacobs") was retained by the Delaware River Joint Toll Bridge Commission (the "Commission" or "DRJTBC") to prepare Level 3 – Investment Grade Traffic and Revenue Forecasts for the tolling of the new Scudder Falls Bridge in the Pennsylvania-bound direction (southbound direction of I-95) and for the Commission's seven (7) existing toll bridges which are tolled only in the Pennsylvania-bound (westbound) direction. The bridges span the Delaware River linking the states of New Jersey and Pennsylvania and provide services for local, daily commuters and commercial, through-traffic as well as many other travelers.

The DRJTBC does not collect tolls on the existing Scudder Falls Bridge, which is designated a "toll-supported" facility by the Commission. Therefore, separate approaches to the analyses documented in this report have been conducted: the approach to the new Scudder Falls Bridge with tolling, which has no direct tolling history, and the approach to the seven (7) existing toll bridges with tolling history. The different approaches are described independently in this report. The analyses overall, however, consider the entire system and are reflected in the results.

The conversion of the Scudder Falls Bridge from a toll-supported facility to a tolled facility would coincide with the replacement of the existing bridge which carries Interstate 95 over the Delaware River and has been in operation for over 55 years attaining an existing customer base. Tolls would be collected southbound using All Electronic Toll Collection (AET) technology, whereby customers will either pay tolls through E-ZPass or be identified by their license plate ("Toll-by-Plate") and sent a toll invoice. Tolling for the southbound direction of travel is expected to begin on the Scudder Falls Bridge on June 1, 2019, after the anticipated completion of the first span on May 1, 2019. Traffic and revenue forecasts have been prepared with the Commission's 9/26/16 approved set of toll rates for the years 2019 through 2026. In addition, Jacobs has estimated the toll collection costs with AET, and traffic and revenue effects of Scudder Falls Bridge tolling on the nearby Trenton-Morrisville Toll Bridge. To conduct the analysis for the new Scudder Falls Bridge, we used our traffic and toll revenue model developed in 2014 for our previous Scudder Falls Bridge Level 3 Study and updated it with the appropriate recent data and parameters.

To conduct the analysis for the seven (7) existing toll bridges, we used our traffic and toll revenue model developed for our forecasts presented in 2014 and updated it with the appropriate recent data and parameters. Jacobs analyzed historical traffic and toll revenue data for the existing toll bridges to determine historical trends; correlated traffic with key economic indicators; and researched demographic data and other key factors that have affected recent traffic patterns and that will affect future traffic behavior. The traffic and

revenue forecasts for the seven (7) existing toll bridges are based on the current toll and fee schedules. The data and analyses were used to develop a traffic and revenue model to estimate annual trips and gross toll revenue for the period through 2026.

The models have the ability to adjust projections based on toll rates, economic parameters by vehicle type, E-ZPass and commuter E-ZPass share, and various factors affecting the collectability of Toll-by-Plate tolls. The traffic and revenue projections presented in this report assume neither toll increases at the currently-tolled bridges, nor any toll increases at the Scudder Falls Bridge after tolling commences in 2019.

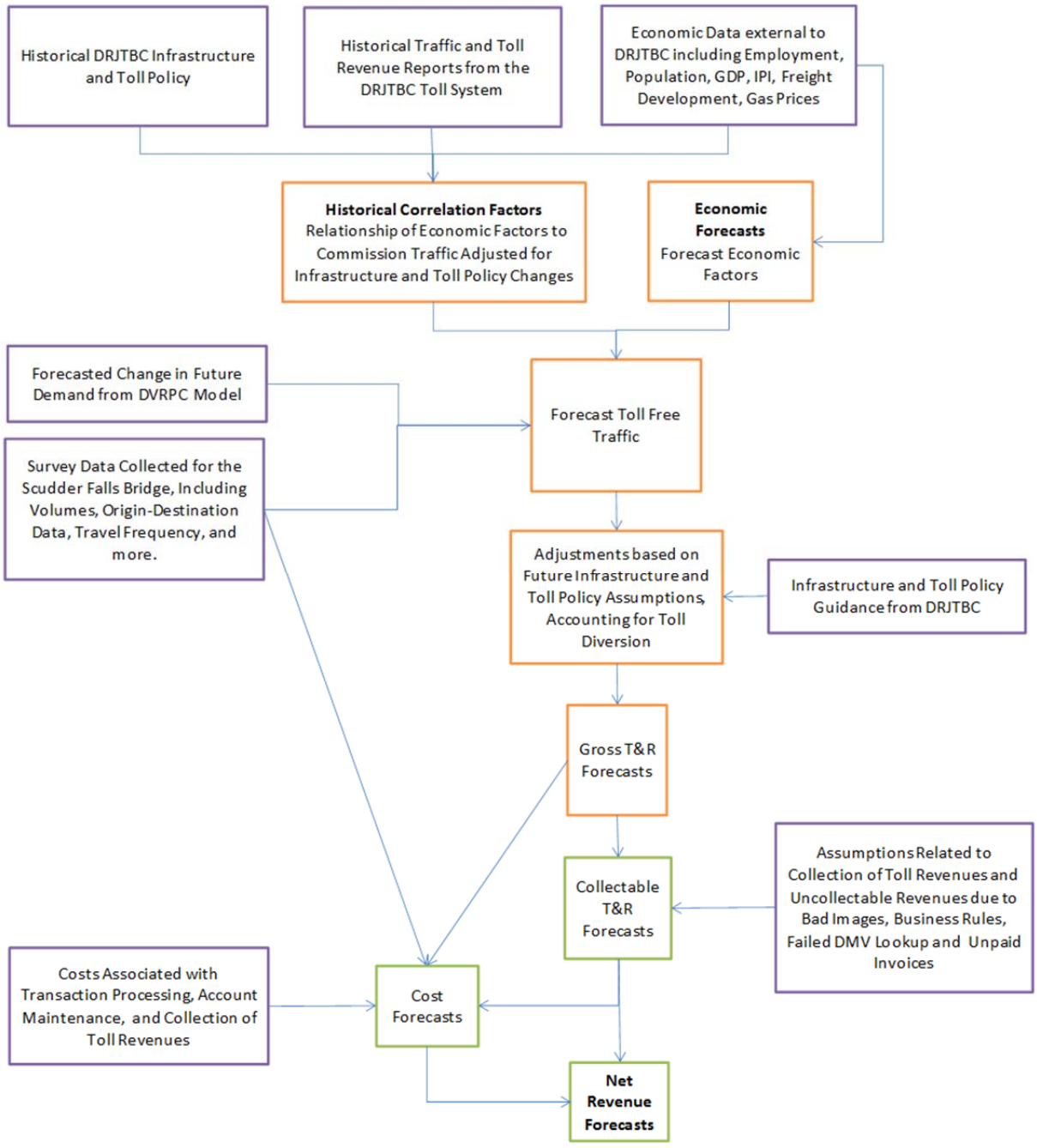
In preparing these Level 3 – Investment Grade Traffic and Revenue Forecasts, Jacobs developed modeling assumptions that are intended to achieve a 90 percent confidence level in the forecast. Expressed in simple terms, our goal is that the forecasted revenue levels would be achieved in nine of the ten years of the forecast.

This executive summary presents the results of our work efforts, including a review of the overall forecasting methodology and a presentation of the final forecasts. The work, analyses, and forecasts for the Commission are of investment-grade quality and are suitable for financing.

T&R Study Methodology

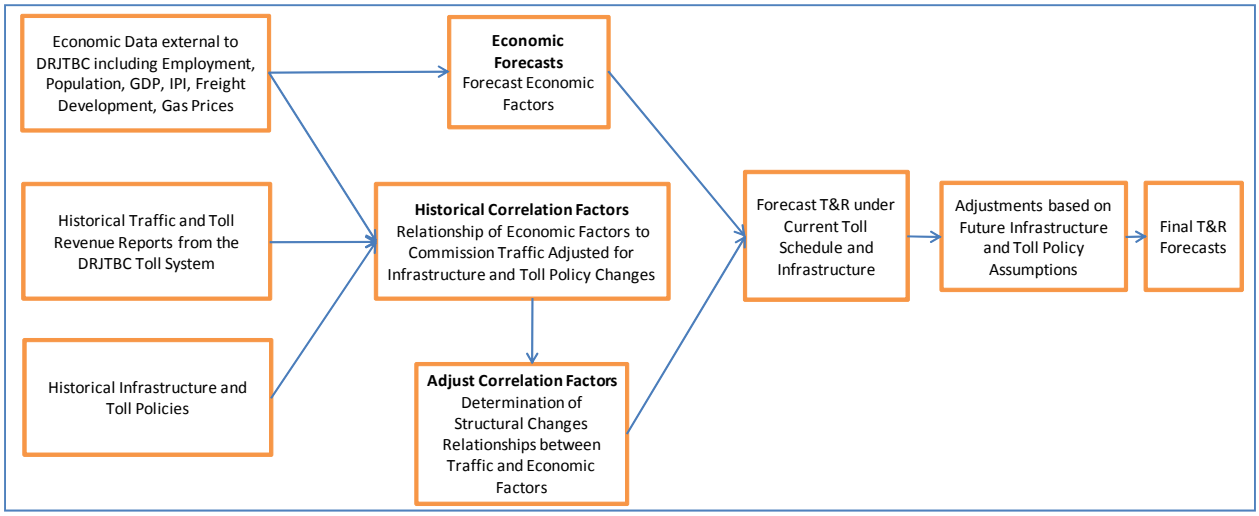
Jacobs' forecasting model for the new Scudder Falls Bridge uses historical correlations between economic and demographic factors and adjusts those correlation factors for the forecast when structural changes in relationships become apparent, and then predicts background traffic growth as a function of forecasted economic and demographic factors. These forecasts were then adjusted to reflect the improvements to the Scudder Falls Bridge and to the nearby Pennsylvania Turnpike / I-95 Interchange based upon the Delaware Valley Regional Planning Commission (DVRPC) regional transportation model that had been run by DVRPC staff specifically for this purpose. Estimates of potential traffic diversion off of the Scudder Falls Bridge due to tolling were developed from the 2014 survey results and also from toll elasticity factors developed from Jacobs' experience with other toll facilities. These factors were then applied to determine the amount of traffic that would remain on the Scudder Falls Bridge based on the toll rates. Using actual data from other AET facilities, we estimated the factors that affect the collectability of Toll-by-Plate tolls (e.g., accounting for bad license plate images, bad addresses or DMV records, and the share of transactions paid on each level of invoicing) in order to calculate Toll-by-Plate revenues from tolls and late/violation fees. Toll collection costs were estimated and used to determine and justify the higher toll rate for Toll-by-Plate transactions. Figure ES-1 diagrams the Scudder Falls Bridge modeling process.

Figure ES-1: Scudder Falls Bridge Model Methodology



The forecasting model for the seven (7) existing toll bridges also uses historical correlations between economic and demographic factors and normalized traffic levels on the toll facilities by vehicle and payment class; adjusts those correlation factors for the forecast when structural changes in relationships are becoming apparent; and then predicts traffic as a function of forecasted economic and demographic factors. These forecasts are then adjusted to reflect DRJTBC and non-DRJTBC system infrastructure construction and improvement projects. Figure ES-2 diagrams the modeling process used for the existing toll bridges.

Figure ES-2: DRJTBC Existing Toll Bridges Model Methodology



The economic and demographic factors that were analyzed for the existing toll bridges include the following:

- Population by region
- Employment by region
- Real Gross Domestic Project (GDP) by region
- Industrial Production Index (IPI)
- Manufacturing levels by region
- Freight movement
- Gas prices
- National, regional, state vehicle miles traveled (VMT)
- Specific developments in the area of the bridges (housing, retail, etc.)
- Other demographic and socio-economic factors

Combining the forecast of economic factors and correlation factors provides DRJTBC traffic forecasts for existing infrastructure and toll policy. Population, GDP and IPI were considered to be the most relevant from our correlation analysis of traffic to demographic and socio-economic factors.

Toll Rates

Jacobs' traffic and revenue model for the new Scudder Falls Bridge was used to test various toll rates to attempt to meet the Commission's revenue and tolling policy goals and to conduct the analyses. The toll rate schedule approved by the Commission on September 26, 2016 is shown in Table ES-1. This schedule meets the Commission's primary goal that the extra price charged to Toll-by-Plate customers would cover the additional costs incurred by Toll-by-Plate over E-ZPass transactions.

Table ES 1: Scudder Falls Bridge Toll Rate Schedule-Approved September 26, 2016

VEHICLE TYPE	
Passenger Vehicles Vehicles with up to two axles and less than 8-feet in height.	
CLASS 1	
2-axle Class 1 vehicle with *E-ZPass*	$1.25
E-ZPass Class 1 Commuter Discount Toll	$0.75
Discount available for customers with passenger-vehicle transponders issued by the New Jersey *E-ZPass* Group.	*40% Discount credited to eligible E-ZPass equipped vehicles that record 16 or more trips during a calendar month.*
2-axle Class 1 vehicle Toll-by-Plate	$2.60
Light Trucks Vehicles with two axles and eight feet and above in height.	
CLASS 2	
2-axle Class 2 vehicle with *E-ZPass*	$7.00
2-axle Class 2 vehicle with E-ZPass Off-Peak Discount	$6.30
2-axle Class 2 vehicle Toll-by-Plate	$8.35
Heavy Trucks Vehicle-types with three or more total axles.	
CLASS 3	
3-axle vehicle with *E-ZPass*	$12.75
3-axle vehicle with *E-ZPass* Off-Peak Discount	$11.48
3-axle vehicle Toll-by-Plate	$14.25
CLASS 4	
4-axle vehicle with *E-ZPass*	$17.00
4-axle vehicle with *E-ZPass* Off-Peak Discount	$15.30
4-axle vehicle Toll-by-Plate	$19.00
CLASS 5	
5-axle vehicle with *E-ZPass*	$21.25
5-axle vehicle with *E-ZPass* Off-Peak Discount	$19.13
5-axle vehicle Toll-by-Plate	$23.75
CLASS 6	
6-axle vehicle with *E-ZPass*	$25.50
6-axle vehicle with *E-ZPass* Off-Peak Discount	$22.95
6-axle vehicle Toll-by-Plate	$28.50
CLASS 7	
7-axle vehicle with *E-ZPass*	$29.75
7-axle vehicle with *E-ZPass* Off-Peak Discount	$26.78
7-axle vehicle Toll-by-Plate	$33.25

Off-Peak Hours: 9:01 PM to 5:59 AM

E-ZPass **per-axle truck rate is $4.25; Toll-by-Plate per-axle rate is $4.75**

Class 1 Passenger vehicles with a trailer will be charged an additional $1.00.
Class 2 through Class 7 vehicles with a trailer and/or towed vehicle will be charged for the total combined axles at the current per axle rate.
Vehicles with a fifth wheel/gooseneck trailer will be charged for the total combined axles at the current per axle rate.

Jacobs' traffic and revenue model for the seven (7) existing toll bridges uses the current DRJTBC toll rates to conduct the analyses on these facilities. The current toll policy for the DRJTBC has been in effect since June 30, 2011 and the current toll rates at each of the seven (7) toll bridges are shown in Table ES-2.

Table ES-2: Current DRJTBC Toll Rates
(tolls charged in the westbound direction only)

	Class	Cash and Full Fare E-ZPass		Discounted E-ZPass**		
		Trip	Multiplier over Class 1	Trip	Multiplier over Class 1	Trip Discount
Auto	1*	$1.00		$0.60		40%
Commercial	2	$6.50	6.5	$5.85	9.75	10%
	3	$12.00	12	$10.80	18	10%
	4	$16.00	16	$14.40	24	10%
	5	$20.00	20	$18.00	30	10%
	6	$24.00	24	$21.60	36	10%
	7	$28.00	28	$25.20	42	10%

** Class 1 vehicles pulling trailers are charged $2.00*

*** There is a discount of 10% for off-peak travel for E-ZPass commercial vehicles, and 40% for autos at all time periods for 16 or more trips per month for those with NJ E-ZPass Regional Consortium accounts.*

The current toll rate for Class 1 vehicles (2-axle automobiles) is $1.00 at each of the seven (7) toll bridges. Class 2 vehicles (2-axle commercial trucks) are charged $3.25 per axle or $6.50 per trip. Classes 3 through 7 vehicles (3 to 7 axle commercial trucks) are assessed a rate of $4.00 per axle.

Forecasted Traffic and Revenue

Scudder Falls Bridge average annual daily traffic (AADT) forecasts with the approved toll rates are shown in Table ES-3. Also included in Table ES-3 is the additional traffic forecasted to cross the Trenton-Morrisville Bridge. With the onset of tolling of the Scudder Falls Bridge, some customers who had been avoiding the Trenton-Morrisville Bridge due to its toll (and thereby using the currently-free existing Scudder Falls Bridge) would switch their trip back to the Trenton-Morrisville Toll Bridge, thus increasing traffic and revenue on that bridge.

Table ES-3: Scudder Falls Bridge Average Annual Daily Toll Traffic Forecasts

Year	Scudder Falls Bridge AADT	Growth	Additional AADT on Trenton-Morrisville Bridge*
2019	27,624		1,805
2020	27,968	1.2%	1,761
2021	28,225	0.9%	1,751
2022	28,464	0.8%	1,743
2023	28,689	0.8%	1,740
2024	28,905	0.8%	1,736
2025	29,114	0.7%	1,744
2026	29,317	0.7%	1,750

**Traffic shift due to Scudder Falls Bridge tolling*

The forecasted revenues with the approved toll rate schedule, netting out the costs of toll collection, for the new Scudder Falls Bridge and additional traffic forecasted for the Trenton-Morrisville Bridge, are presented in Table ES-4.

Table ES-4: Scudder Falls Bridge Net Revenues ($millions per year)

Year	SFB E-ZPass Tolls	SFB Toll-by-Plate Tolls	Total Collected SFB Toll Revenue	SFB TBP Viol. & Late Fees	**TOTAL SFB REV**	Trenton-Morrisville Add'l Toll Revenue*	**TOTAL GROSS REVENUE**	SFB Toll Collection Cost	**NET REVENUE**
2019	$8.8	$1.3	$10.1	$0.9	**$10.9**	$0.9	**$11.9**	$(2.4)	**$9.5**
2020	$15.8	$3.4	$19.1	$2.2	**$21.3**	$1.6	**$22.9**	$(3.7)	**$19.2**
2021	$16.2	$3.1	$19.3	$2.0	**$21.3**	$1.6	**$22.9**	$(3.5)	**$19.4**
2022	$16.6	$2.9	$19.5	$1.8	**$21.3**	$1.6	**$23.0**	$(3.3)	**$19.6**
2023	$16.9	$2.7	$19.7	$1.7	**$21.4**	$1.6	**$23.1**	$(3.2)	**$19.9**
2024	$17.2	$2.6	$19.9	$1.7	**$21.5**	$1.7	**$23.2**	$(3.1)	**$20.1**
2025	$17.5	$2.6	$20.1	$1.6	**$21.7**	$1.7	**$23.3**	$(3.0)	**$20.3**
2026	$17.7	$2.5	$20.3	$1.6	**$21.8**	$1.7	**$23.5**	$(3.0)	**$20.5**

**Due to traffic shifting to the Trenton-Morrisville Bridge from the Scudder Falls Bridge when it is tolled*

The estimates of future annual gross toll revenue for the DRJTBC's seven (7) existing toll bridges are presented in Table ES-5. The estimates of gross toll revenue are of a 90 percent confidence level suitable for financing.

The toll traffic and revenue forecasts were developed with the aid of a computerized modeling platform created specifically for the DRJTBC. The base function of this model is to take current traffic volumes by class and payment type for each DRJTBC toll facility and adjust them in the future years for various factors such as underlying socio-economic/demographic growth in the corridor.

Table ES-5: DRJTBC Gross Toll Revenues in millions, 2016 to 2026

Facility		Delaware River Joint Toll Bridge Commission - Toll Revenue Projections										
		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Trenton-Morrisville												
	Cars	$8.50	$8.64	$8.70	$8.75	$8.80	$8.84	$8.89	$8.94	$8.99	$9.04	$9.09
	Trucks	$7.56	$7.53	$7.59	$7.71	$7.83	$7.95	$8.08	$8.21	$8.34	$8.47	$8.61
	Total	***$16.06***	***$16.17***	***$16.29***	***$16.46***	***$16.63***	***$16.79***	***$16.97***	***$17.15***	***$17.33***	***$17.51***	***$17.70***
New Hope-Lambertville												
	Cars	$1.80	$1.82	$1.83	$1.84	$1.84	$1.85	$1.86	$1.87	$1.88	$1.89	$1.90
	Trucks	$1.44	$1.45	$1.47	$1.49	$1.51	$1.53	$1.55	$1.57	$1.59	$1.61	$1.63
	Total	***$3.24***	***$3.27***	***$3.30***	***$3.33***	***$3.35***	***$3.38***	***$3.41***	***$3.44***	***$3.47***	***$3.50***	***$3.53***
I-78												
	Cars	$9.63	$10.52	$10.64	$10.74	$10.85	$10.96	$11.07	$11.18	$11.29	$11.40	$11.52
	Trucks	$52.23	$52.43	$52.94	$53.34	$53.74	$54.15	$54.57	$54.98	$55.41	$55.83	$56.26
	Total	***$61.86***	***$62.95***	***$63.58***	***$64.08***	***$64.59***	***$65.11***	***$65.64***	***$66.16***	***$66.70***	***$67.23***	***$67.78***
Easton-Phillipsburg												
	Cars	$5.24	$5.04	$5.05	$5.06	$5.07	$5.08	$5.09	$5.10	$5.11	$5.12	$5.13
	Trucks	$4.29	$4.23	$4.24	$4.25	$4.25	$4.26	$4.27	$4.28	$4.29	$4.30	$4.31
	Total	***$9.53***	***$9.27***	***$9.29***	***$9.31***	***$9.32***	***$9.34***	***$9.36***	***$9.38***	***$9.40***	***$9.42***	***$9.44***
Portland-Columbia												
	Cars	$1.27	$1.21	$1.22	$1.23	$1.23	$1.24	$1.25	$1.26	$1.26	$1.27	$1.28
	Trucks	$1.35	$1.28	$1.29	$1.29	$1.30	$1.30	$1.31	$1.31	$1.32	$1.32	$1.32
	Total	***$2.62***	***$2.49***	***$2.51***	***$2.52***	***$2.53***	***$2.54***	***$2.56***	***$2.57***	***$2.58***	***$2.59***	***$2.60***
Delaware Water Gap												
	Cars	$8.47	$8.92	$9.03	$9.11	$9.19	$9.28	$9.36	$9.44	$9.53	$9.62	$9.71
	Trucks	$25.18	$25.31	$25.52	$25.71	$25.89	$26.08	$26.27	$26.46	$26.65	$26.84	$27.04
	Total	***$33.66***	***$34.23***	***$34.55***	***$34.82***	***$35.08***	***$35.36***	***$35.63***	***$35.90***	***$36.18***	***$36.46***	***$36.75***
Milford Montague												
	Cars	$1.28	$1.31	$1.31	$1.31	$1.32	$1.32	$1.32	$1.33	$1.33	$1.33	$1.33
	Trucks	$0.40	$0.39	$0.39	$0.39	$0.39	$0.39	$0.39	$0.39	$0.40	$0.40	$0.40
	Total	***$1.69***	***$1.70***	***$1.70***	***$1.70***	***$1.71***	***$1.71***	***$1.71***	***$1.72***	***$1.73***	***$1.73***	***$1.73***
Legacy Toll Bridges - SubTotal												
	Cars	$36.19	$37.46	$37.78	$38.04	$38.30	$38.57	$38.84	$39.12	$39.39	$39.67	$39.96
	Trucks	$92.46	$92.62	$93.44	$94.18	$94.91	$95.66	$96.44	$97.20	$98.00	$98.77	$99.57
	Total	***$128.65***	***$130.08***	***$131.22***	***$132.22***	***$133.21***	***$134.23***	***$135.28***	***$136.32***	***$137.39***	***$138.44***	***$139.53***
Scudder Falls												
	Toll Revenue				$10.06	$19.12	$19.31	$19.49	$19.68	$19.88	$20.07	$20.27
	Late Fees				$0.87	$2.20	$2.00	$1.85	$1.74	$1.65	$1.60	$1.55
	Trenton-Morrisville Additional Revenue				$0.94	$1.61	$1.62	$1.63	$1.64	$1.65	$1.67	$1.68
	Adtl Costs				-$2.42	-$3.72	-$3.49	-$3.32	-$3.20	-$3.11	-$3.05	-$3.01
	Total				***$9.46***	***$19.22***	***$19.44***	***$19.65***	***$19.86***	***$20.07***	***$20.29***	***$20.50***
All Toll Bridges												
	Total	***$128.65***	***$130.08***	***$131.22***	***$141.68***	***$152.43***	***$153.67***	***$154.93***	***$156.18***	***$157.46***	***$158.73***	***$160.03***

Note: 2016 data shown is unaudited.

1.0 INTRODUCTION

Jacobs Engineering Group, Inc. ("Jacobs") was retained by the Delaware River Joint Toll Bridge Commission (the "Commission" or "DRJTBC") to prepare Level 3 – Investment Grade Traffic and Revenue Forecasts for the tolling of the new Scudder Falls Bridge and the Commission's seven (7) existing toll bridges. All tolls are one-way, in the Pennsylvania-bound direction, which is considered "westbound" for the existing toll bridges and "southbound" for the Scudder Falls Bridge because it is located on I-95, a north-south interstate route. The bridges span the Delaware River linking the states of New Jersey and Pennsylvania and provide services for local, daily commuters and commercial, through-traffic as well as many other travelers.

The 'new' Scudder Falls Bridge will be a replacement of the existing bridge carrying Interstate 95 over the Delaware River which has been in operation for over 55 years and as such, already has an existing customer base. Tolls would be collected southbound using All Electronic Toll Collection (AET) technology, whereby customers will either pay tolls through E-ZPass or be identified by their license plate ("Toll-by-Plate") and sent a toll invoice. Tolling for the southbound direction of travel is expected to begin on the bridge on June 1, 2019, after the anticipated completion of the first span on May 1, 2019. Traffic and revenue forecasts have been prepared with the Commission's approved set of toll rates for the years 2019 through 2026. In addition, Jacobs has estimated the toll collection costs with AET, and traffic and revenue effects of Scudder Falls Bridge tolling on the nearby Trenton-Morrisville Toll Bridge.

The DRJTBC does not collect tolls on the existing Scudder Falls Bridge, which is designated a "toll-supported" facility by the Commission. The conversion of this bridge from a toll-supported facility to a tolled facility would coincide with the completion of the first (southbound) span of the new Scudder Falls Bridge, a wider bridge with improvements to the approaches and adjacent interchanges.

Jacobs conducted extensive research into the most relevant historic and forecasted socio-economic parameters in order to make a viable estimate of future traffic and toll revenues. We analyzed historical traffic and toll revenue data for the Commission's existing toll facilities to determine historical trends; correlated traffic with key economic indicators; and researched demographic data and other key factors that have affected recent traffic patterns and that will affect future traffic behavior. A complete set of available traffic and economic data, including historical trips and toll revenue data, were compiled from the DRJTBC for all toll trips on the Commission's existing toll facilities by month, detailing payment type and vehicle class.

The traffic and revenue model developed for the DRJTBC's seven (7) existing toll bridges with resulting toll trips and toll revenue projections was based on historical traffic and toll revenue data through the full year 2015. As part of the analysis, a static trend line-based traffic and toll revenue model was developed which has the ability to adjust projections based on various economic parameters and is segmented by vehicle class and payment type. The traffic and revenue projections presented in this report assume neither toll increases at the currently-tolled bridges, nor any toll increases at the Scudder Falls Bridge after tolling commences in 2019.

The work, analyses and results presented herein for the new Scudder Falls Bridge and the seven (7) existing toll bridges are of investment-grade quality and are suitable for financing.

1.1 History of Jacobs' Tolling Analyses

Jacobs completed a Traffic and Revenue Study for the Commission in 2009. This study consisted of two parts: (1) a ten-year forecast of traffic and revenue for the Commission's seven (7) existing toll bridges, of investment-grade quality and suitable for financing; and (2) Level 2 traffic and revenue estimates for the proposed tolling of the currently toll-supported Scudder Falls Bridge.

As part of the Level 2 study, we also conducted a tolling policy forum with the Commission in October 2008 in regards to the various policies associated with AET (Toll-by-Plate and E-ZPass tolling), and developed a basic set of policy and business rules including toll rates and how to define and handle violators; the Commission made some policy decisions based on these.

In 2011, Jacobs completed a toll diversion study for the Scudder Falls Bridge to determine the effects of widening and tolling this bridge on other area facilities. This study helped support the favorable Record of Decision by the National Environmental Policy Act (NEPA) for the planned replacement bridge.

In 2014, Jacobs held another tolling policy forum to discuss and update the Commission's goals related to AET and the tolling of the new Scudder Falls Bridge. We then completed a Level 3 investment-grade traffic and revenue study for the seven (7) existing toll bridges and a separate Level 3 study for the new Scudder Falls Bridge. The new Scudder Falls Bridge study involved a large survey and data collection effort by Jacobs, as well as detailed estimates of costs and un-collectability of revenues related to AET.

This current study updates the previous Scudder Falls Bridge study with recent data, socioeconomic inputs, policy decisions made at a third tolling policy forum held in March

2016, and the September 2016 approved toll schedule for the Scudder Falls Bridge. The current study also incorporates updates to the March 2014 long term traffic and revenue study of the seven (7) existing toll bridges.

There have been no institutional changes in the roadway network since these earlier studies have been conducted; the data used in this study are recent and sufficient for use in this Investment-grade analysis.

1.2 Existing Toll Bridges Analyses

This section describes the approach to the analyses of the seven (7) existing toll bridges under jurisdiction of the DRJTBC.

The forecasting model uses historical correlations between economic and demographic factors and normalized traffic levels on the Commission's toll facilities by vehicle and payment class, adjusts those correlation factors for the forecast when structural changes in relationships are becoming apparent, and then predicts traffic as a function of forecasted economic and demographic factors. These forecasts are then adjusted to reflect DRJTBC and non-DRJTBC system infrastructure construction and improvement projects.

1.3 Scudder Falls Bridge Analyses

This section of the report discusses the approach to the analyses of the new Scudder Falls Bridge, a replacement of the currently non-tolled bridge over the Delaware River with a wider bridge including improvements to the approaches and adjacent interchanges, which will be tolled in the southbound direction.

1.3.1 General Work Scope

The existing Scudder Falls Bridge opened in 1961 and has over 55 years of traffic history. The customer base for this bridge already exists, and we have used the extensive historical traffic data as a starting point for our analyses.

There is, however, no history of tolling on the Scudder Falls Bridge, and tolling is planned to be all-electronic tolling collection (AET) with no cash payment option. As part of this study, we built upon our Level 2 and Level 3 traffic and revenue studies completed previously.

To satisfy the objectives of a Level 3, investment-grade study, it is necessary to develop a full understanding of the patrons of the existing Scudder Falls Bridge – such as where they reside, how often they use the facility, and how they would potentially pay their tolls. The group of customers that is likely to choose Toll-by-Plate over E-ZPass in an AET

environment would come from the existing motorists that do not have a transponder and, therefore, it is very important to determine the travel characteristics of these customers.

Jacobs developed the model for the Scudder Falls Bridge based on the most recent traffic data available from the Commission, plus the results of an extensive recent data collection effort performed by Jacobs for this project in 2014. Data collected and incorporated into the model included traffic volumes segmented by class of vehicle, direction of travel, and time and day of travel.

To estimate the impact of tolling the Scudder Falls Bridge, Jacobs reviewed historical traffic and revenue data from nearby DRJTBC toll facilities to understand past trends. Jacobs also correlated historical traffic data with key economic indicators and researched relevant demographic and other factors that have affected recent traffic patterns and that may affect future driver behavior. In addition, results from the Delaware Valley Regional Planning Commission (DVRPC), who ran their regional transportation model as part of the Jacobs team for the previous study in 2014, were used to estimate the effects of widening the Scudder Falls Bridge and the completion of a new I-95/Pennsylvania Turnpike interchange on Scudder Falls Bridge traffic volumes. Jacobs used this information and associated analyses to develop a traffic and revenue model to estimate annual trips, gross toll revenue, fee revenue, and toll collection costs on the Scudder Falls Bridge from 2019 to 2026.

1.3.2 Data Sources

Jacobs compiled historical traffic and revenue data from the DRJTBC toll facilities through early 2016. In addition, as part of our investment-grade traffic and revenue study in 2014, Jacobs had conducted an extensive data collection program in and around the Scudder Falls Bridge specifically for this project. As there have been no institutional changes in the roadway network or socio-economic parameters in the past 2 years, these data collected are recent and sufficient for use in this Investment-Grade analysis. Data collection included:

- hourly traffic counts,
- license plate surveys,
- counts of vehicles equipped with E-ZPass,
- travel time surveys, and
- Scudder Falls Bridge customer characteristic surveys via Jacobs-designed online surveys.

A review by Jacobs revealed that there have not been any major changes to the regional transportation network, land use, or socio-economic parameters in the past two years;

therefore, no further field surveys were performed. The results of these data collection efforts have been incorporated into Jacobs' traffic and revenue forecasting model, and are discussed and presented herein.

1.3.3 Policy Workshop / Discussion

A new AET tolling policy forum was conducted with DRJTBC on March 22, 2016 to revisit and revise the policy decisions for AET made in the October 2008 and January 2014 policy forums. Choices on policy can significantly influence toll revenues; for example, the inclusion of a higher rate for Toll-by-Plate vehicles. We worked with the DRJTBC staff to determine the most likely scenario(s), and incorporated these in the development of the Investment Grade Analysis for the Scudder Falls Bridge.

1.3.4 Operating Costs for AET

We researched and compiled data from the NJ E-ZPass Regional Consortium (a group of regional E-ZPass agencies) and existing AET facilities, as well as the Commission's collection costs on its current toll bridges, in order to arrive at estimated operating costs for AET so that the Commission can prepare its budget and potential associated fee structure, and also to estimate expenses that the Commission would want to recover through a higher toll rate charged to Toll-by-Plate customers. These resulting estimated toll collection operating costs allowed us to calculate net toll revenues for the Scudder Falls Bridge.

1.3.5 Scudder Falls' Model Development

Because the existing Scudder Falls Bridge is not currently tolled, it is not suited to a typical trend line analysis for forecasting purposes. In addition, the new Scudder Falls Bridge will be an AET facility with no cash toll collection. Because of these factors, a much more comprehensive analysis of the facility was required to achieve the depth and quality of report required for an investment-grade study.

In order to determine future background growth (i.e., growth in traffic without tolling or any other changes), Jacobs used historical DRJTBC traffic data, correlated it to Gross Domestic Product (GDP) and Industrial Production Index (IPI), then used forecasts of future GDP and IPI to estimate traffic growth rates. We used results from the regional DVRPC model as run by DVRPC staff to estimate traffic changes due to the replacement of the Scudder Falls Bridge with a wider bridge, and also due to the new I-95/Pennsylvania Turnpike interchange.

Estimates of toll diversions from previous Jacobs studies were refined based on differences in Pennsylvania-bound vs. New Jersey-bound traffic in the area, travel times using the Scudder Falls Bridge versus alternative crossings, and origin-destination patterns from the

online survey results. Survey data was also used to develop a customer profile, such as state of vehicle registration and frequency of travel, which enables us to estimate the number of Toll-by-Plate toll accounts and the number of invoices to be mailed to customers.

Data on Toll-by-Plate collection costs and uncollectable revenues from existing AET facilities throughout the country were incorporated into our models. As part of the Tolling Policy, DRJTBC chose to set the Toll-by-Plate rate to cover the additional cost of collecting these types of tolls over the cost of collecting E-ZPass tolls. Part of our modeling process was to estimate this Toll-by-Plate rate. In addition, a $5 late fee will be charged on the second bill (regardless of the number of toll transactions) to all customers who did not pay their first invoice within 30 days. A $30 violation fee per transaction will be imposed on the third Toll-by-Plate invoice if the first two invoices are not paid, which is consistent with the Commission's current violation fee. The revenues from late and violation fees were also estimated by Jacobs for each year of the forecast.

Our model is segmented by vehicle classification (truck vs. passenger car), travel frequency, and payment type. It is important to note that there may be some customers currently utilizing the existing Scudder Falls Bridge simply because it is free; once tolling is introduced it is probable that some of them will move to other tolled facilities such as the Trenton-Morrisville Toll Bridge because it is cheaper or more convenient than a tolled Scudder Falls Bridge. Jacobs has developed estimates of the shift of traffic from the future-tolled Scudder Falls Bridge to the Trenton-Morrisville Toll Bridge, and the additional revenue this produces at the Trenton-Morrisville Toll Bridge.

The work, analyses, and results for the DRJTBC included in this report are of investment-grade quality and are suitable for financing. The background and methodology for Jacobs' traffic and toll revenue projections for the DRJTBC are presented herein.

1.4 Report Structure

The following is a brief outline of the remaining chapters in this report:

- Introduction and History of Jacobs' Tolling Analyses for the Commission
- Description of the Bridges
    - DRJTBC's Existing Seven Toll Bridges
    - Scudder Falls Bridge
- Historical Traffic and Revenues for Existing Seven Toll Bridges
- Analysis of Collected Data for Scudder Falls Bridge
- Economic Backdrop and Outlook for the Future

- Toll Traffic and Toll Revenue Forecasts
    - DRJTBC's Existing Seven Toll Bridges
    - Scudder Falls Bridge
- Toll Operation Costs and Uncollectable Tolls
- Net Revenues and Debt Service Coverage Ratios.

2.0 THE TOLL BRIDGES

This section of the report provides a description of the toll bridges under study.

2.1 DRJTBC's Existing Seven Toll Bridges

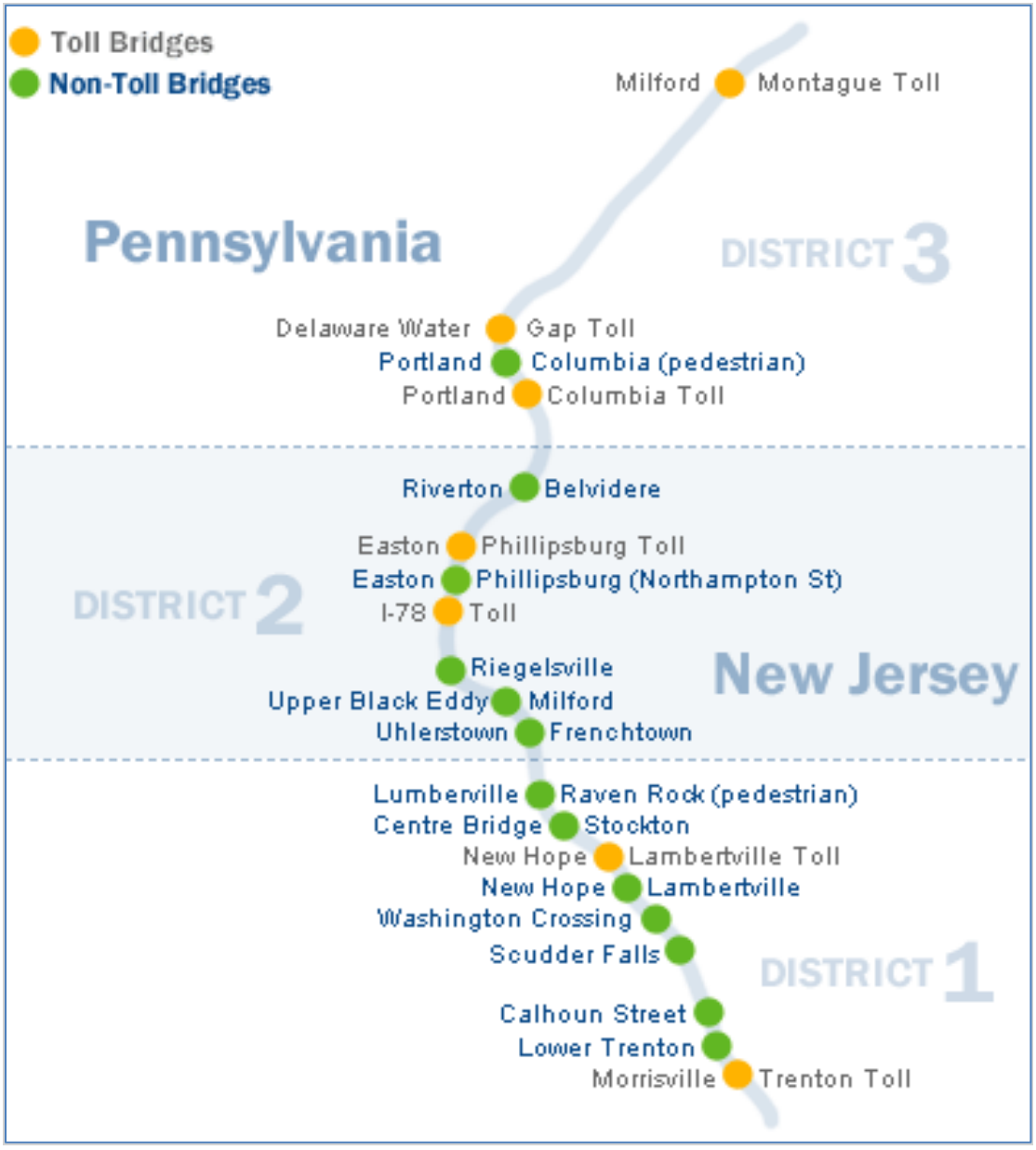
This section of the report provides a description of the DRJTBC seven (7) existing toll bridges, along with a historical overview of the toll collection on the DRJTBC, and is followed by a description of the existing toll rate schedule.

2.1.1 Description of DRJTBC Existing Seven Toll Bridges

The DRJTBC owns and operates 20 bridges that span the Delaware River linking the states of New Jersey and Pennsylvania. They are located from as far south as the Bucks County, PA – Philadelphia line to as far north as the New York State border. Figure 2-1 provides an overview of all DRJTBC facilities, which range in utilization from a pedestrian-only bridge crossing the river to the I-78 Toll Bridge that supports over 60,000 daily crossings. Seven (7) of these bridges are tolled and comprise a unique mix of local and through crossings. This unique mix of facilities provides service for local, daily commuters and commercial, through-traffic crossing the Delaware River, as well as many other travelers. For all the toll bridges, tolls are collected in the westbound direction only.

I-78 and I-80 (Delaware Water Gap) are major east-west corridors for long distance truck traffic. I-95 (Scudder Falls) is a major north-south corridor that also includes a significant mix of local commuting traffic between Trenton and the Bucks County suburbs of Philadelphia. Many of the remaining facilities also have components of traffic that include commuting and recreational trips.

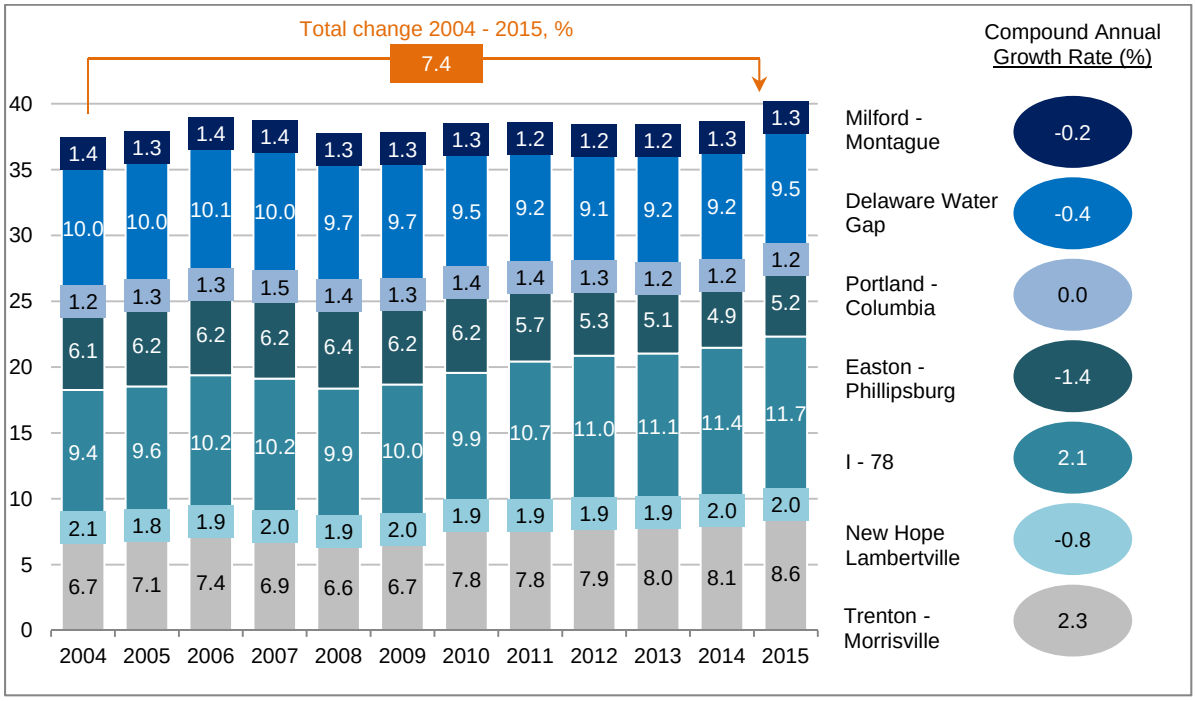
Figure 2-1: DRJTBC System



Source: DRJTBC

Figure 2-2 displays annual toll traffic on the seven DRJTBC bridges that collect tolls. As shown in the figure, the I-78, Delaware Water Gap, and Trenton-Morrisville toll facilities attract the most toll traffic. Total toll traffic on all toll bridges increased by a total of 7.4 percent from 2004 to 2015, but growth was not distributed equally among the toll bridges. Of the seven toll facilities, only the Trenton-Morrisville and the I-78 bridges experienced increases in toll traffic over the twelve-year period.

Figure 2-2: Annual Toll Traffic, Millions of Toll Trips



2.1.2 Toll Collection Historical Overview

On each of the seven (7) existing toll bridges, tolls are collected in the westbound (Pennsylvania-bound) direction only, at toll plazas located on the Pennsylvania side of the Delaware River except for the Easton-Phillipsburg Toll Bridge where the toll plaza is located in New Jersey. Tolls are assessed based on the classification of each vehicle and the payment type. When the first toll bridge opened to traffic in 1938, tolls were collected manually via cash payment or in the form of commutation tickets that provided discounts to frequent bridge users. In the early 1970s, the Commission began utilizing automated coin and token collection devices at its toll plazas in an effort to increase vehicle throughput, with the tokens replacing the original commutation tickets.

However, beginning in 2002, the Commission began implementing transponder-based electronic toll collection in the form of E-ZPass at each of its seven (7) existing toll bridges. Although toll lane gates were installed at each toll plaza, the introduction of E-ZPass as a payment method significantly increased vehicle throughput over previous automated coin and token machines.

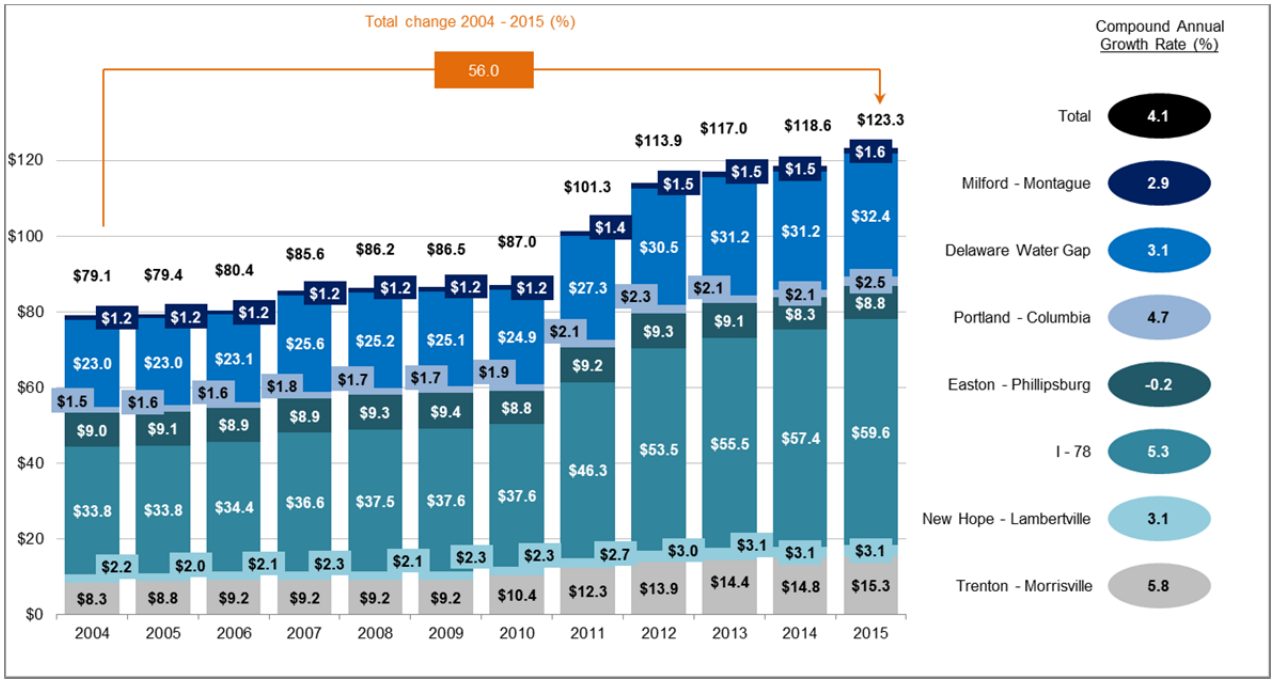
In 2010, the Commission removed the gates from the E-ZPass toll lanes at its seven (7) toll bridges which increased vehicle throughput even further. In addition, the Commission implemented Open Road Tolling in the form of highway speed Express E-ZPass lanes at

the I-78 Toll Bridge in May 2010 and at the Delaware Water Gap (I-80) Toll Bridge in November 2010.

The E-ZPass technology allows customers to travel seamlessly on toll facilities operated by 25 toll agencies in 15 states. These toll facilities include some of the toll facilities that feed directly or indirectly to the DRJTBC's toll bridges, including the Pennsylvania Turnpike, Ohio Turnpike and other tolled Delaware River crossings such as those operated by the Burlington County Bridge Commission, Delaware River Port Authority and the Delaware River and Bay Authority. In 2015, almost 65 percent of the Commission's revenue was collected by E-ZPass. The discounts previously offered through commutation tickets and tokens are still provided to motorists that use New Jersey E-ZPass Regional Consortium-issued transponders.

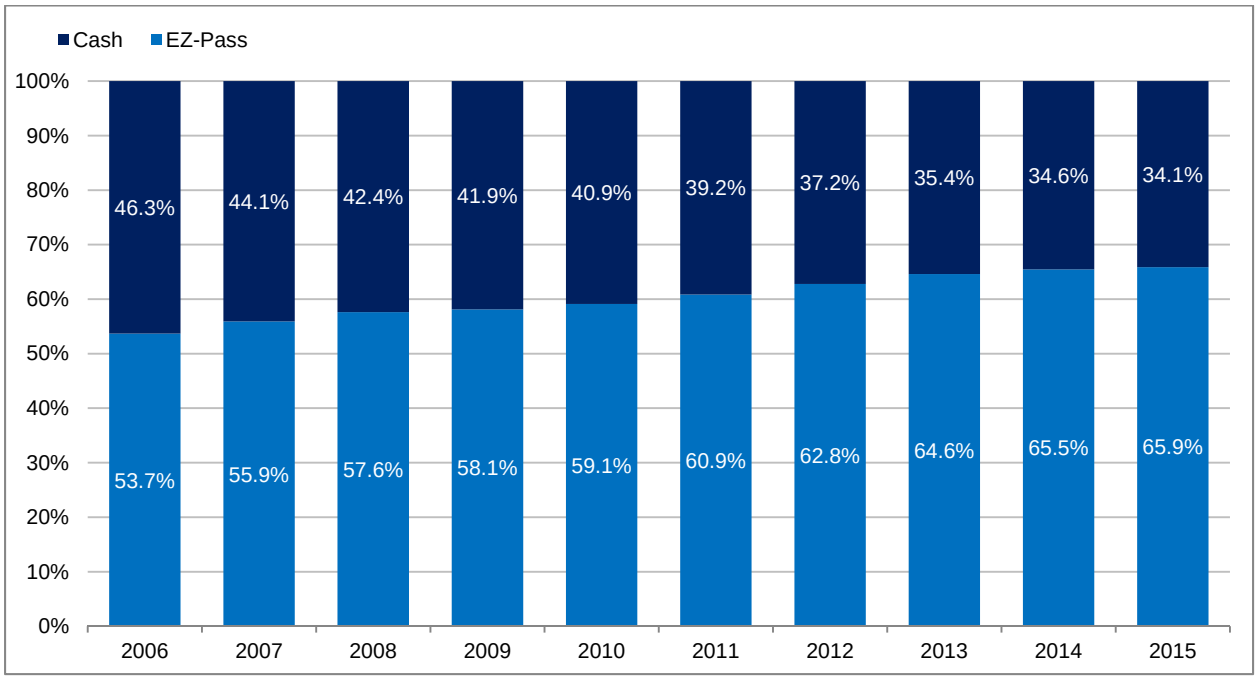
Figure 2-3 illustrates the total DRJTBC toll revenue trends over the twelve-year period from 2004 to 2015. Overall, total toll revenue grew by an average of 4.1 percent each year with toll revenue on the Trenton-Morrisville and I-78 bridges increasing the most over the period. Most of the recent revenue increase was due to a toll rate increase implemented in June 2011, where standard car tolls on each toll bridge increased from $0.75 to $1.00, discounted car E-ZPass tolls increased from $0.45 to $0.60, and truck tolls increased by $0.75 per axle.

Figure 2-3: Historical DRJTBC Total Toll Revenue, $ Millions



Utilization of E-ZPass as a method of payment has increased on DRJTBC toll bridges in the last 12 years. As illustrated in Figure 2-4, the percentage of trips paid for using an E-ZPass transponder increased from 53.7 percent in 2004 to 65.9 percent in 2015. Utilization rates have increased in each of the past 10 years.

Figure 2-4: Annual E-ZPass Utilization on DRJTBC Toll Bridges



Note: totals may not add due to rounding

2.1.3 Current Toll Rates on DRJTBC Toll Bridges

The current toll policy for the DRJTBC has been in effect since June 30, 2011 and the current toll rates at each of the seven (7) toll bridges are shown in Table 2-1.

The Commission offers automatic commuter discounts of 40 percent (i.e., a toll charged of $0.60 per trip) to automobiles equipped with transponders attached to NJ E-ZPass Regional Consortium accounts, provided that they make at least 16 trips on a DRJTBC toll facility in a calendar month. This change went into effect in May 2014; the previous discount was applied to 20 trips in a 35-day period. Prior to May 2014, the discount was automatic for all customers with a DRJTBC account who met or exceeded the required number of trips, and those without a DRJTBC account could opt in to the program by creating a “companion account” with DRJTBC. Now, the discount is applied automatically to all automobiles with a

transponder that is attached to a NJ E-ZPass Regional Consortium account and that makes 16 or more trips in a month, and companion accounts have been discontinued.

All commercial vehicles (Class 2 through 7) equipped with E-ZPass transponders receive automatic discounts of 10 percent when traveling during the off-peak period of 9:01pm to 5:59am.

Table 2-1: Current DRJTBC Toll Rates
(tolls charged in the westbound direction only)

	Class	Cash and Full Fare E-ZPass		Discounted E-ZPass**		
		Trip	Multiplier over Class 1	Trip	Multiplier over Class 1	Trip Discount
Auto	1*	$1.00		$0.60		40%
Commercial	2	$6.50	6.5	$5.85	9.75	10%
	3	$12.00	12	$10.80	18	10%
	4	$16.00	16	$14.40	24	10%
	5	$20.00	20	$18.00	30	10%
	6	$24.00	24	$21.60	36	10%
	7	$28.00	28	$25.20	42	10%

** Class 1 vehicles pulling trailers are charged $2.00*

*** There is a discount of 10% for off-peak travel for E-ZPass commercial vehicles, and 40% for autos at all time periods for 16 or more trips per month for those with NJ E-ZPass Regional Consortium accounts.*

2.1.4 Reasonableness of Toll Rates / Comparison to Other Facilities

Figure 2-5 compares the passenger car toll rates on the DRJTBC's toll facilities to other various E-ZPass toll crossings in the northeastern U.S. Standard cash and peak period E-ZPass toll rates are shown for each facility. Discounted peak-period E-ZPass and off peak E-ZPass toll rates are also shown. We can see that all of the other E-ZPass toll crossings shown have higher toll rates than the current DRJTBC rates. It can be said that the DRJTBC passenger car toll rates are very reasonable compared to rates at other E-ZPass toll facilities.

Figure 2-5: Passenger Car Toll Rates on Select E-ZPass Toll Crossings as of December 2016

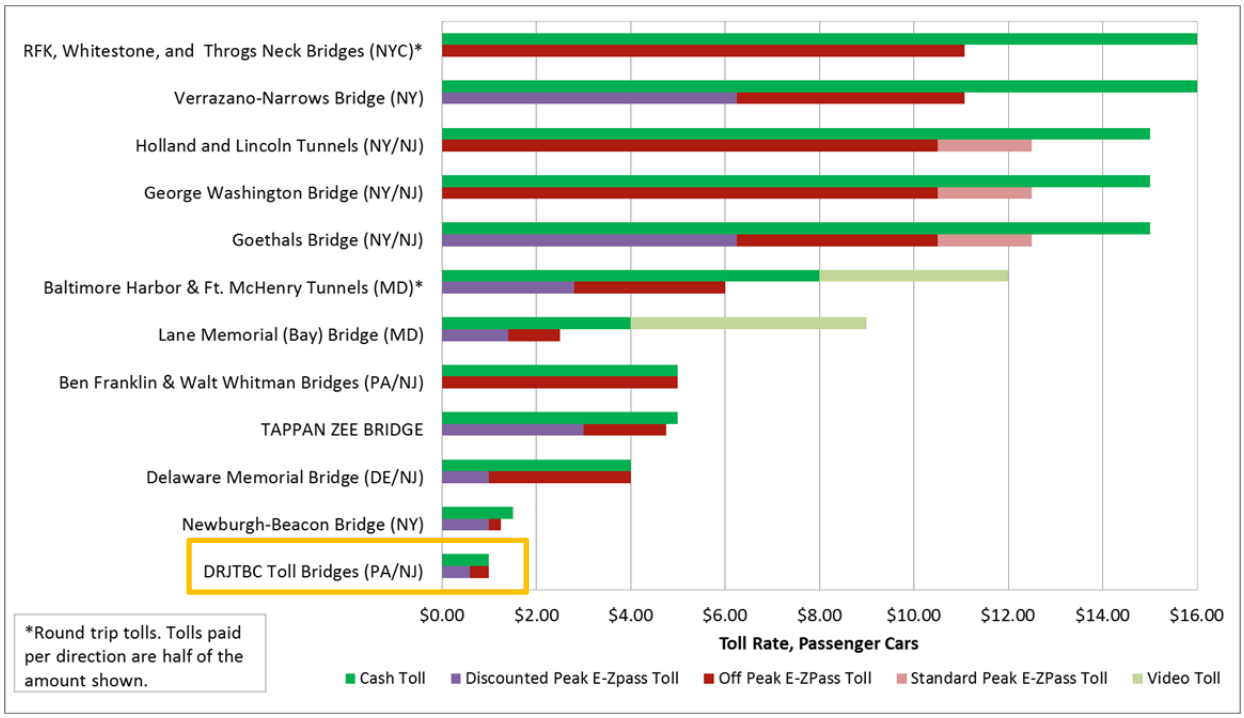
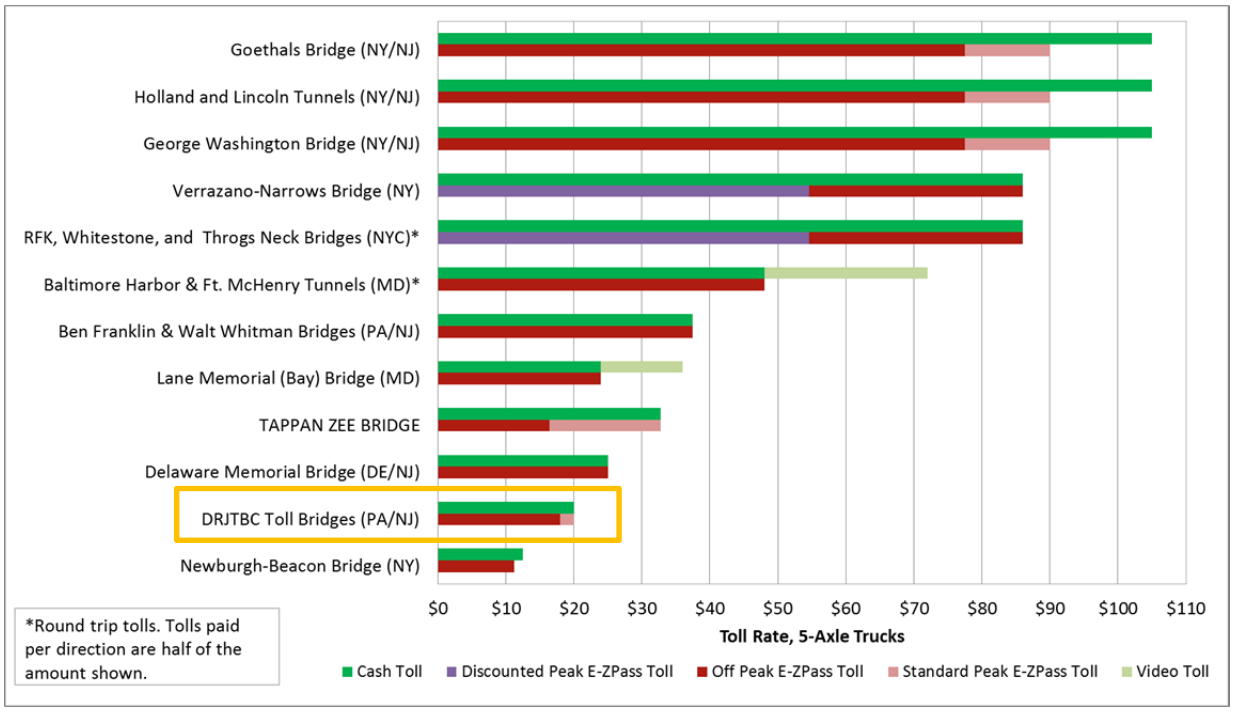


Figure 2-6 shows a similar comparison for 5-axle vehicles. All but one of the major E-ZPass toll crossings shown have higher 5-axle truck toll rates than the DRJTBC's current tolls. It can be said that the DRJTBC commercial vehicle toll rates are very reasonable compared to other E-ZPass toll facilities.

Figure 2-6: 5-Axle Truck Toll Rates on Select E-ZPass Toll Crossings as of December 2016



2.2 Scudder Falls Bridge

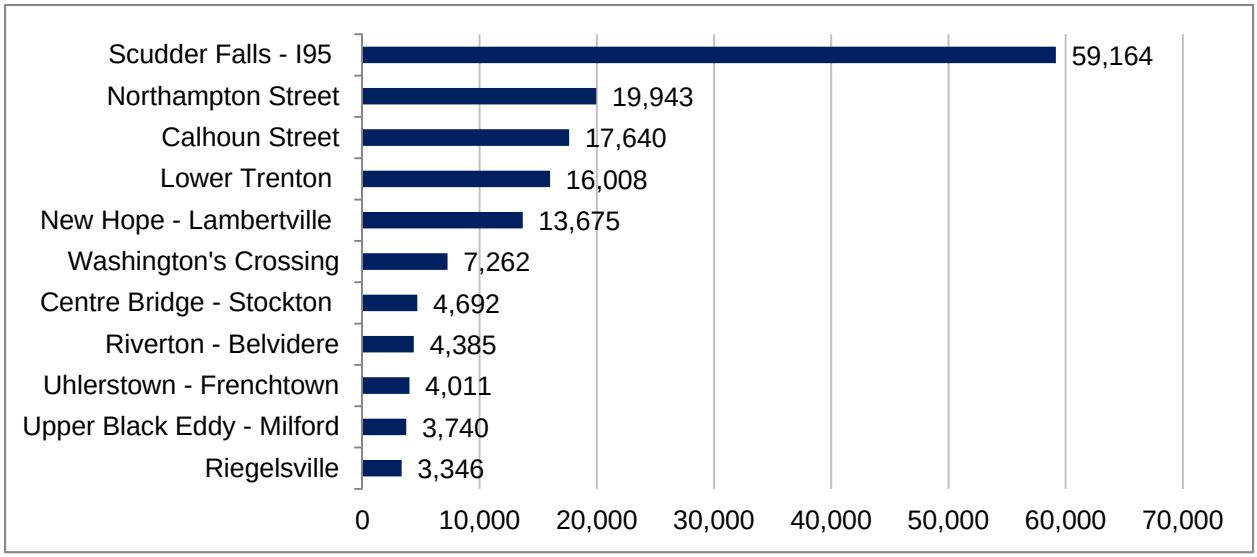
This section of the report provides a description of the Scudder Falls Bridge, along with a description of the bridge's competitors and recent traffic volumes.

The Scudder Falls Bridge is a toll-supported bridge located north of Trenton, NJ on I-95 crossing the Delaware River on the border between Pennsylvania and New Jersey. The segment of I-95 where the bridge is located is a major north-south corridor that accommodates a mix of through and local traffic traveling between Trenton, New Jersey, and the Bucks County suburbs of Philadelphia, Pennsylvania. The bridge currently experiences recurring traffic congestion during peak rush hours and is functionally obsolete. Consequently, the DRJTBC is in the process of making investments in the bridge to improve its performance. The I-95 / Scudder Falls Bridge Replacement Project will replace the current facility with a wider, improved bridge and approaches. Details can be found on the website http://scudderfallsbridge.com/. For this study, we are assuming that the first span of the facility will be completed by May 2019, followed by the commencement of southbound toll collection on the bridge in June 2019.

As shown in Figure 2-7, the Scudder Falls Bridge accomodates the most traffic of the DRJTBC toll-supported bridges. The bridge, on average, supported almost 60,000 vehicles

per day in 2015 – almost three times as much traffic as the next most utilized bridge at Northampton Street, making it a critical transportation asset for traffic traveling between Pennsylvania and New Jersey.

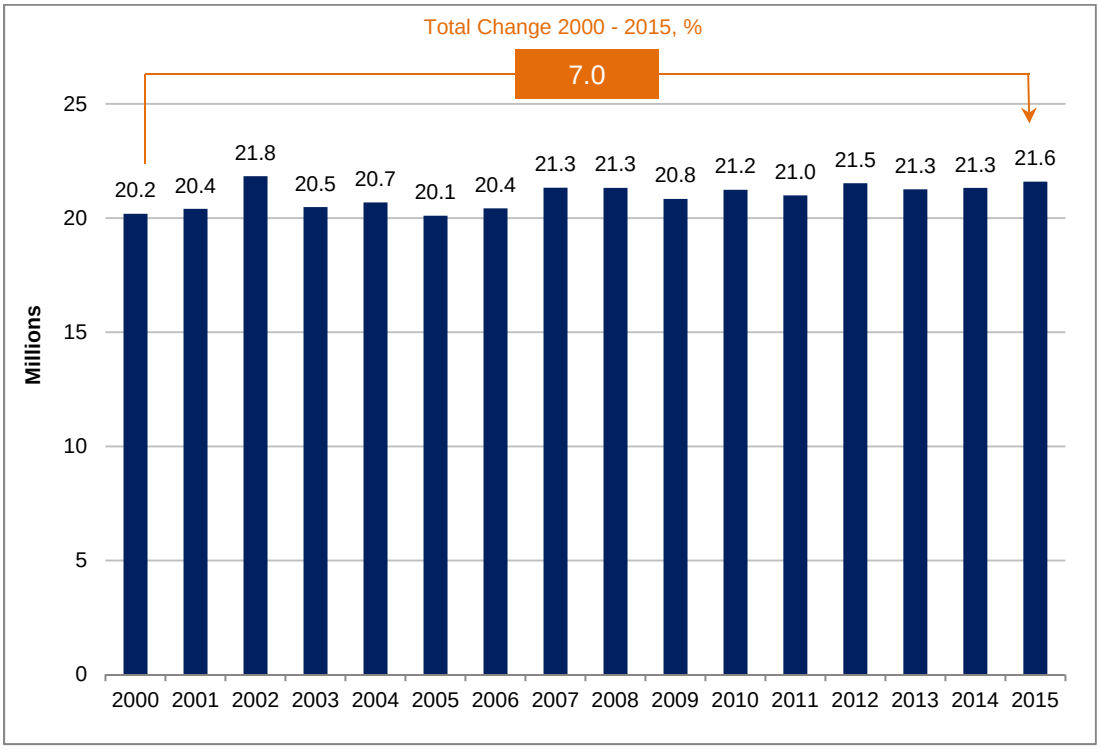
Figure 2-7: 2015 Total Average Daily Two-way Traffic on Toll Supported Bridges*



**Note: most recent data available.*

Since 2000, annual two-way traffic on the Scudder Falls Bridge has fluctuated between 20.1 and 21.8 million trips. From 2000 to 2015, traffic increased a total of 7.0 percent as seen in Figure 2-8. It should be noted, however, that annual traffic peaked at 21.8 million trips in 2002.

Figure 2-8: Scudder Falls Bridge Total Annual Two-way Traffic



NOTE: From 2006 to 2009 the Trenton-Morrisville Toll Bridge was under construction.
Source: DRJTBC

2.2.1 Alternate Routes to the Scudder Falls Bridge

While the Scudder Falls Bridge is a critical piece of transportation infrastructure in the region, the DRJTBC maintains a number of toll and toll-supported facilities in the vicinity of the bridge for travelers crossing the Delaware River. The Washington Crossing (non-tolled), Calhoun Street (non-tolled), Lower Trenton (non-tolled), and Trenton-Morrisville (tolled) bridges may serve as alternative routes for travelers who typically utilize the Scudder Falls Bridge. It should be noted that the Washington Crossing, Calhoun Street and Lower Trenton toll-supported bridges all have weight restrictions, therefore prohibiting truck traffic. Further to the south, the major toll bridges include the Pennsylvania Turnpike Bridge and the Delaware Memorial Bridge, both of which are potential alternate truck routes to the Scudder Falls Bridge. Figure 2-9 provides an overview of the bridges in the area.

Figure 2-9: Alternate Bridge Routes Near Scudder Falls Bridge

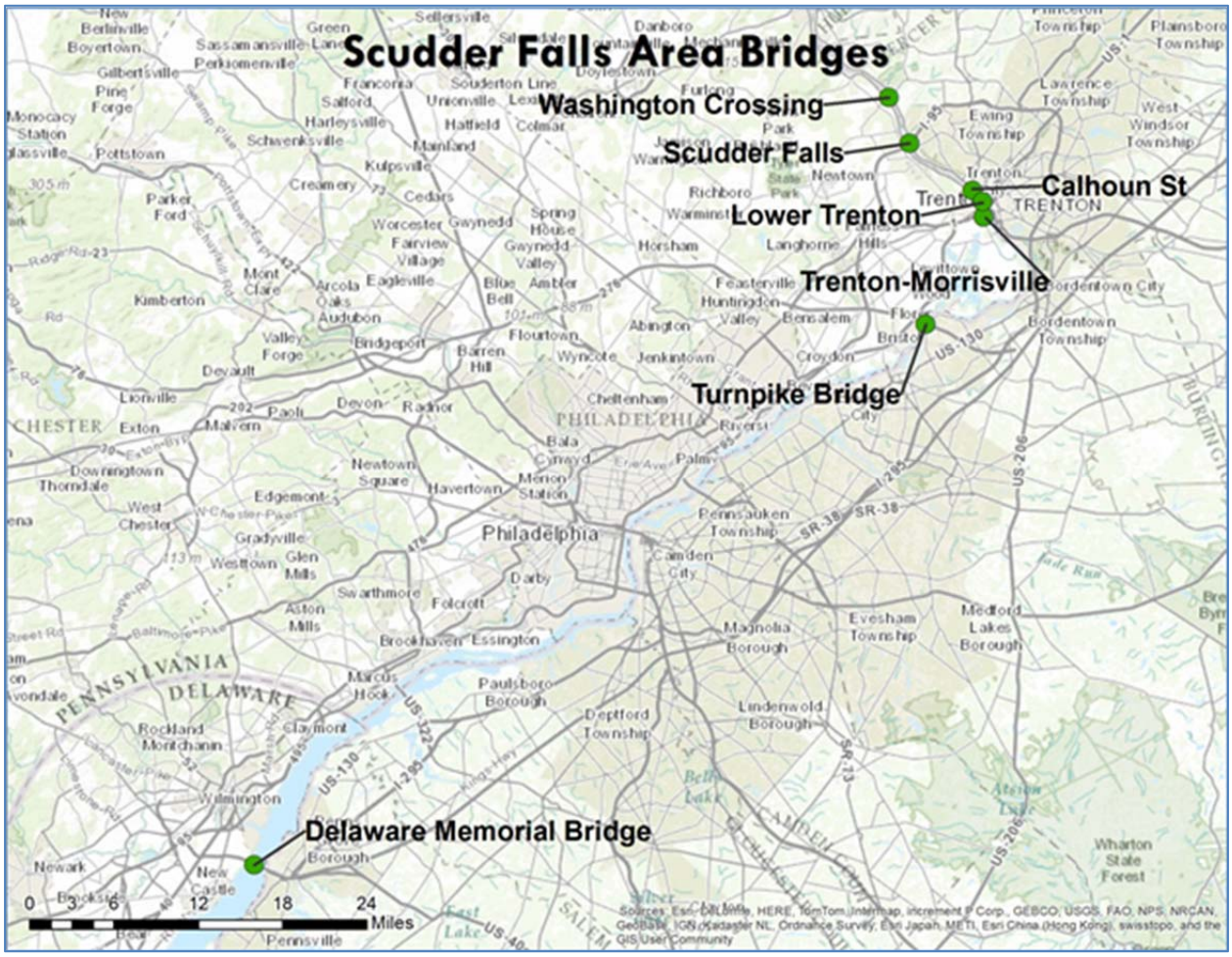
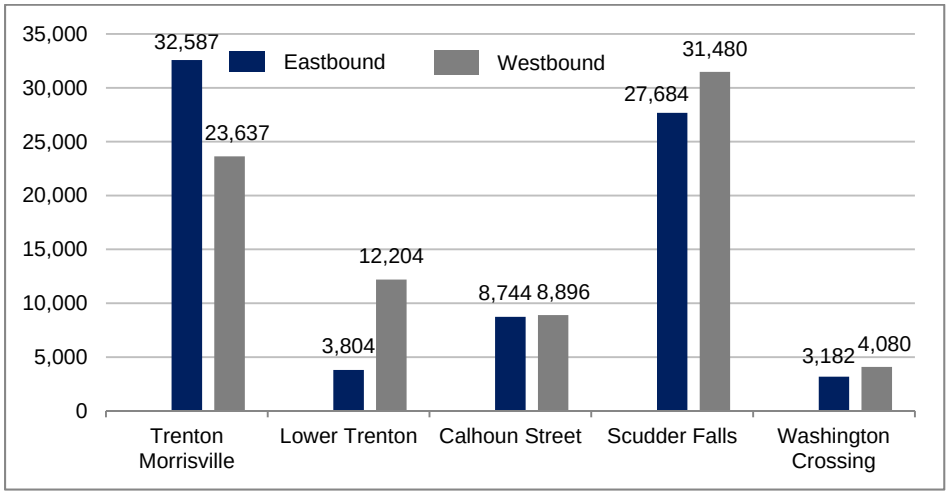


Figure 2-10 displays 2015 annual average daily traffic by direction – both northbound and southbound – for the Scudder Falls Bridge and those bridges most likely to serve as alternative travel routes to the Scudder Falls Bridge. Note that while some of these bridges operate on a north-south route, "westbound" refers to the Pennsylvania-bound direction, or the direction of tolling for the Trenton-Morrisville Toll Bridge, and starting in 2019, the new Scudder Falls Bridge. With the exception of the Trenton-Morrisville Toll Bridge, which is not tolled in the eastbound direction, the Scudder Falls Bridge accomodates the most traffic on an average daily basis. It is possible that some travelers utilizing the Scudder Falls Bridge in the southbound direction choose to use the existing Trenton-Morrisville Toll Bridge in the eastbound direction to avoid paying a toll.

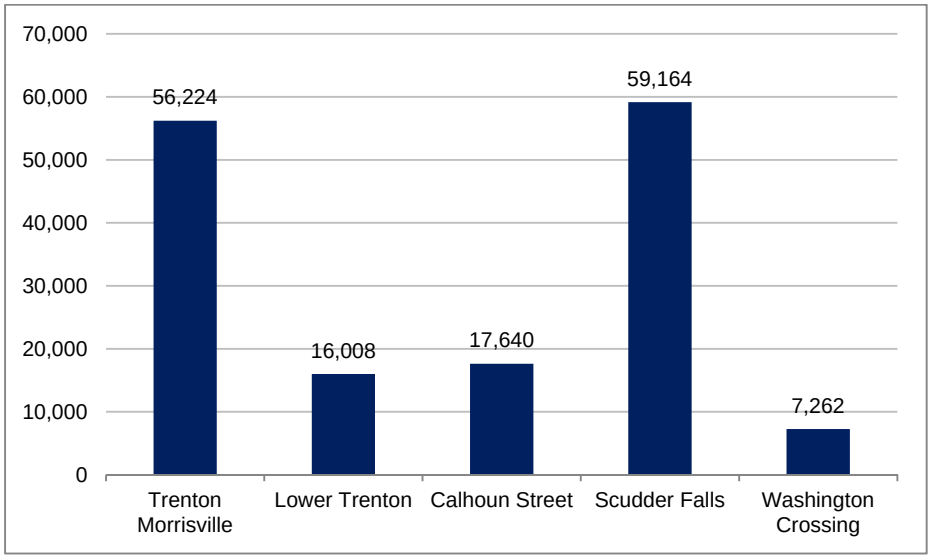
Figure 2-10: 2015 Average Daily Traffic (AADT) by Direction



Note: Traffic on the Trenton-Morrisville Toll Bridge is not tolled in the eastbound direction.
Source: DRJTBC

In 2015, the existing Scudder Falls Bridge handled the most annual average daily traffic of the five bridges in the Scudder Falls area. As shown in Figure 2-11, the Scudder Falls Bridge accommodated almost 3,000 more vehicles on an average daily basis than the Trenton-Morrisville Toll Bridge, which is only tolled in the westbound direction. The other bridges – Lower Trenton, Calhoun Street, and Washington's Crossing – experienced significantly less traffic.

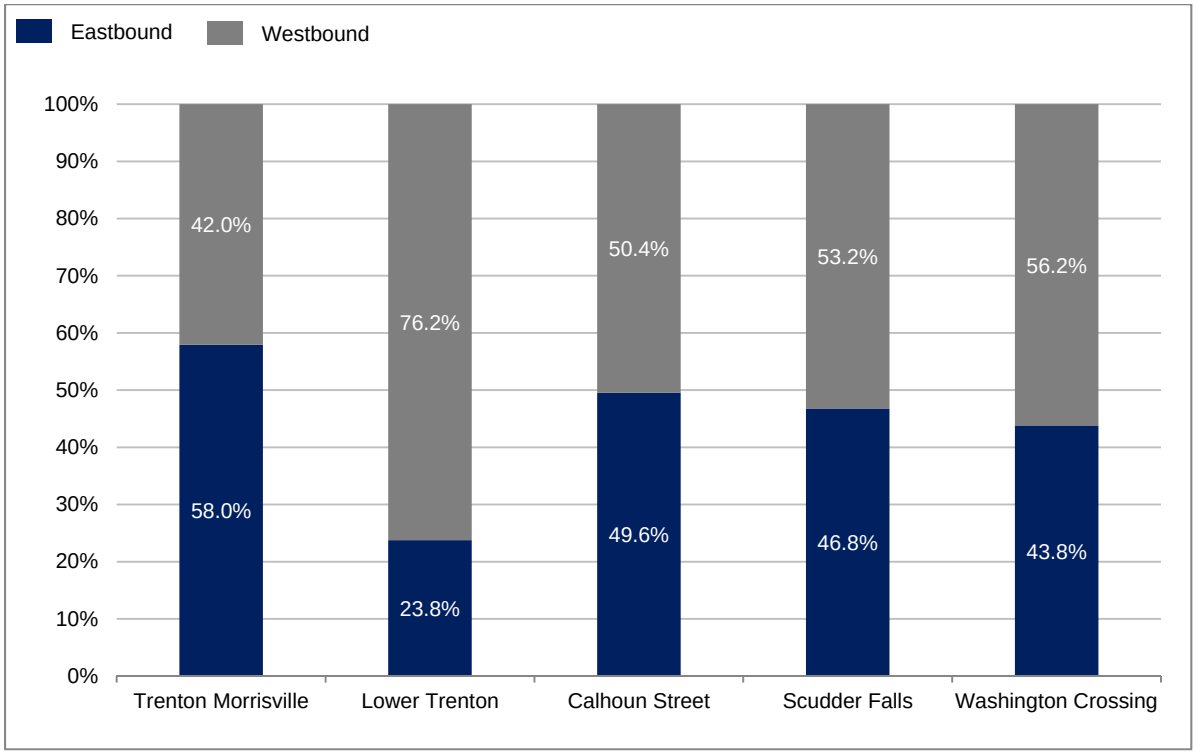
Figure 2-11: 2015 Average Daily Two-Way Traffic



Note: Traffic on the Trenton-Morrisville Toll Bridge is not tolled in the eastbound direction.
Source: DRJTBC

Pennsylvania-bound and New Jersey-bound traffic is not distributed equally on the five bridges in the Scudder Falls Bridge area. As shown in Figure 2-12, the Scudder Falls Bridge and the Calhoun Street Bridge handle a relatively equal split of directional traffic. Conversely, westbound (Pennsylvania-Bound) traffic is predominant on both the Washington Crossing Bridge and especially the Lower Trenton Bridge (due to westbound tolling on the adjacent Trenton-Morrisville Toll Bridge). Eastbound traffic is more prevalent on the Trenton-Morrisville Toll Bridge as the DRJTBC does not toll traffic in that direction.

Figure 2-12: 2015 Directional Distribution of Traffic



Note: Traffic on the Trenton-Morrisville Toll Bridge is not tolled in the eastbound direction.
Source: DRJTBC

3.0 SEVEN EXISTING TOLL BRIDGES HISTORICAL TOLL TRIPS AND TOLL REVENUE TRENDS

This section discusses historical toll trips and toll revenue trends and pertains exclusively to the seven (7) existing toll bridges; the DRJTBC does not collect tolls on the existing Scudder Falls Bridge, which is designated a "toll-supported" facility by the Commission.

3.1 Historical Toll Trips

Figure 3-1 illustrates passenger car toll traffic trends on the seven (7) existing toll bridges between 1987 and 2015. The number of passenger car toll transactions has reduced significantly from the high levels experienced during the late 1980s and early 1990s due to the conversion to one-way toll collection. The historical long term trend shows that passenger car toll traffic has increased steadily over the years with some years of negative traffic growth. We can see that passenger car toll traffic has been relatively flat to decreasing in recent years.

Figure 3-1: Passenger Car Toll Traffic on DRJTBC Bridges, 1987 to 2015

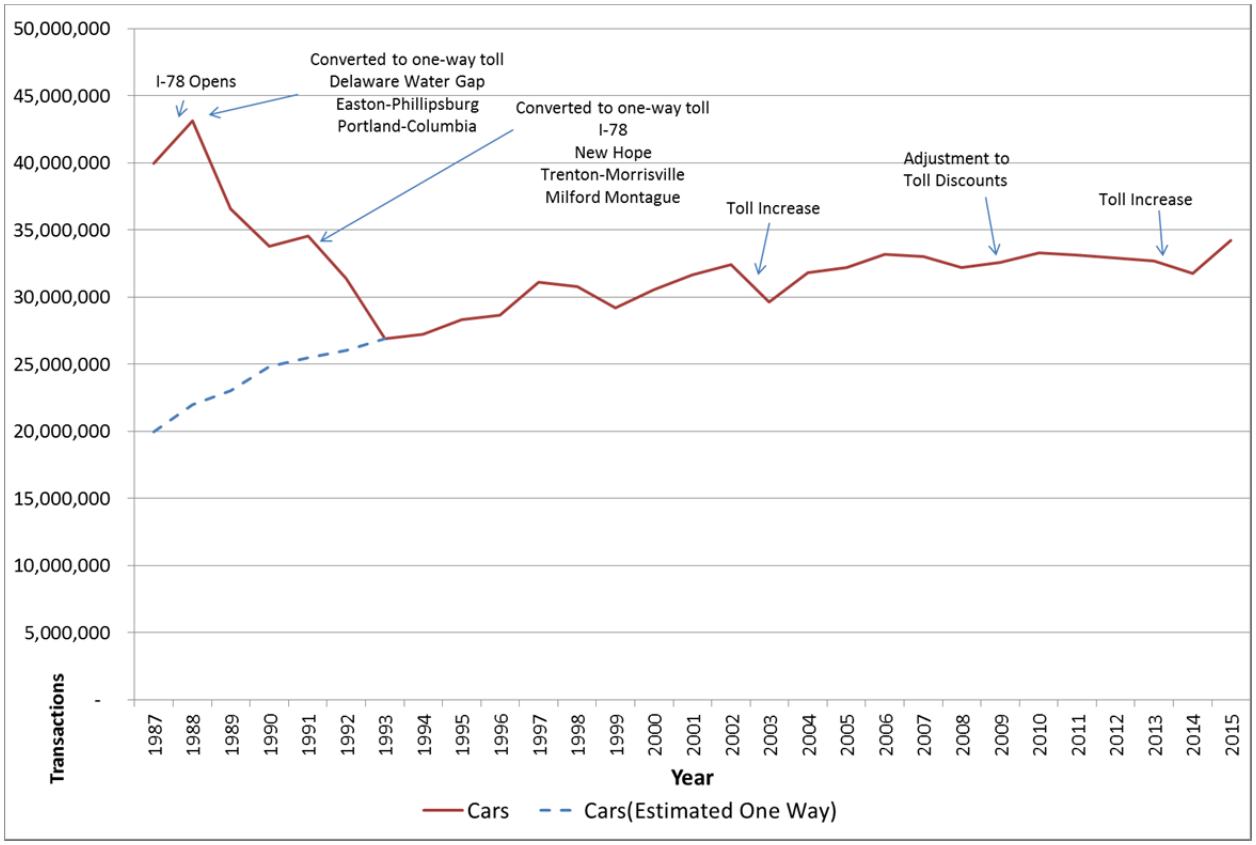


Table 3-1 shows annual passenger car toll trips from 2004 through 2015. Passenger car toll trips increased from 2004 to 2007, declined in 2007 and 2008, increased again from 2008 to 2010 and then slowly decreased through 2014. In 2015, total annual passenger car toll traffic increased by 7.8 percent overall. All seven toll bridges showed positive growth in 2015.

Table 3-1: Historical DRJTBC Passenger Car Toll Trips, 2004 through 2015

Bridge	Annual Passenger Car Toll Trips (in Thousand)											
	2004	2005	2006	2007	2008	2009*	2010	2011**	2012	2013	2014	2015
Milford - Montague	1,312	1,301	1,312	1,310	1,266	1,258	1,267	1,214	1,178	1,209	1,227	1,280
Delaware Water Gap	8,489	8,493	8,638	8,501	8,291	8,390	8,169	7,920	7,812	7,885	7,858	8,120
Portland - Columbia	1,163	1,218	1,237	1,365	1,275	1,243	1,319	1,288	1,212	1,120	1,113	1,146
Easton - Phillipsburg	5,551	5,691	5,708	5,743	5,925	5,755	5,739	5,346	5,009	4,794	4,632	4,919
I - 78	6,975	7,226	7,703	7,821	7,559	7,791	7,679	8,280	8,516	8,428	8,636	8,871
New Hope - Lambertville	2,027	1,700	1,737	1,895	1,759	1,853	1,805	1,809	1,773	1,814	1,842	1,844
Trenton - Morrisville	6,282	6,583	6,855	6,396	6,108	6,296	7,292	7,298	7,424	7,470	7,549	8,039
Total	31,798	32,211	33,191	33,031	32,182	32,586	33,271	33,154	32,924	32,721	31,743	34,218

**Adjustments to Toll Discount*
***Passenger Car Toll Increase Year*

Figure 3-2 illustrates passenger car toll traffic trends on the seven toll bridges between 2004 and 2015. Over the twelve year period, only the Trenton-Morrisville and I-78 bridges experienced positive growth in passenger car traffic while the remaining five bridges saw traffic levels contract.

Figure 3-2: Passenger Car Traffic on DRJTBC Toll Bridges, Millions of Trips, 2004 to 2015

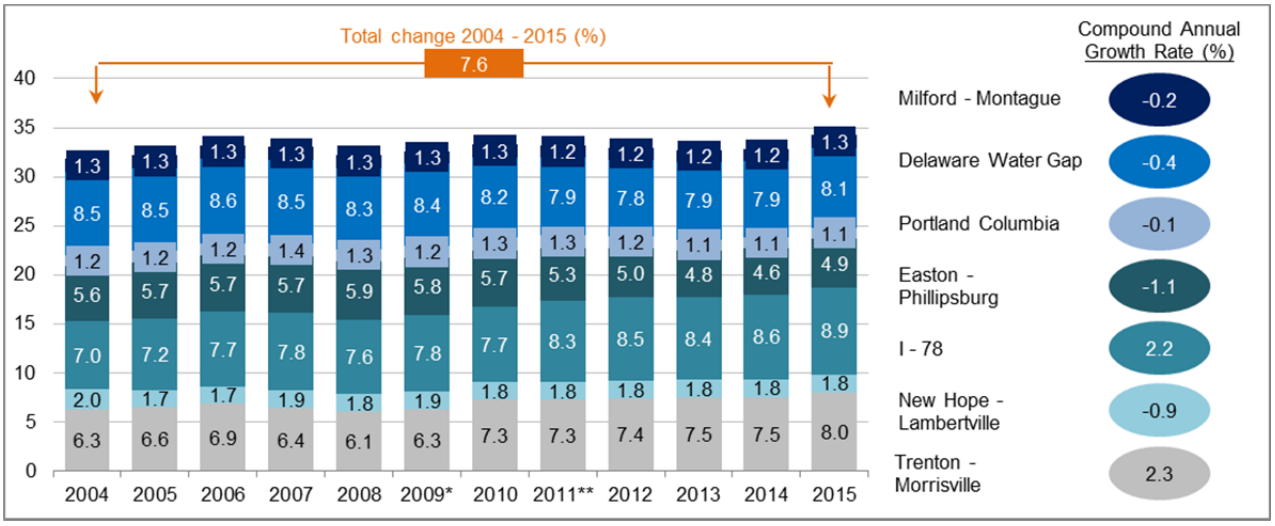


Figure 3-3 illustrates truck toll traffic trends on the seven (7) toll bridges between 1987 and 2015. Similar to passenger cars, the number of truck toll transactions has reduced significantly from the high levels experienced during the late 1980s and early 1990s due to

the conversion to one-way toll collection. The historical long term trend shows that truck toll traffic has generally been increasing over the years with some years of negative traffic growth. However, we can see that truck toll traffic has been increasing in recent years.

Figure 3-3: Truck Toll Traffic on DRJTBC Bridges, 1987 to 2015

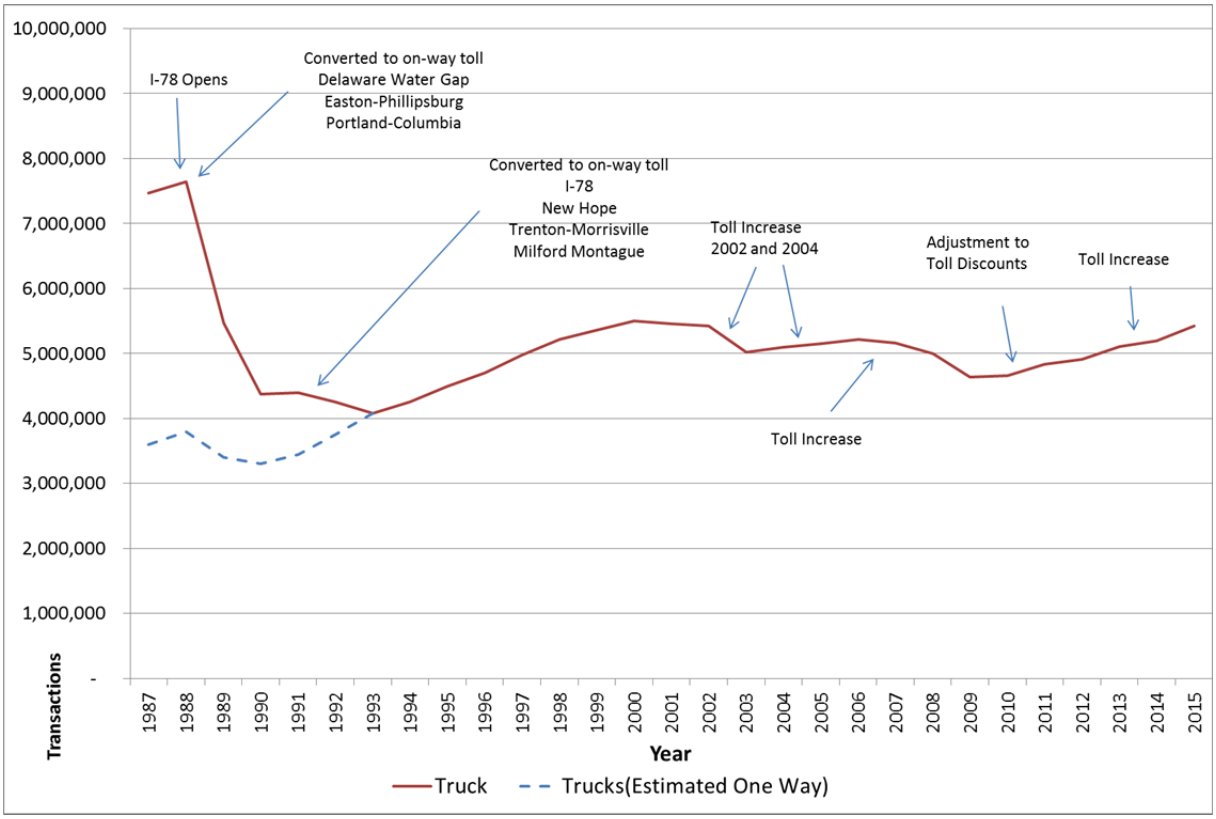


Table 3-2 shows annual truck toll trips from 2004 through 2015. Truck toll traffic increased in 2005 and 2006, declined from 2007 to 2009, and increased again annually from 2010 through 2015. In 2015, all seven bridges experienced increases in truck traffic; overall the increase was 4.5 percent over 2014 truck traffic.

Table 3-2: Historical DRJTBC Truck Toll Trips, 2004 through 2015

Bridge	Annual Truck Toll Trips (in Thousand)											
	2004	2005	2006	2007*	2008	2009**	2010	2011*	2012	2013	2014	2015
Milford - Montague	41	41	41	42	42	35	34	33	32	35	36	39
Delaware Water Gap	1,463	1,464	1,472	1,527	1,424	1,330	1,329	1,287	1,304	1,339	1,338	1,399
Portland - Columbia	79	82	84	85	84	77	85	84	82	73	77	99
Easton - Phillipsburg	543	550	534	498	501	459	418	384	338	341	296	314
I - 78	2,411	2,412	2,453	2,389	2,332	2,200	2,203	2,416	2,530	2,654	2,747	2,866
New Hope - Lambertville	112	112	121	123	112	109	108	111	112	119	118	119
Trenton - Morrisville	452	489	514	501	499	431	479	514	511	551	578	589
Total	5,101	5,149	5,219	5,166	4,994	4,642	4,655	4,830	4,908	5,112	5,191	5,425

**Commercial Vehicle Toll Increase Year*
***Adjustment to Toll Discount*

Figure 3-4 shows that truck traffic increased on the New Hope-Lambertville, Trenton-Morrisville, Portland-Columbia and I-78 bridges over the twelve year period with the remaining three bridges experiencing declines in truck traffic. This decline in truck traffic was particularly acute on the Easton-Phillipsburg Bridge which experienced a 4.9 percent average annual decline in truck traffic from 2004 to 2015.

Figure 3-4: Truck Traffic on DRJTBC Toll Bridges, Millions of Trips, 2004 to 2015

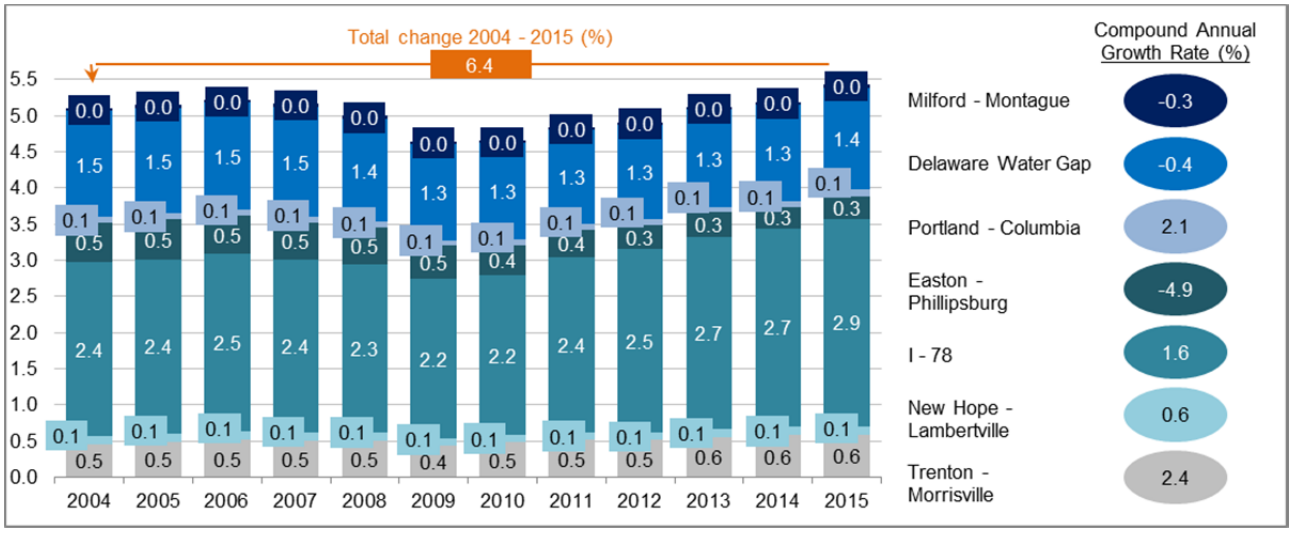


Table 3-3 shows total annual toll trips (cars plus trucks) from 2004 through 2015. Total toll trips increased from 2004 to 2006, declined in 2007 and 2008, increased again in 2009 through 2011, declined in 2012 and has shown slow growth through 2015. All seven (7) toll bridges showed positive growth in 2015.

Table 3-3: Historical DRJTBC Total Toll Trips, 2004 through 2015

Bridge	Annual Total Toll Trips (in Thousand)											
	2004	2005	2006	2007*	2008	2009**	2010	2011***	2012	2013	2014	2015
Milford - Montague	1,353	1,341	1,353	1,352	1,308	1,293	1,301	1,247	1,211	1,244	1,263	1,319
Delaware Water Gap	9,952	9,957	10,110	10,029	9,715	9,720	9,498	9,207	9,116	9,223	9,196	9,518
Portland - Columbia	1,241	1,300	1,321	1,450	1,358	1,320	1,404	1,372	1,294	1,193	1,190	1,245
Easton - Phillipsburg	6,094	6,240	6,241	6,241	6,426	6,214	6,157	5,731	5,346	5,135	4,928	5,233
I - 78	9,386	9,638	10,157	10,210	9,891	9,992	9,881	10,695	11,046	11,083	11,383	11,737
New Hope - Lambertville	2,139	1,812	1,859	2,018	1,871	1,962	1,914	1,920	1,885	1,933	1,960	1,964
Trenton - Morrisville	6,734	7,077	7,369	6,898	6,607	6,726	7,771	7,812	7,934	8,021	8,127	8,628
Total	**36,898**	**37,366**	**38,409**	**38,197**	**37,176**	**37,228**	**37,926**	**37,984**	**37,832**	**37,832**	**38,047**	**39,643**

**Truck Only Toll Increase Year*
***Adjustment to Toll Discounts*
**** Car and Truck Toll Increase Year*

Figure 3-5 illustrates the total DRJTBC toll traffic trends over the period. We can see that total traffic on the Trenton-Morrisville and I-78 bridges grew at average annual rates of 2.3 and 2.1 percent respectively while total traffic on the other five bridges declined or kept flat overall over the same time frame.

Figure 3-5: Total Traffic on DRJTBC Toll Bridges, Millions of Toll Trips, 2004 to 2015

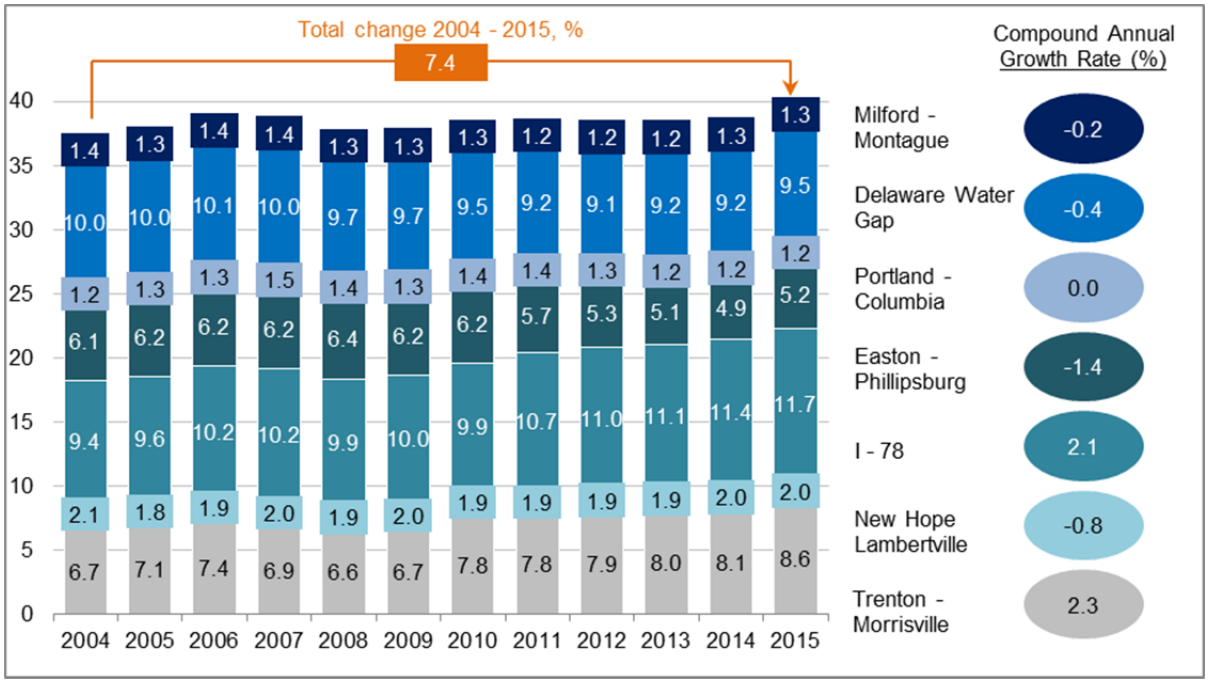
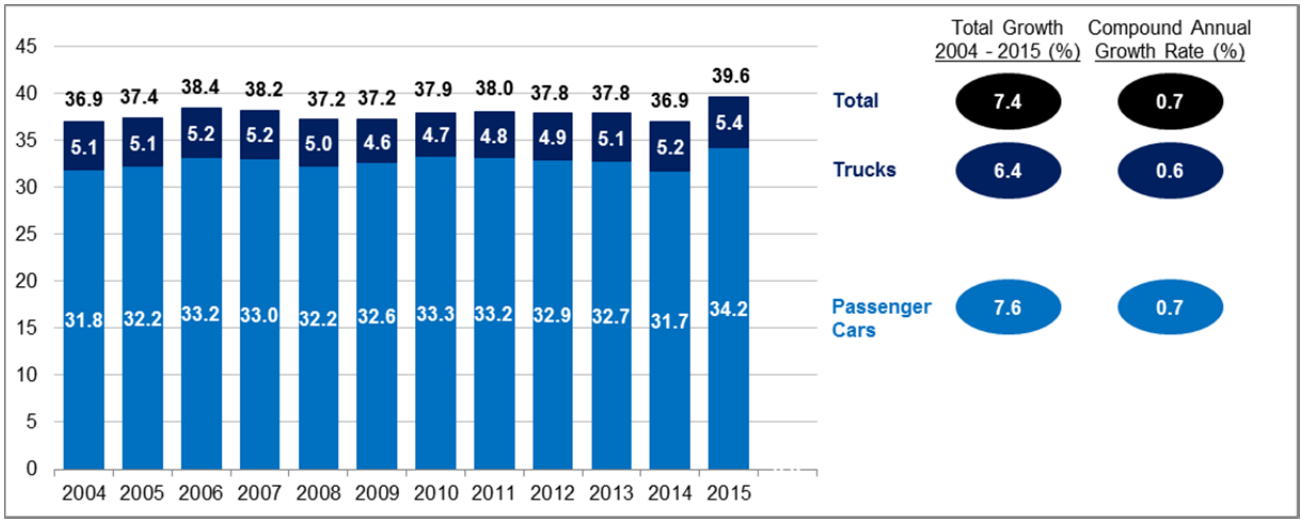


Figure 3-6 shows the total growth in traffic on the DRJTBC's toll bridges over the period 2004 to 2015. Total toll traffic increased by a total of 7.4 percent between 2004 and 2015 at an average annual rate of 0.7 percent. However, passenger car traffic growth outpaced the

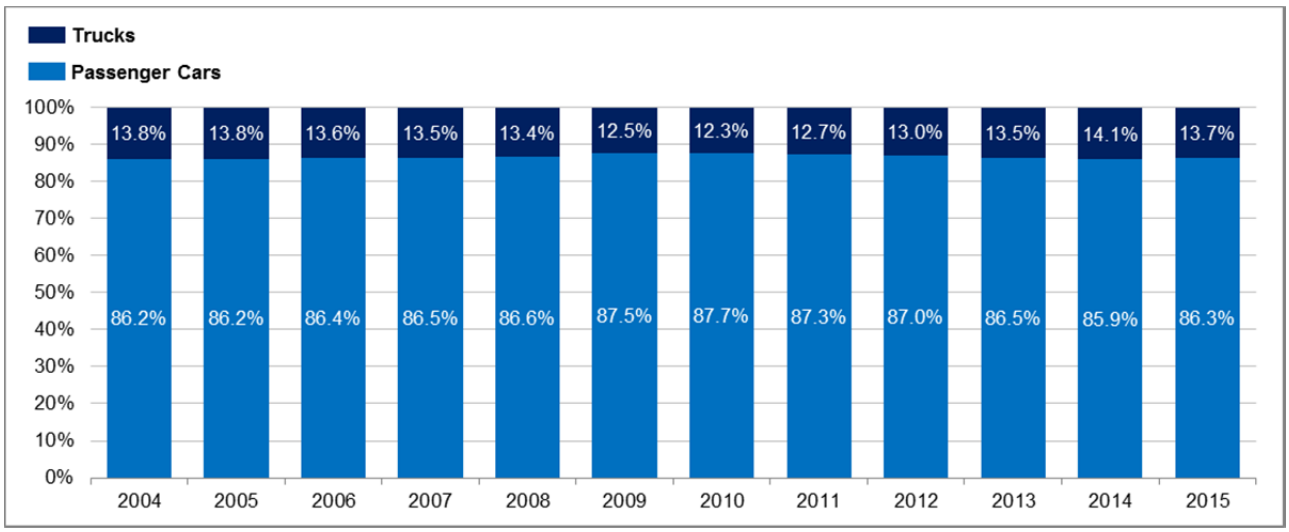
truck traffic over the twelve year period, with passenger cars experiencing an overall increase of 7.6 percent versus only 6.4 percent for truck traffic.

Figure 3-6: Traffic on DRJTBC Toll Bridges, Millions of Trips, 2004 to 2015



The distribution of traffic between passenger cars and trucks has shifted over the years, as shown in Figure 3-7. For the time period shown, the truck share of traffic was the lowest in the recession and post-recession years of 2009-2011, with 12.5 percent, 12.3 percent, and 12.7 percent, respectively. The year 2014 saw the highest share of truck traffic, with 14.1 percent. Though both car and truck traffic grew from 2014 to 2015, car traffic grew more; therefore, the truck traffic share declined from 2014 to 2015.

Figure 3-7: DRJTBC Passenger Car vs. Truck Distribution of Toll Traffic, 2004 to 2015



3.2 Historical Toll Revenue Trends

Table 3-4 shows annual passenger car toll revenues from 2004 through 2015. Passenger car toll revenue increased in 2005 and 2006, declined in 2007 and 2008, increased again from 2009 to 2012 and declined in 2013 to 2014. In 2015, overall passenger car toll revenues increased by 3.9 percent. Only one of the seven toll bridges (New Hope-Lambertville) experienced declines in passenger car toll revenue with the remaining six toll bridges showing positive growth in 2015.

Table 3-4: Historical DRJTBC Passenger Car Toll Revenue, 2004 through 2015

Bridge	Annual Passenger Car Revenue (in Thousand)											
	2004	2005	2006	2007	2008	2009*	2010	2011**	2012	2013	2014	2015
Milford - Montague	$869	$861	$866	$865	$831	$915	$916	$1,041	$1,145	$1,178	$1,185	$1,235
Delaware Water Gap	$5,691	$5,687	$5,772	$5,678	$5,527	$6,141	$5,944	$6,819	$7,622	$7,698	$7,616	$7,849
Portland - Columbia	$769	$807	$818	$905	$838	$893	$947	$1,096	$1,173	$1,082	$1,069	$1,098
Easton - Phillipsburg	$3,698	$3,772	$3,760	$3,760	$3,876	$4,175	$4,138	$4,525	$4,849	$4,664	$4,474	$4,732
I - 78	$4,713	$4,858	$5,161	$5,207	$5,014	$5,715	$5,595	$7,133	$8,324	$8,198	$8,327	$8,573
New Hope - Lambertville	$1,342	$1,110	$1,130	$1,223	$1,120	$1,332	$1,290	$1,529	$1,706	$1,757	$1,767	$1,748
Trenton - Morrisville	$4,196	$4,399	$4,554	$4,303	$4,093	$4,718	$5,483	$6,246	$7,217	$7,287	$7,314	$7,758
Total	**$21,278**	**$21,494**	**$22,061**	**$21,939**	**$21,298**	**$23,889**	**$24,313**	**$28,388**	**$32,035**	**$31,864**	**$31,753**	**$32,992**

**Passenger Car Toll Increase Year*
***Adjustment to Toll Discounts*

Figure 3-8 illustrates passenger car toll revenue trends on the seven toll bridges between 2004 and 2015. Over the twelve year period, total passenger car toll revenue increased by 55.1% or by an average annual rate of 4.1 percent each year. The Trenton-Morrisville and I-78 bridges both experienced the highest annual average growth over 5.7 percent and 5.6 percent, respectively, over the twelve year period.

Figure 3-8: Historical DRJTBC Passenger Car Toll Revenue, $Millions, 2004 to 2015

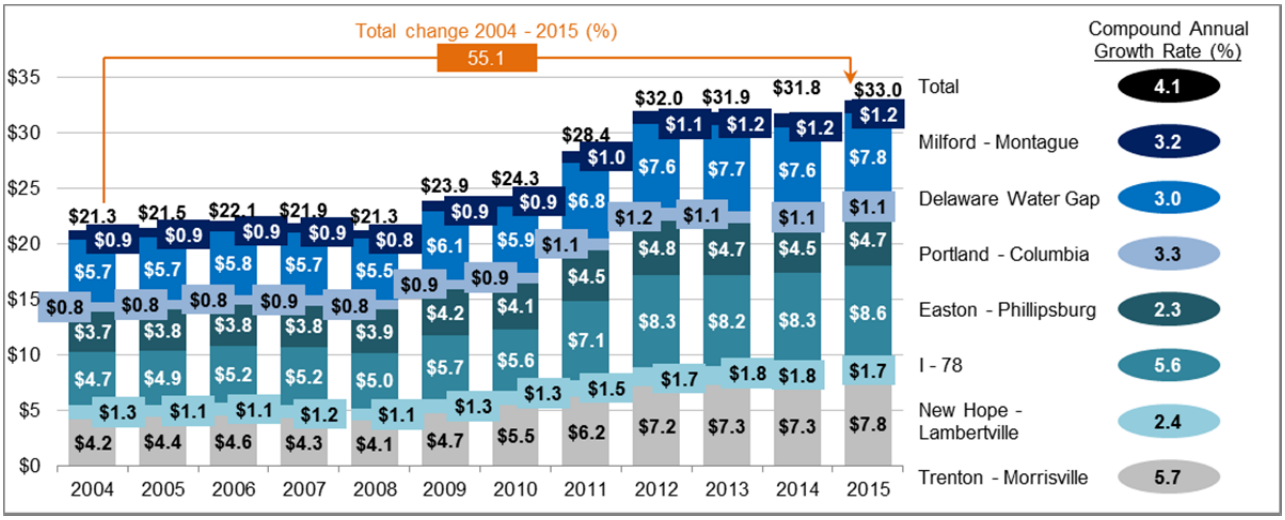


Table 3-5 shows annual truck toll revenue from 2004 through 2015. Truck toll revenue increased from 2004 to 2008, declined in 2009, was flat in 2010, and then exhibited strong positive growth of 16.4 percent and 12.3 percent in 2011 and 2012, respectively. In 2013, 2014, and 2015, total annual overall truck toll revenue increased by 4.0 percent, 1.9, percent, and 4.0 percent, respectively. In 2015, all seven toll bridges experienced increases in truck toll revenue over 2014.

Table 3-5: Historical DRJTBC Truck Toll Revenue, 2004 through 2015

Bridge	Annual Truck Revenue (in Thousand)											
	2004	**2005**	**2006**	**2007**	**2008**	**2009***	**2010**	**2011****	**2012**	**2013**	**2014**	**2015**
Milford - Montague	$314	$308	$304	$323	$330	$288	$274	$312	$340	$362	$361	$395
Delaware Water Gap	$17,342	$17,269	$17,300	$19,970	$19,642	$18,974	$18,915	$20,519	$22,902	$23,536	$23,558	$24,510
Portland - Columbia	$723	$763	$773	$855	$877	$829	$931	$1,053	$1,114	$992	$1,059	$1,370
Easton - Phillipsburg	$5,314	$5,349	$5,159	$5,157	$5,465	$5,253	$4,645	$4,723	$4,429	$4,484	$3,835	$4,066
I - 78	$29,105	$28,904	$29,259	$31,435	$32,528	$31,872	$31,994	$39,146	$45,188	$47,329	$49,119	$50,990
New Hope - Lambertville	$894	$889	$951	$1,049	$976	$971	$979	$1,136	$1,290	$1,342	$1,376	$1,397
Trenton - Morrisville	$4,081	$4,427	$4,627	$4,891	$5,080	$4,453	$4,924	$6,072	$6,644	$7,128	$7,516	$7,569
Total	**$57,775**	**$57,909**	**$58,373**	**$63,679**	**$64,898**	**$62,641**	**$62,662**	**$72,962**	**$81,906**	**$85,172**	**$86,824**	**$90,297**

**Commercial Vehicle Toll Increase Year*
***Adjustment to Toll Discounts*

Figure 3-9 illustrates truck toll revenue trends on the seven (7) toll bridges between 2004 and 2015. Over the twelve year period, total truck revenue on DRJTBC's toll facilities increased by an average annual rate of 4.1 percent. However, the Easton-Phillipsburg Bridge was the only toll facility that experienced an overall average annual decline of 2.4 percent from 2004 to 2015. The total revenue increase of 56.3 percent over the timeframe shown is due in large part to the mid-2011 toll increase.

Figure 3-9: Historical DRJTBC Truck Toll Revenue, $Millions, 2004 to 2015

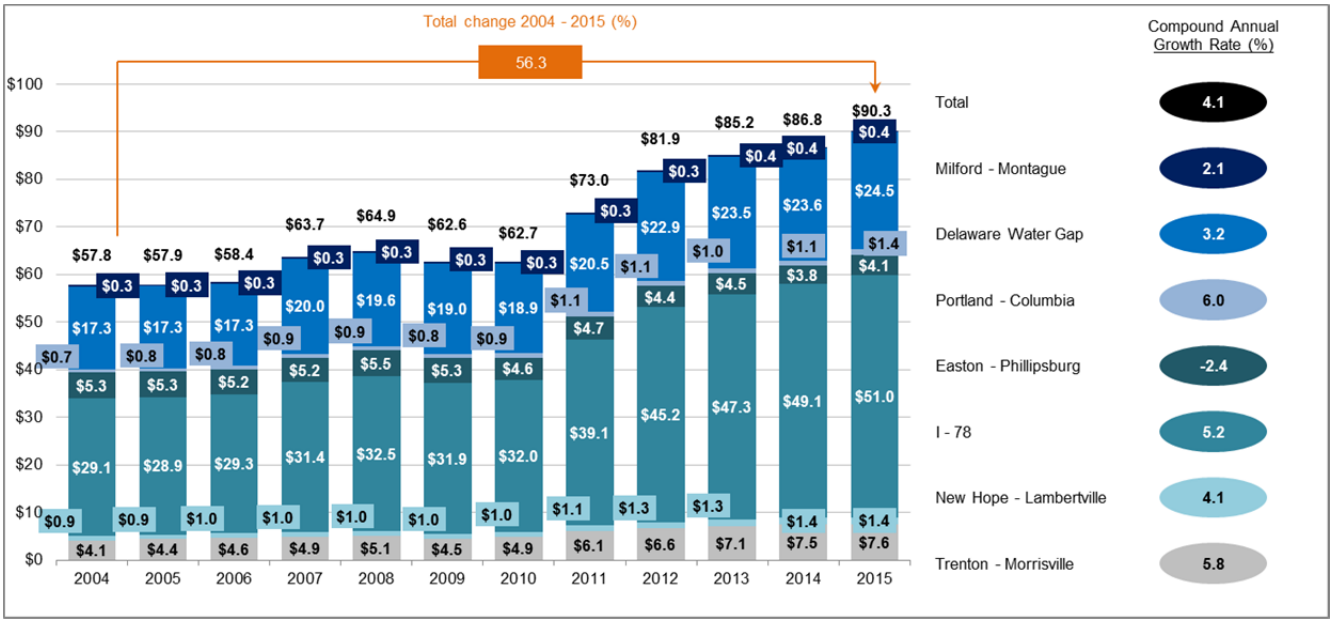


Table 3-6 shows annual total car and truck toll revenue from 2004 through 2015. Total toll revenue increased each year over the twelve year period. However, during the period 2008 to 2010, total annual revenue growth was less than 1 percent. Except for the New Hope-Lambertville Bridge being flat, all other toll bridges experienced positive revenue growth in 2015.

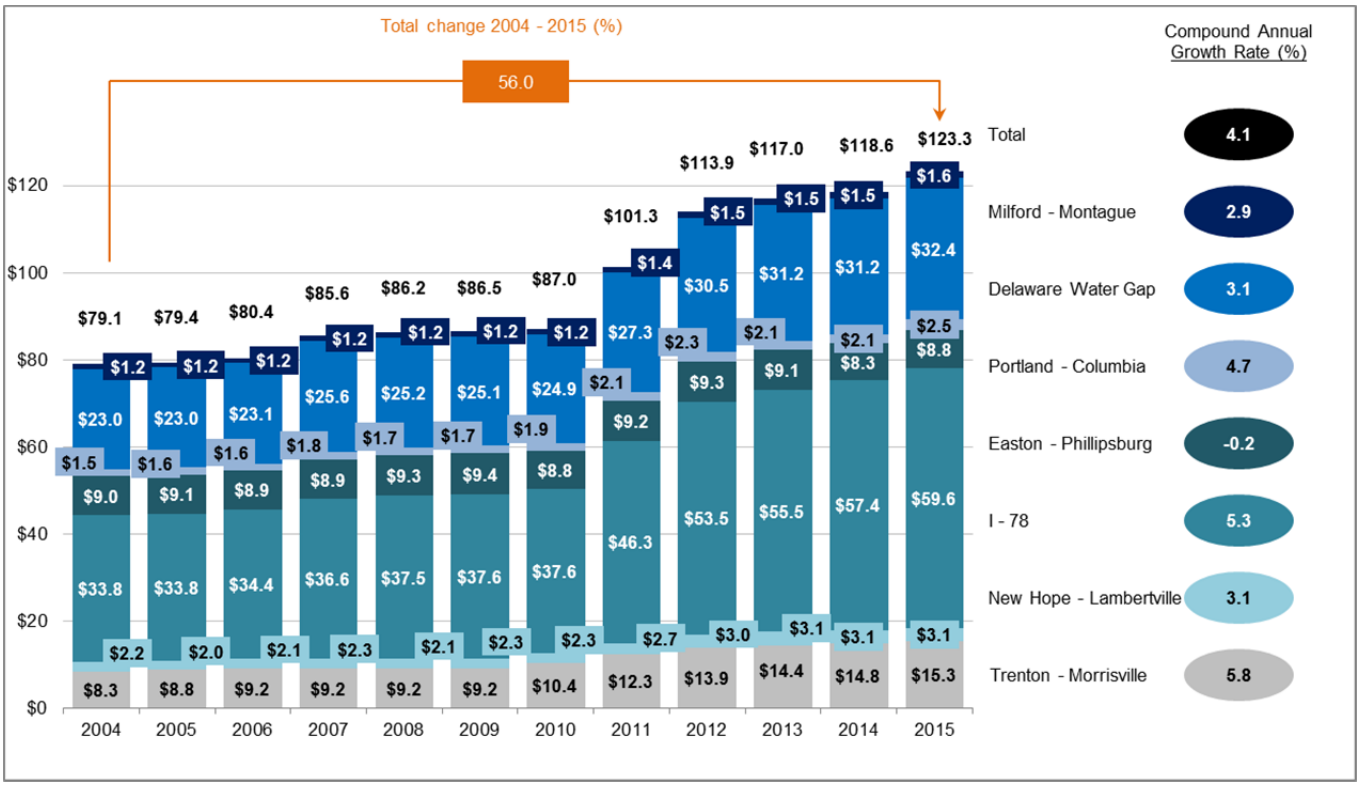
Table 3-6: Historical DRJTBC Total Toll Revenue, 2004 through 2015

Bridge	Annual Total Toll Revenue (in Thousand)											
	2004	2005	2006	2007*	2008	2009**	2010	2011***	2012	2013	2014	2015
Milford - Montague	$1,184	$1,169	$1,170	$1,187	$1,161	$1,203	$1,190	$1,353	$1,485	$1,540	$1,546	$1,630
Delaware Water Gap	$23,033	$22,956	$23,072	$25,648	$25,169	$25,116	$24,859	$27,338	$30,523	$31,235	$31,174	$32,359
Portland - Columbia	$1,492	$1,570	$1,591	$1,759	$1,715	$1,722	$1,878	$2,149	$2,287	$2,074	$2,129	$2,468
Easton - Phillipsburg	$9,012	$9,121	$8,919	$8,917	$9,341	$9,428	$8,783	$9,249	$9,278	$9,148	$8,309	$8,798
I - 78	$33,819	$33,762	$34,419	$36,641	$37,542	$37,587	$37,589	$46,278	$53,511	$55,527	$57,445	$59,563
New Hope - Lambertville	$2,236	$1,999	$2,081	$2,272	$2,096	$2,303	$2,269	$2,664	$2,996	$3,098	$3,143	$3,144
Trenton - Morrisville	$8,277	$8,825	$9,181	$9,194	$9,173	$9,171	$10,407	$12,318	$13,861	$14,415	$14,830	$15,327
Total	**$79,053**	**$79,403**	**$80,433**	**$85,618**	**$86,196**	**$86,529**	**$86,974**	**$101,350**	**$113,941**	**$117,036**	**$118,576**	**$123,289**

**Truck Only Toll Increase Year*
***Adjustment to Toll Discounts*
****Car and Truck Toll Increase Year*

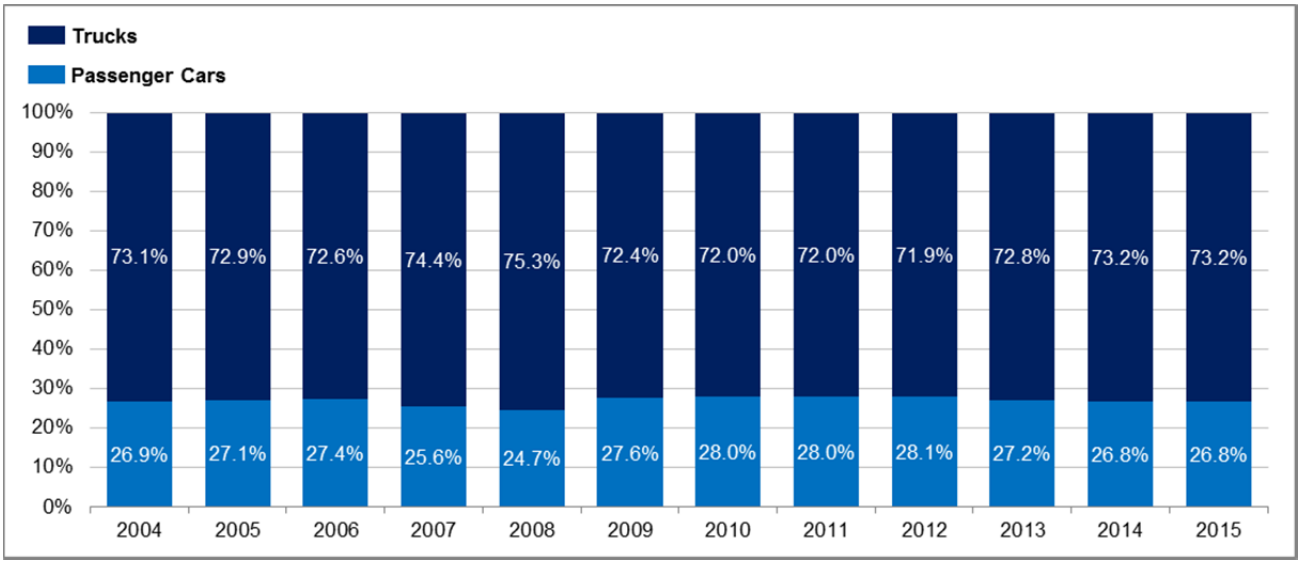
Figure 3-10 illustrates the total DRJTBC toll revenue trends over the twelve year period. Overall, total toll revenue grew by an average of 4.1 percent each year with toll revenue on the Trenton-Morrisville and I-78 bridges increasing the most over the twelve year period. Most of the recent revenue increase was due to the June 2011 toll discount adjustment.

Figure 3-10: Historical DRJTBC Total Toll Revenue, $Millions, 2004 to 2015



The distribution of toll revenue between passenger cars and trucks has seen little change over the years as shown in Figure 3-11. Overall, the truck share of toll revenue peaked before the recession at 75.3 percent in 2008 and dipped to 71.9 to 72.0 percent in the post-recessionary years of 2010 through 2012. In 2015, truck toll revenue made up 73.2 percent of total toll revenue and car revenue made up 26.8 percent of total toll revenue.

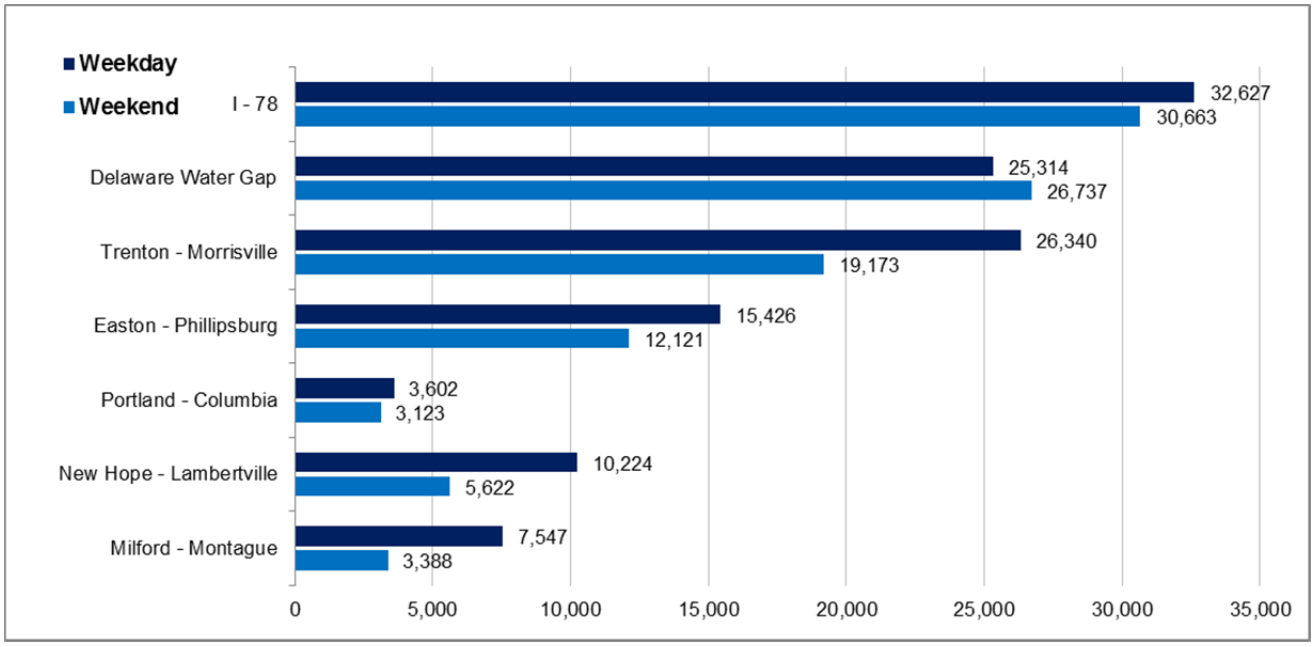
Figure 3-11: DRJTBC Passenger Car vs. Truck Distribution of Toll Revenue, 2004 to 2015



3.3 Average Daily Toll Traffic

Figure 3-12 displays average daily traffic estimates for an average weekday and an average weekend day, calculated from a sample of October 2016.

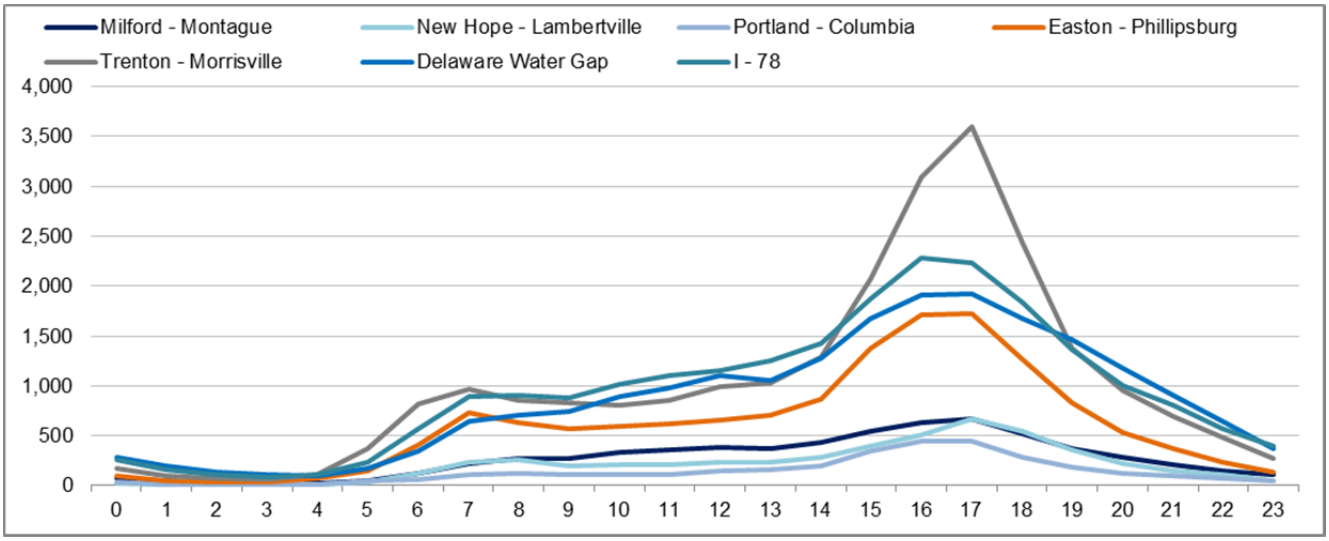
Figure 3-12: DRJTBC Average Daily Toll Traffic, Sample from October 2016



We can see that the I-78 and Trenton-Morrisville Toll Bridges carry the most traffic on weekdays and the I-78 and Delaware Water Gap Toll Bridges carry the most weekend traffic. All of the bridges except for the Delaware Water Gap Bridge support more weekday traffic than weekend traffic.

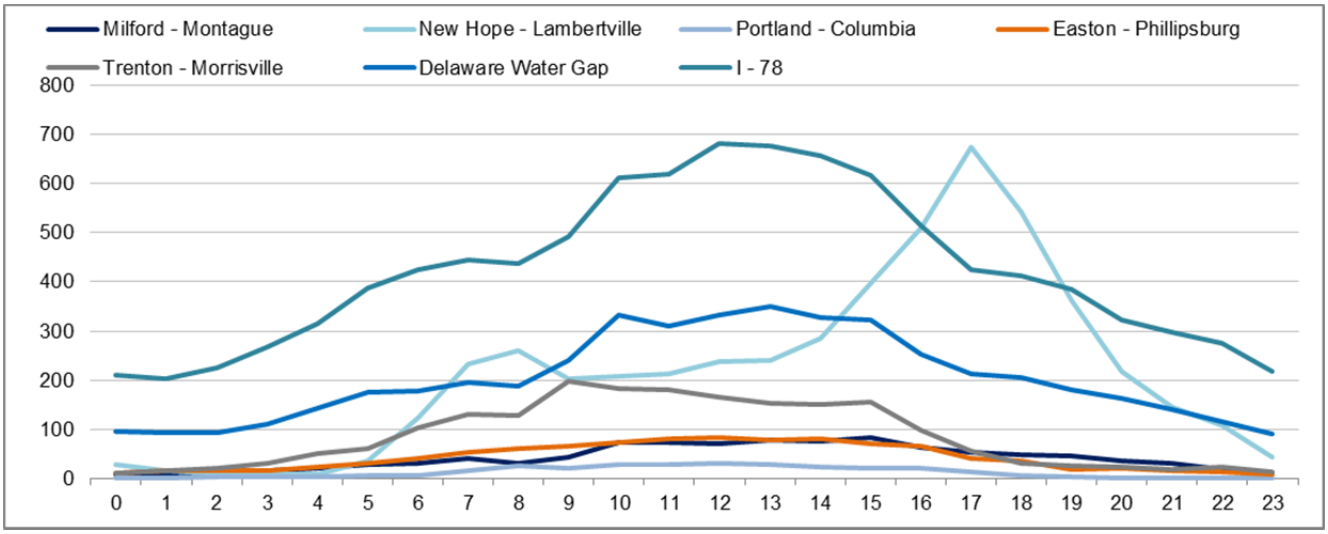
Toll traffic patterns on the DRJTBC bridges vary throughout the day as shown in Figure 3-13. As shown in Figure 3-13, hourly passenger car traffic on an average weekday follow a fairly typical commuter pattern where traffic levels are low at the beginning of the day; rise during the morning peak hours; flatten somewhat during the middle of the day; peak again during the afternoon rush hours; and then decline at the end of the day. This pattern is observed across all the DRJTBC toll bridges. The Trenton-Morrisville Bridge experiences the highest passenger car traffic volumes in both the morning and afternoon peak periods.

Figure 3-13: DRJTBC Average Weekday Hourly Passenger Car Toll Traffic, 2016



Hourly truck traffic volumes on an average weekday do not exhibit the same trends as observed in the hourly passenger car weekday traffic data. As shown in Figure 3-14, truck traffic over the DRJTBC toll bridges follow a more typical long distance pattern, building steadily during the morning, peaking somewhere in the 10am to 2pm timeframe, and decreasing again at the end of the day. The I-78 Bridge experiences the highest level of truck traffic throughout the typical weekday. Interestingly the New Hope-Lambertville Bridge experiences a peaking of truck traffic during the 5pm-6pm hour.

Figure 3-14: DRJTBC Average Weekday Hourly Truck Toll Traffic, 2016



Hourly traffic patterns on weekend days differ from weekdays for both passenger cars and trucks. As shown in Figure 3-15, passenger car traffic on an average weekend day builds steadily during the morning and reaches its apex in the middle of the day, typically between 11am and 1pm before declining during the remainder of the day. Interestingly the Delaware Water Gap Bridge experiences a slight peaking of passenger car traffic during the 11pm-12am hour.

Figure 3-15: DRJTBC Average Weekend Day Hourly Passenger Car Toll Traffic, 2016

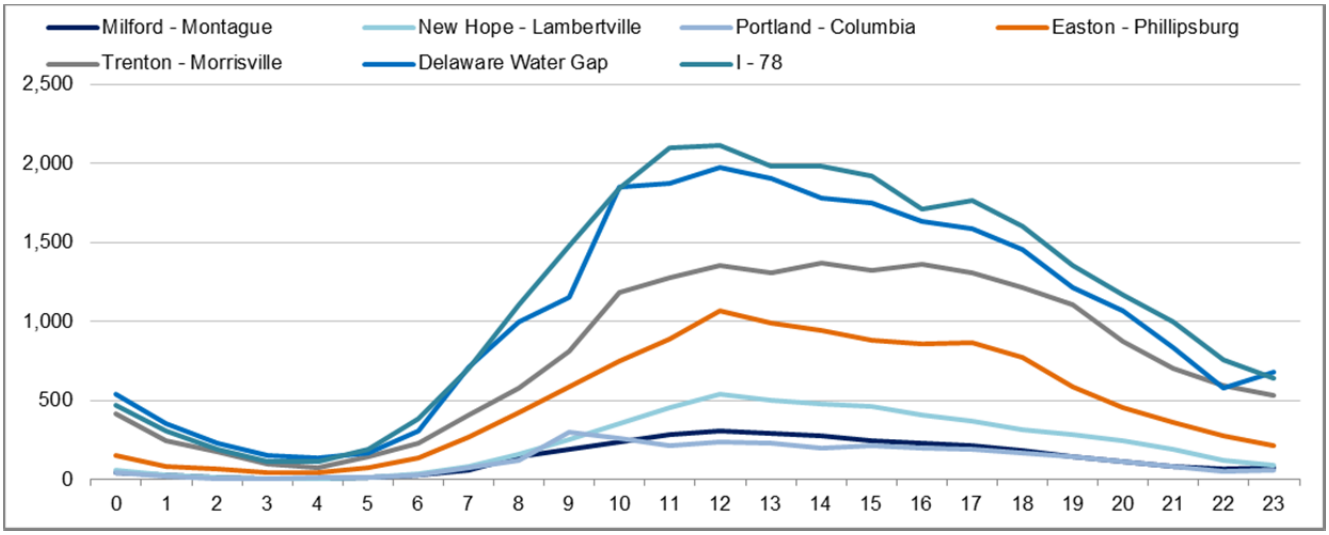
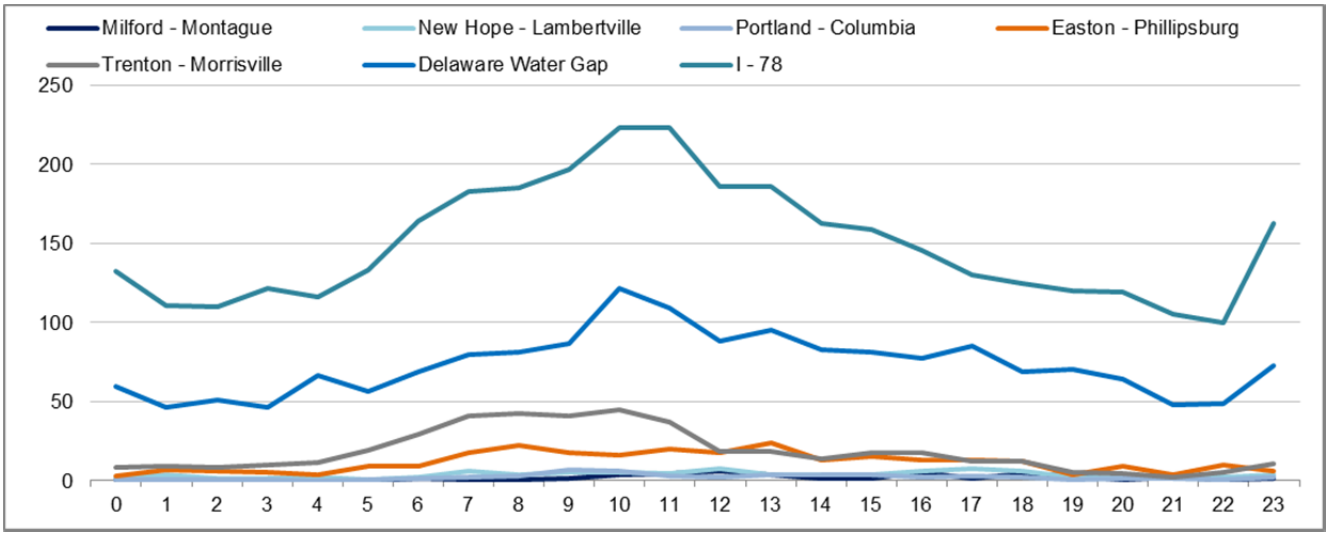


Figure 3-16 shows that the hourly truck traffic pattern for an average weekend day is somewhat similar to the pattern observed for passenger cars with truck traffic increasing in

the morning, peaking before midday, and then declining in the evening hours, with a few having another, smaller peak between 11pm and 12am (I-78, Delaware Water Gap and Trenton-Morrisville bridges). Truck traffic on the Easton-Phillipsburg and Trenton-Morrisville bridges tends to peak earlier on a weekend day compared to passenger car traffic.

Figure 3-16: DRJTBC Average Weekend Day Hourly Truck Toll Traffic, 2015



3.4 Average Toll Rates

As shown in Table 3-7, the average toll rate per trip paid by passenger cars increased from 2004 to 2015 across all DRJTBC toll bridges. Average toll rates remained relatively unchanged from 2004 to 2008 and then rose in 2009 with elimination of the standard E-ZPass discount and in mid-2011 with the toll increase. In 2015, passenger car toll rates averaged between $0.95 and $0.97 across the seven toll bridges.

Table 3-7: Average DRJTBC Toll Rates for Passenger Cars, $ per Trip

Year	Bridge							System Wide
	T-M	NH-L	I-78	E-P	P-C	DWG	M-M	
2004	$0.67	$0.66	$0.68	$0.67	$0.66	$0.67	$0.66	**$0.67**
2005	$0.67	$0.65	$0.67	$0.66	$0.66	$0.67	$0.66	**$0.67**
2006	$0.66	$0.65	$0.67	$0.66	$0.66	$0.67	$0.66	**$0.66**
2007	$0.67	$0.65	$0.67	$0.65	$0.66	$0.67	$0.66	**$0.66**
2008	$0.67	$0.64	$0.66	$0.65	$0.66	$0.67	$0.66	**$0.66**
2009	$0.75	$0.72	$0.73	$0.73	$0.72	$0.73	$0.73	**$0.73**
2010	$0.75	$0.71	$0.73	$0.72	$0.72	$0.73	$0.72	**$0.73**
2011	$0.86	$0.85	$0.86	$0.85	$0.85	$0.86	$0.86	**$0.86**
2012	$0.97	$0.96	$0.98	$0.97	$0.97	$0.98	$0.97	**$0.97**
2013	$0.98	$0.97	$0.97	$0.97	$0.97	$0.98	$0.97	**$0.97**
2014	$0.96	$0.97	$0.97	$0.97	$0.96	$0.96	$0.97	**$1.00**
2015	$0.97	$0.97	$0.97	$0.96	$0.96	$0.95	$0.96	**$0.96**

Similar to other toll facilities around the country, the average toll rate per trip paid by trucks on DRJTBC toll facilities was significantly higher than the average rate paid by passenger cars. While the truck toll rates are the same at all the bridges, the average axle count of the trucks crossing each bridge differs. As shown in Table 3-8, average truck toll rates started increasing in mid-2007 with the toll increase for larger trucks, again in 2009 with the reduction or removal of E-ZPass discounts, and in mid-2011 with a larger toll increase. In 2015, average toll rates for trucks by bridge ranged from $10.05 to $17.79, with a weighted average toll rate of $16.64 across all seven toll bridges.

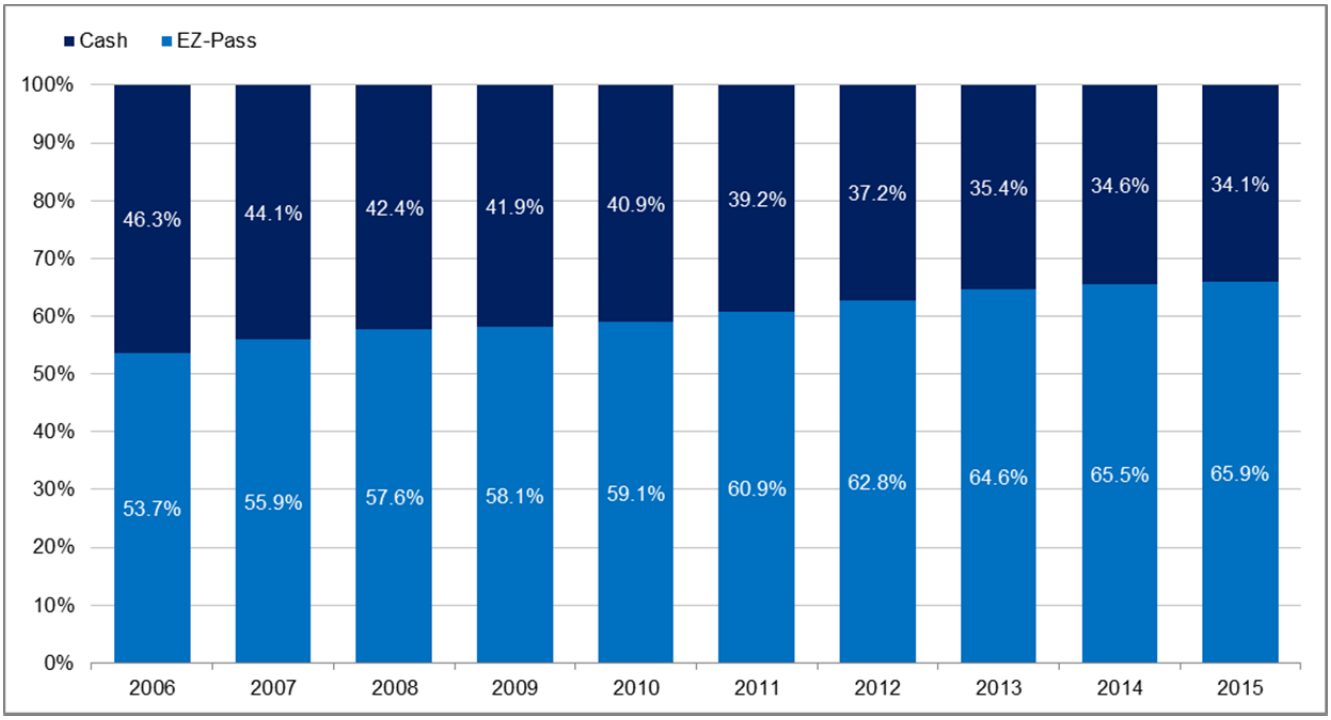
Table 3-8: Average DRJTBC Toll Rates for Trucks, $ per Trip

Year	Bridge							System Wide
	T-M	NH-L	I-78	E-P	P-C	DWG	M-M	
2004	$9.03	$7.98	$12.07	$9.79	$9.79	$11.85	$7.73	**$11.33**
2005	$9.05	$7.96	$11.98	$9.73	$9.73	$11.80	$7.61	**$11.25**
2006	$9.00	$7.83	$11.93	$9.67	$9.24	$11.76	$7.42	**$11.19**
2007	$9.75	$8.52	$13.16	$10.35	$10.04	$13.07	$7.73	**$12.33**
2008	$10.18	$8.71	$13.95	$10.91	$10.50	$13.79	$7.90	**$13.00**
2009	$10.34	$8.92	$14.49	$11.43	$10.79	$14.26	$8.19	**$13.49**
2010	$10.29	$9.04	$14.52	$11.12	$10.96	$14.23	$8.06	**$13.46**
2011	$11.82	$10.24	$16.21	$12.29	$12.50	$15.94	$9.35	**$15.11**
2012	$13.01	$11.49	$17.86	$13.12	$13.64	$17.56	$10.51	**$16.69**
2013	$12.94	$11.30	$17.83	$13.16	$13.50	$17.58	$10.42	**$16.66**
2014	$17.88	$17.61	$12.99	$12.95	$13.70	$11.63	$10.10	**$16.73**
2015	$17.79	$17.52	$12.86	$12.95	$13.79	$11.71	$10.05	**$16.64**

3.5 E-ZPass Utilization

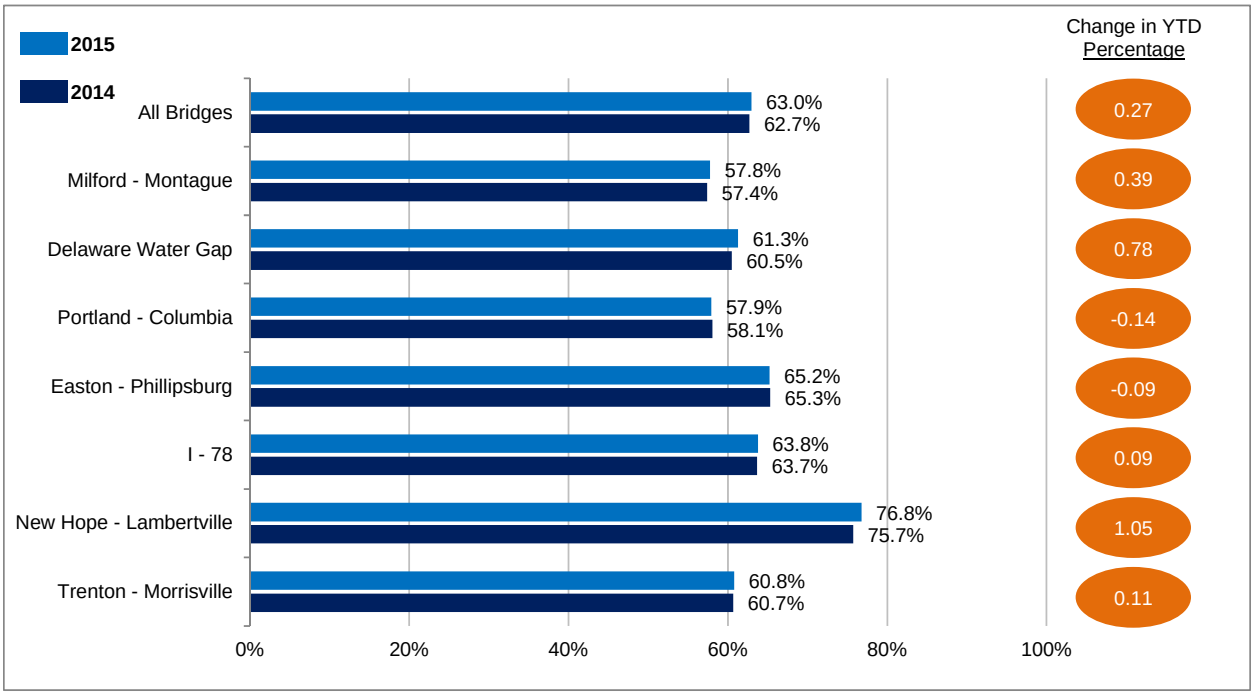
Utilization of E-ZPass as a method of payment has increased on DRJTBC toll bridges in the last 10 years. As illustrated in Figure 3-17, the percentage of trips paid for using an E-ZPass transponder increased from 53.7 percent in 2006 to 65.9 percent in 2015. Utilization rates have increased in each of the past ten years but there is a wide variance in utilization between passenger cars and trucks on DRJTBC toll bridges.

Figure 3-17: Annual E-ZPass Utilization on DRJTBC Toll Bridges



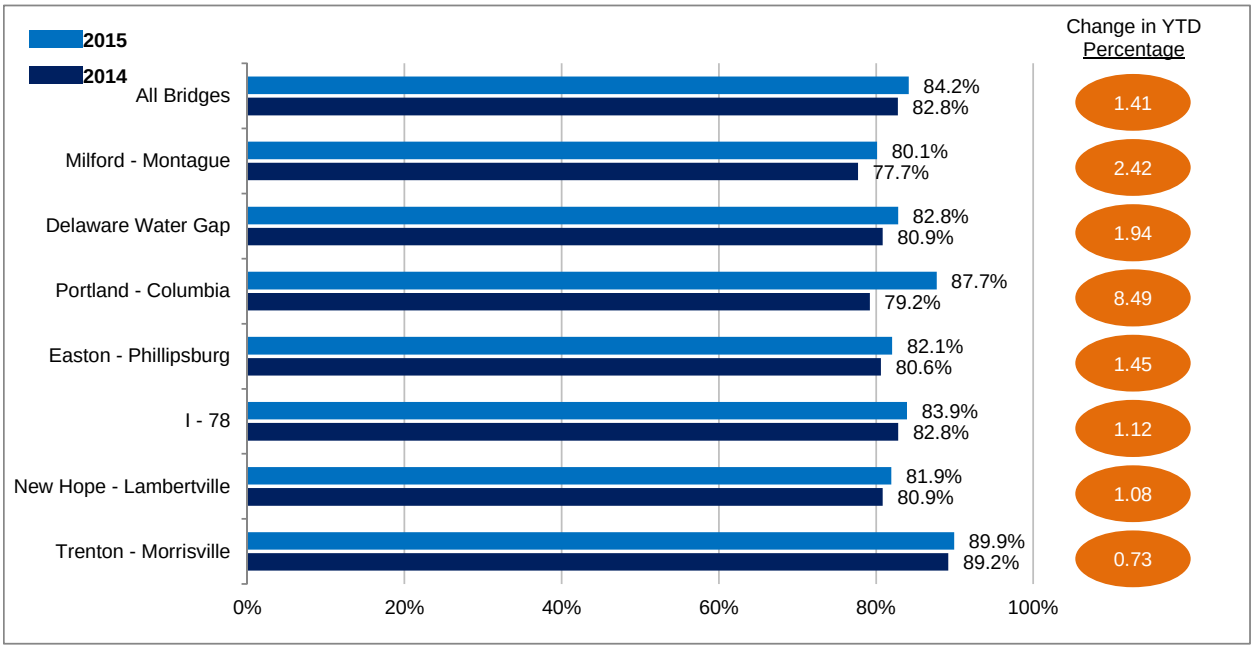
As shown in Figure 3-18, passenger car E-ZPass utilization ranged from a low of 57.8 percent on the Milford-Montague Bridge to a high of 76.8 percent on the New Hope Lambertville Bridge in 2015. Passenger car E-ZPass utilization increased on all toll bridges between 2014 and 2015, except the Portland-Columbia Bridge and at Easton-Phillipsburg, which both had a decline of approximately 0.1 percent.

Figure 3-18: 2014 and 2015 Passenger Car E-ZPass Utilization on DRJTBC Toll Bridges



Trucks are more likely than passenger cars to pay for their trips using E-ZPass transponders. As shown in Figure 3-19, E-ZPass utilization rates in 2015 ranged from a low of 80.1 percent on the Milford-Montague Bridge to a high of 89.9 for the Trenton-Morrisville Bridge. Approximately 84.2 percent of all trucks trips on DRJTBC toll facilities used E-ZPass. In 2015, truck E-ZPass utilization increased over 2014 levels for all bridges.

Figure 3-19: 2014 and 2015 Truck E-ZPass Utilization on DRJTBC Toll Bridges



4.0 SCUDDER FALLS BRIDGE DATA COLLECTION AND ANALYSES

This section describes the extensive 2014 data collection efforts that were done for the 2014 Scudder Falls Investment-Grade Traffic and Revenue Study and incorporated into these analyses of the Scudder Falls Bridge. This data collection program included:

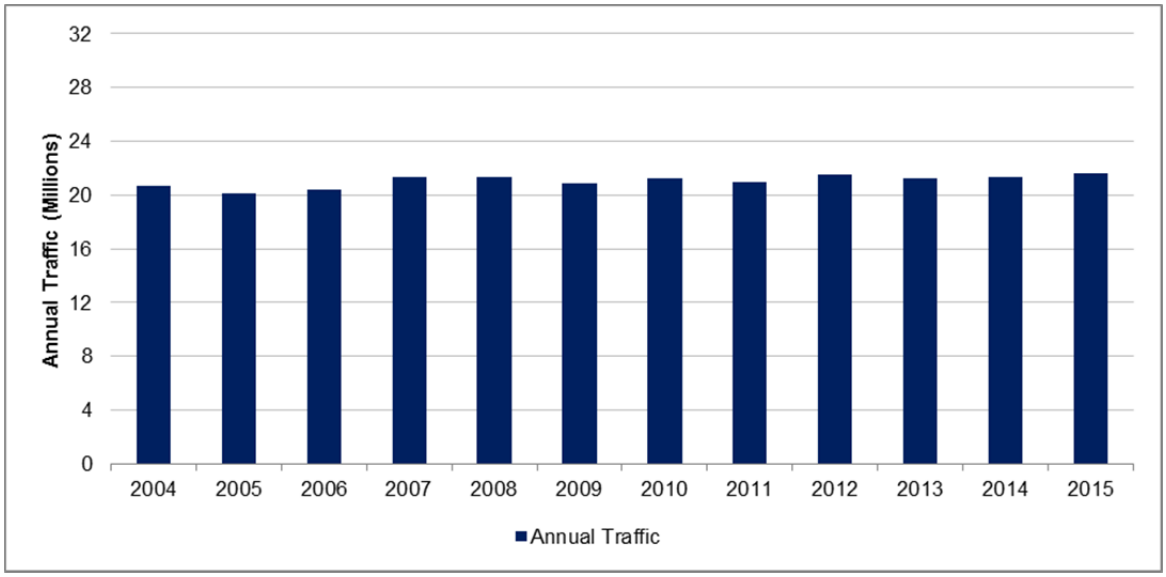
- hourly traffic counts on the Scudder Falls Bridge,
- license plate surveys,
- counts of vehicles equipped with E-ZPass,
- travel time surveys, and
- Scudder Falls Bridge customer characteristic surveys via Jacobs-designed online surveys.

As no significant volume shifts or changes to land use or the regional highway system have occurred between 2014 and 2016, it was deemed unnecessary to redo the full survey program and instead it was supplemented with recent counts on the bridges.

4.1 Historical Data

DRJTBC collects traffic count data on all of its facilities, including its toll-supported bridges. Figure 4-1 shows the annual two-way traffic counts and annual traffic growth on the Scudder Falls Bridge from 2004 through 2015. During this 12-year period, traffic has been relatively stable, hovering around 21 million crossings per year.

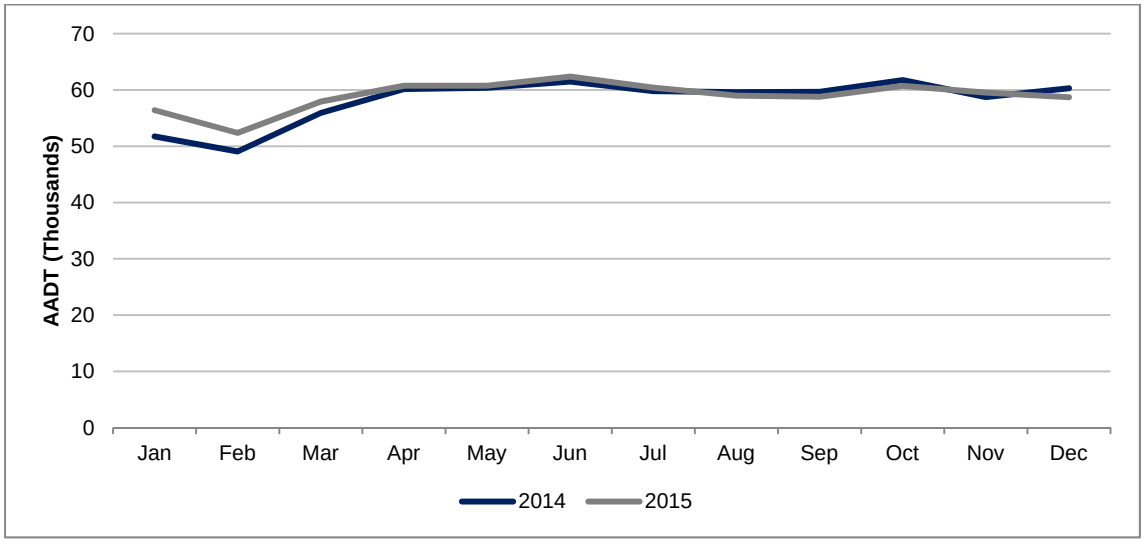
Figure 4-1: Historical 2-Way Traffic Volumes on the Scudder Falls Bridge, 2004 - 2015



Note: From 2006 to 2009 the Trenton-Morrisville Toll Bridge was under construction.
Source: DRJTBC

Figure 4-2 compares monthly two-way average annual daily traffic (AADT) for 2014 and 2015 on the Scudder Falls Bridge, from data received by the DRJTBC. As in all investment-grade Traffic and Revenue studies, Jacobs conducted project-specific traffic counts (as provided in the next section) in order to supplement these existing data sources.

Figure 4-2: Historical Monthly Distribution of Two-way Daily Traffic on the Scudder Falls Bridge, 2014 and 2015



Source: DRJTBC

4.2 Traffic Counts

Traffic counts by direction on the Scudder Falls Bridge between October 22nd and October 28th 2015 were provided to Jacobs by the Commission. Figure 4-3 and Figure 4-4 show the daily counts by hour for southbound and northbound traffic.

Figure 4-3: Southbound Hourly Traffic on Scudder Falls Bridge, 10/22/15-10/28/15

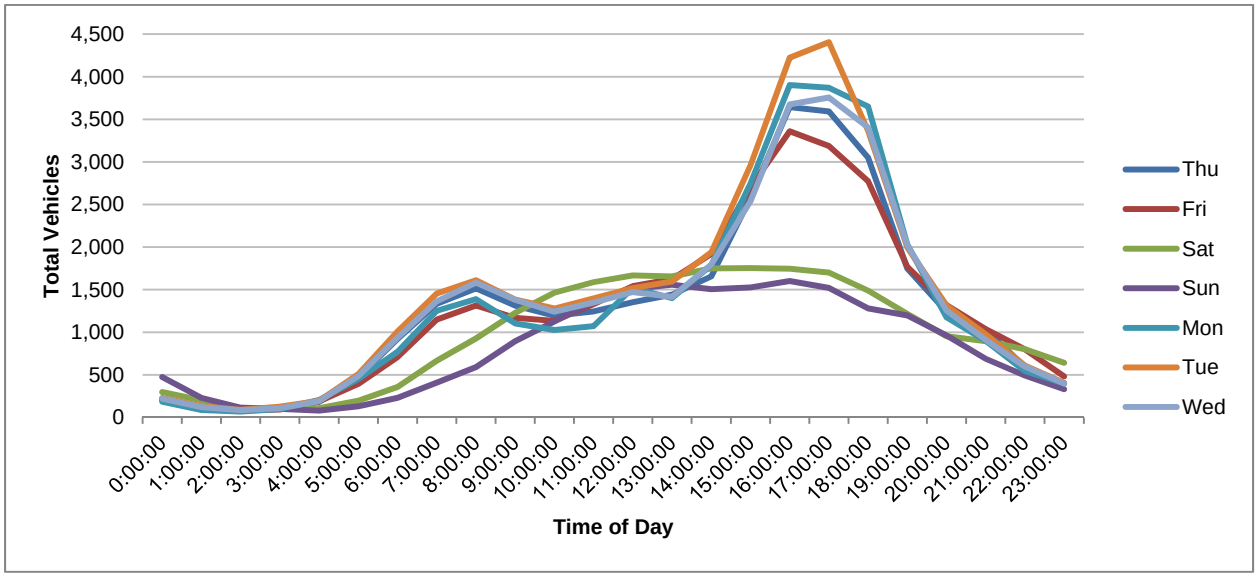
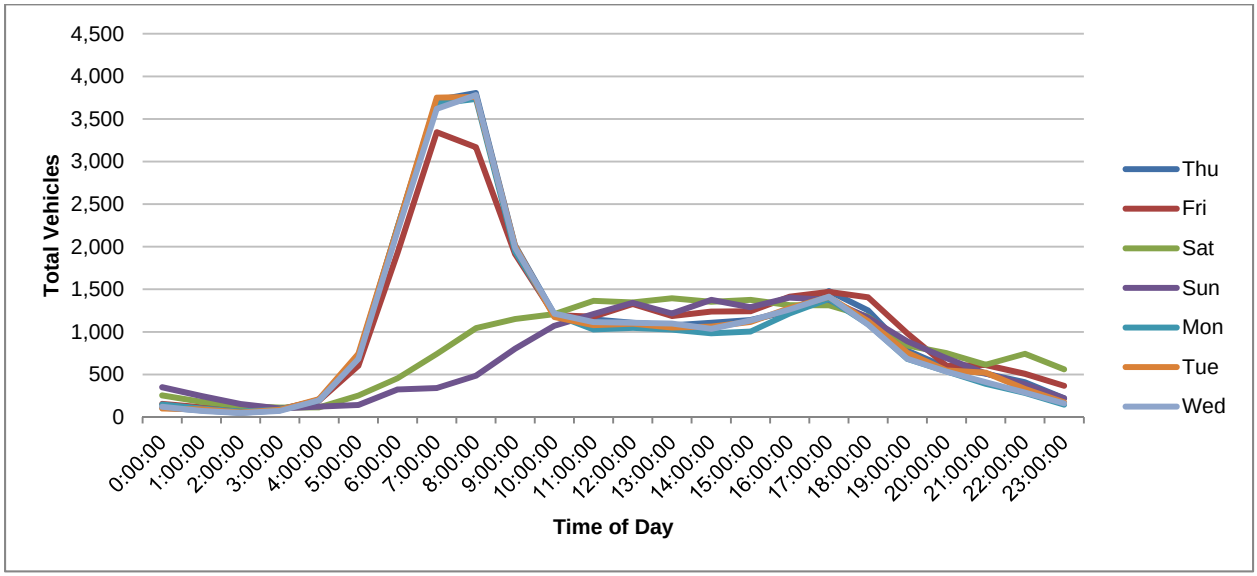


Figure 4-4: Northbound Hourly Traffic on Scudder Falls Bridge, 10/22/15-10/28/15



Data from the Commission's facilities reveals that October is an average month in terms of daily traffic volumes. Therefore, 2015 Average Annual Daily Traffic (AADT) and Average Annual Weekday Traffic (AAWDT) were estimated to be the same as the counted traffic shown in Table 4-1.

Table 4-1: 2014 Estimated AADT and AAWDT, based on October 22-28, 2015 Count Data

	Southbound	Northbound*
Annual Average Daily Traffic (AADT)	29,068	23,647
Annual Average Weekday Traffic (AAWDT)	32,011	25,705

** Approximately eleven hours (or 6%) of traffic counts during the one-week period had missing or faulty counts in the northbound and southbound direction; Jacobs estimated counts for these few hours.*

The count data also separated vehicles by class. It was calculated from the data that 5.0 percent of average daily traffic is trucks.

4.3 License Plate Surveys

In order to determine the amount of traffic currently using the Bridge that is from New Jersey and Pennsylvania, and to help us determine potential Toll-by-Plate invoicing for an All Electronic Toll Facility (AET), a license plate survey had been conducted for Jacobs' previous study on the Scudder Falls Bridge by Jacobs' subconsultant Arora and Associates, PC. This survey took place on Tuesday, April 1st, 2014 for two hours each during the AM peak, midday and PM peak periods. This survey was done in the westbound / southbound direction only (the direction of potential future tolling). Results are shown in Table 4-2. As expected, the majority of vehicles (some 90 percent) are registered in PA or NJ, with more from PA overall (as Pennsylvania to New Jersey is the major home to work commute direction). Note that eight percent of peak period and 12 percent of off-peak vehicles are from neither PA nor NJ.

Table 4-2: Southbound Scudder Falls Bridge License Plate Count Results, April 2014

	Traffic Volume by State License Plate								
PERIOD	PA	NJ	NY	CT	DE	MD	OTHER NE*	OTHERS**	PERIOD TOTAL
7:30AM TO 9:30AM	671	2221	22	11	10	49	74	82	**3140**
	21%	71%	1%	0%	0%	2%	2%	3%	
12:00PM TO 2:00PM	1383	1062	45	12	15	29	60	185	**2791**
	50%	38%	2%	0%	1%	1%	2%	7%	
3:00PM TO 5:00PM	4920	1033	71	12	34	35	145	256	**6506**
	76%	16%	1%	0%	1%	1%	2%	4%	

**- New England States of MA, RI, VT, NH, ME*

***- All other States except PA, NJ, NY, CT, DE, MD, RI, NH, VT, MA, ME*

Note: May not appear to add to 100% due to rounding

4.4 Counts of Vehicles Equipped with E-ZPass

A temporary E-ZPass reader was installed by the Commission at the Bridge for one week, from April 1st through April 7th 2014. This was done to determine how many vehicles currently crossing the Scudder Falls Bridge in the southbound direction were already equipped with E-ZPass. Table 4-3 summarizes the counts of E-ZPass vehicles by tag agency. Along with this data collection effort, traffic counts had been conducted during the same timeframe; these two data collection efforts helped us to determine the percentage of existing vehicles equipped with E-ZPass.

It was found that 49 percent of weekday vehicles and 46 percent of weekend vehicles crossing on the survey days had a readable E-ZPass transponder. Some 78 percent of those with E-ZPass had obtained it from the NJ Turnpike (some 44 percent) or the Pennsylvania Turnpike Commission (some 34 percent). It is assumed that there were some E-ZPass transponders that were not displayed (as some E-ZPass customers do not keep their transponder affixed to their windshield at all times) and/or not read.

Table 4-3: Southbound Scudder Falls Bridge E-ZPass Counts, April 2014 (Raw Data)

	Southbound Transponder Reads			Avg Day
Agency	**Avg Weekday**	**Avg Weekend Day**	**Avg Day**	**Share by Agency**
NYSTA/NYSBA	509	336	460	3.2%
PANYNJ	990	795	934	6.5%
PTC	5,581	3,090	4,869	33.7%
MTAB&T	501	458	489	3.4%
DRPA	9	4	8	0.1%
VDOT	58	83	65	0.4%
Peace Br	4	2	4	0.0%
Illinois	57	37	51	0.4%
MdTA	121	160	132	0.9%
DelDOT	143	145	143	1.0%
MassPike	92	64	84	0.6%
NJTPKE	6,854	5,270	6,401	44.3%
WV	6	3	5	0.0%
DRBA	17	13	16	0.1%
NHDOT	12	10	11	0.1%
Maine	10	7	9	0.1%
DRJTBC	875	468	759	5.2%
Indiana	5	5	5	0.0%
Ohio	10	7	9	0.1%
RITBA	5	3	4	0.0%
NC	1	1	1	0.0%
Total E-ZPass Reads	**15,860**	**10,959**	**14,460**	**100.0%**
Total SB Traffic	**32,207**	**23,779**	**29,799**	
% E-Zpass	**49.2%**	**46.1%**	**48.5%**	

4.5 Travel Time Surveys

Travel time surveys were conducted in April 2014 in order to indicate time differences between trips taking the Scudder Falls Bridge and alternate routes. These results factor into our estimates of who would remain on the new tolled Scudder Falls Bridge versus using another bridge in the area. The southbound origin-destination (O-D) study that was part of the surveys conducted by Jacobs during the Level 2 Scudder Falls Bridge T&R Study in 2009 indicated two major clusters of origin points in New Jersey for Scudder Falls Bridge customers.

The two major origin points that were used as the starting locations for the travel time surveys were:

- Ewing, NJ at Scotch Road and Parkway Avenue
- The I-95/Rte 1 interchange in Lawrence, NJ (which would include the majority of trips from the north and east)

Three major clusters of destination points were identified on the Pennsylvania side, and were used as the ending points for the travel time surveys:

- Newtown, PA at Lincoln Ave. and Washington Ave.
- Yardley, PA at Afton Ave. and Schuyler Dr.
- The I-95/Rte 1 interchange in Langhorne, PA (which would include the majority of the trips from the south and west)

The travel time surveys were conducted the first week of April 2014, from Tuesday through Thursday, by Jacobs' subconsultant Arora and Associates, PC, between each combination of O-D pairs during peak and off-peak periods. Different routes were traveled between each O-D pair, using the Scudder Falls Bridge and using alternative bridges where they made sense as alternate routes (as an example, for a trip between Lawrence and Langhorne, the Washington Crossing Toll Supported Bridge is *not* a reasonable alternative because it is located well outside the area of travel and would add significant journey time, but the Route 1/Trenton-Morrisville Toll Bridge and the Lower Trenton Toll-Supported Bridge are reasonable alternatives). As shown in Table 4-4, the Scudder Falls Bridge is always the fastest route between these points, except between the two I-95/ Route 1 interchanges, where the travel time using the Trenton-Morrisville Toll Bridge is very similar to and sometimes shorter than the travel time using the Scudder Falls Bridge. PM Peak travel times on these New Jersey to Pennsylvania routes are typically longer than the AM and midday times, and the routes via the three smaller toll-supported bridges (Lower Trenton, Calhoun St, and Washington Crossing) typically experience a greater increase in PM peak travel time than the two larger bridges.

Table 4-4: Travel Times between O-D Pairs, Using Scudder Falls Bridge and Alternative Crossings, April 2014

(in minutes)

AM Peak Period						
From	To	Scudder Falls Br.	Trenton-Morrisville Toll Br.	Lower Trenton Toll Supported Br.	Calhoun St. Toll Supp. Br.	Washington Crossing Toll Supp. Br.
Ewing, NJ	Yardley, PA	12.4			18.3	
Ewing, NJ	I-95/Rte 1 Int., PA	11.5	18.0	17.8		
Ewing, NJ	Newtown, PA	13.0				23.0
I-95/Rte 1 Int., NJ	Yardley, PA	14.1		18.5		
I-95/Rte 1 Int., NJ	I-95/Rte 1 Int., PA	13.6	13.4	18.0		
I-95/Rte 1 Int., NJ	Newtown, PA	16.9	23.0	25.5		
Midday / Off-Peak Period						
From	To	Scudder Falls Br.	Trenton-Morrisville Toll Br.	Lower Trenton Toll Supported Br.	Calhoun St. Toll Supp. Br.	Washington Crossing Toll Supp. Br.
Ewing, NJ	Yardley, PA	10.8			18.4	
Ewing, NJ	I-95/Rte 1 Int., PA	13.0	17.5	18.3		
Ewing, NJ	Newtown, PA	14.0				21.5
I-95/Rte 1 Int., NJ	Yardley, PA	14.4		18.0		
I-95/Rte 1 Int., NJ	I-95/Rte 1 Int., PA	13.7	14.3	17.0		
I-95/Rte 1 Int., NJ	Newtown, PA	16.8	21.0	25.0		
PM Peak Period						
From	To	Scudder Falls Br.	Trenton-Morrisville Toll Br.	Lower Trenton Toll Supported Br.	Calhoun St. Toll Supp. Br.	Washington Crossing Toll Supp. Br.
Ewing, NJ	Yardley, PA	10.4			20.2	
Ewing, NJ	I-95/Rte 1 Int., PA	11.5	18.5	21.5		
Ewing, NJ	Newtown, PA	14.5				22.0
I-95/Rte 1 Int., NJ	Yardley, PA	14.2		24.0		
I-95/Rte 1 Int., NJ	I-95/Rte 1 Int., PA	13.7	13.9	17.9		
I-95/Rte 1 Int., NJ	Newtown, PA	17.5	23.5	32.0		

4.6 Online Customer Characteristic Surveys

Online surveys were conducted in 2014 to obtain information on Scudder Falls Bridge current customer travel characteristics such as frequency of travel, state of residence, trip origin/destination, familiarity with electronic tolling, and stated preference (i.e., what a driver states they would do if the Scudder Falls Bridge were to be tolled). Results of the surveys were used in the development of Jacobs' traffic and revenue forecasting model. Note that only some of the results have been included herein; the full set of questions and analyses of responses are available in the Jacobs memo entitled "Scudder Falls Bridge Data Collection and Survey Results" included in the Appendix.

Two different methods were used to direct patrons to take the survey:

1. through e-Rewards, a service whereby e-Rewards members are e-mailed a survey link and earn e-Rewards points for completion of surveys, and
2. through variable message signs (VMS) displayed for several weeks near the Scudder Falls Bridge directing drivers to an internet link, "www.SURVEY-U.com".

4.6.1 e-Rewards Survey

The purpose of conducting an e-Rewards survey in addition to the roadside VMS survey was:

- to obtain responses from additional customers, and
- to include infrequent customers who may not have seen - or did not respond to - the VMS sign.

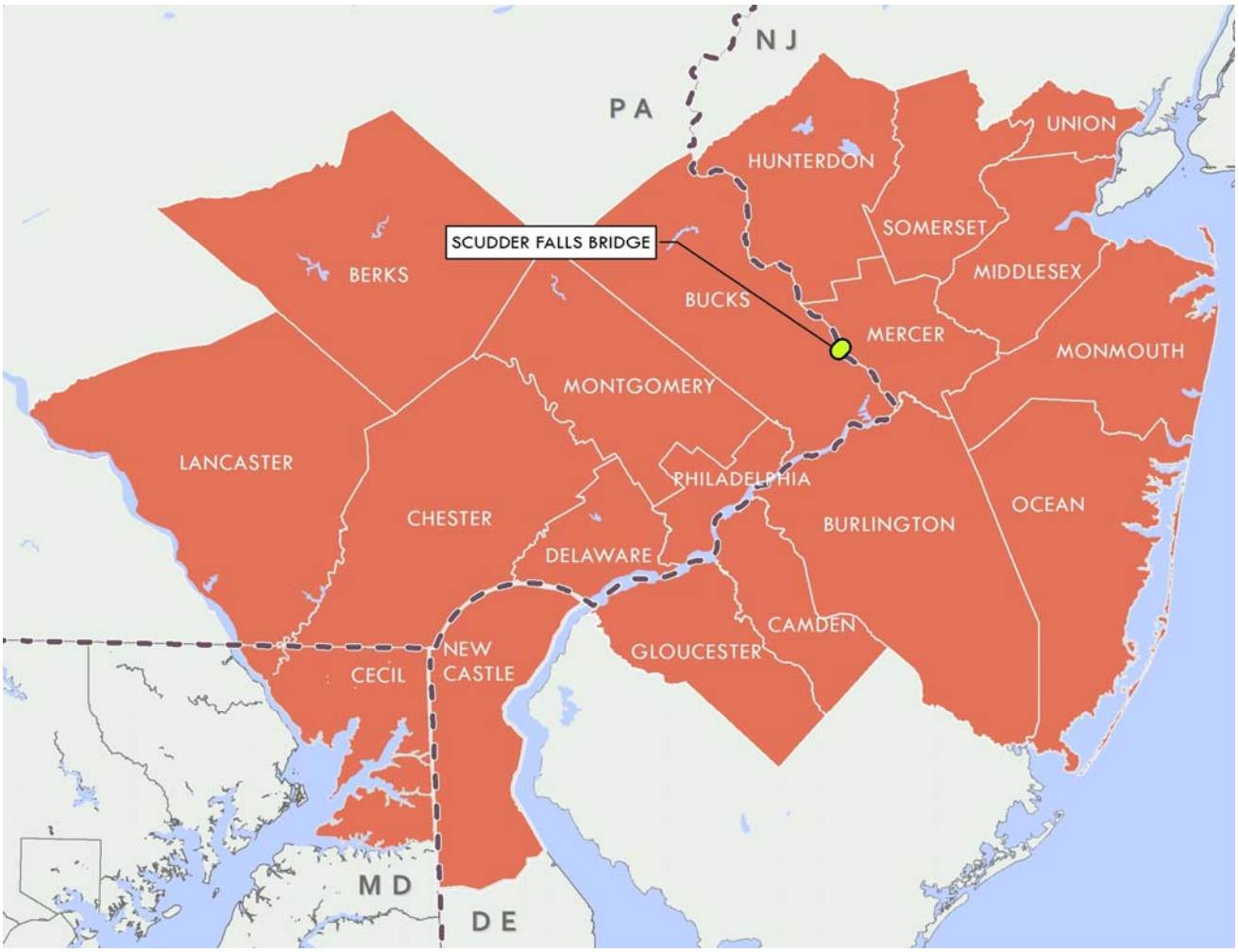
The e-Rewards survey, since it is sent to essentially a random sampling of people throughout the area, provides a far better indication of frequency of travel across the Bridge than the VMS survey, mainly because a person who sees the VMS sign advertising the survey over and over again (i.e., a frequent traveler) is much more likely to complete the survey than someone who sees it only once or not at all.

Research Now (parent company of e-Rewards) conducted the survey through their e-Rewards program. e-Rewards participants who did not meet the survey requirements – such as people without a driver's license, and people who state that they have not crossed the Scudder Falls Bridge at all in the past year – were screened out of the survey and were not included in Jacobs' quota of 1,000 completed surveys.

e-Rewards e-mailed the survey link to all e-Rewards participants within an area specified by Jacobs. This area, chosen by Jacobs to cover the parts of the DVRPC model region that were proximate to the Scudder Falls Bridge and I-95 – and therefore likely to contain both

frequent and infrequent Scudder Falls Bridge customers – consisted of 19 counties, as shown in Figure 4-5. The e-mails were sent and the survey commenced on March 25th 2014; the 1,000 quota was reached and the survey concluded on March 28th.

Figure 4-5: Counties Included in e-Rewards Survey Area



4.6.2 VMS-Advertised SurveyMonkey Survey

The 2014 roadside VMS-advertised survey was administered by Jacobs through the internet survey site SurveyMonkey. Jacobs owns the web address "www.SURVEY-U.com," which was linked to the Scudder Falls survey. "WWW.SURVEY-U.COM" was publicized to patrons of the Scudder Falls Bridge via four strategically located roadside variable message signs.

The two phases for the VMS were as follows:

Phase 1 -
"TAKE TRAVEL SURVEY"

Phase 2 -
"WWW. SURVEY-U .COM"

The Commission placed the VMS signs and displayed the messages on the two Pennsylvania signs from March 5th through March 28th, 2014. The two signs in New Jersey were displayed from March 5th through March 14th, 2014. The survey was kept open to collect responses until March 31st, 2014. Locations for these variable message signs are shown in Figure 4-6.

Figure 4-6: Location of Variable Message Signs at Scudder Falls Bridge for 2014 Online Customer Characteristics Survey

Notes:
VMS 1 & 3 faced Northbound (NB) traffic. VMS 2 & 4 faced Southbound (SB) traffic.
VMS 3 & 4 were removed on March 14, the 10th day of the survey.

4.6.3 Online Customer Characteristic Survey Results

From the 2014 survey, we had received 1,001 fully completed surveys from e-Rewards and 477 completed plus 32 partially-completed surveys from SurveyMonkey, the VMS-advertised survey. (This is in comparison to the 445 full and 27 partial surveys completed via the VMS surveys in the 2008-2009 Level 2 Traffic & Revenue study.)

The results for several of the questions that were expanded to represent total trips are presented in the following section, while the full set of survey questions and raw results can be found in Jacobs' memorandum entitled "Scudder Falls Bridge Data Collection and Survey Results" included in the Appendix.

4.6.3.1 Trip Frequency

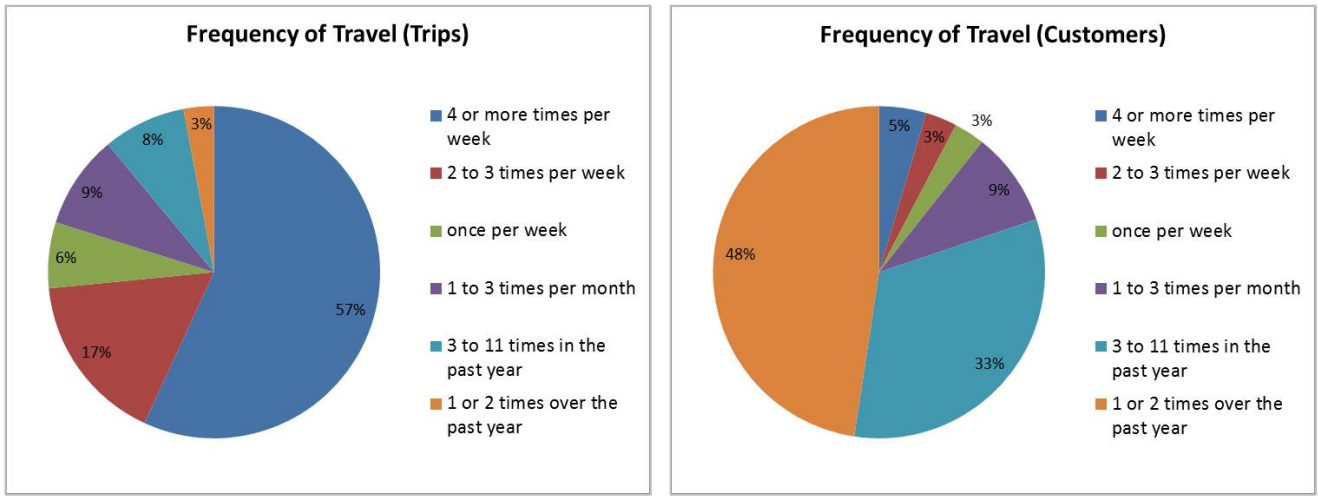
Some of the customer responses, in order to be effectively used in our traffic and revenue modeling, needed to be expanded to represent total trips across the Bridge. This expansion was achieved using the customer trip frequency profile, developed from responses to the question "How often do you travel southbound across the Scudder Falls Bridge?"

Jacobs developed the frequency profile by taking the following steps:

- Each SurveyMonkey response to the frequency question was assumed to represent one trip, as the survey captured travelers across the Scudder Falls Bridge for nearly one month.
- The e-Rewards survey, since it was not advertised to people crossing the Scudder Falls Bridge, represented customers from all around the area. Factors were applied to turn each customer (survey response) into trips. This is detailed in the paragraph following Figure 4-7.
- Because the SurveyMonkey responses were biased towards frequent users who saw the survey advertisements multiple times, and the e-Rewards respondents tended to be more infrequent users, the frequency profiles between the two surveys differed somewhat. We felt that by combining the e-Rewards and SurveyMonkey frequency data with equal weight, we would remove most of this bias.

Figure 4-7 represents the overall adjusted frequencies of trips and customers. As seen from these results, 5 percent of customers who travel four or more times a week across the Scudder Falls Bridge make 57 percent of the trips across the Bridge. The 48 percent of customers who cross the Scudder Falls Bridge once or twice per year make only 3 percent of the trips.

Figure 4-7: Scudder Falls Bridge Frequency Profile (Expanded Data)

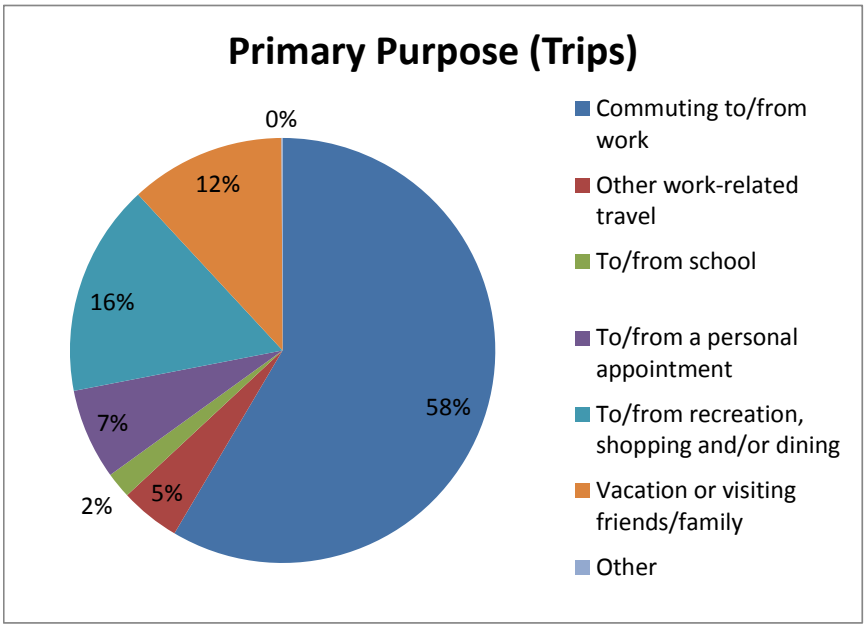


The remaining expanded data charts shown in this section apply the trip frequency of each customer in order to turn customers into trips. For example, if a customer takes one trip per week across the Scudder Falls Bridge, this represents 52 trips per year. A customer who takes 4 or more trips per week makes about 300 trips per year. A customer who states he traveled over the Scudder Falls Bridge one or two times over the past year was assumed to make, on average, 1.5 trips per year. Therefore the survey results were expanded using the appropriate factors to represent trips. It is important to expand customer results to trips because a trip represents a potential *toll transaction*, and we would like to know if this *toll transaction* will be made by someone who has E-ZPass (rather than know the general population that has E-ZPass), or if a potential Toll-by-Plate transaction will be made by someone who travels frequently (and therefore receives one toll invoice with multiple transactions) or very infrequently (and receives one toll invoice with only one transaction on it). This is significant data that we incorporated into our forecasting models and estimates of Toll-by-Plate collection costs.

4.6.3.2 Trip Purpose

Figure 4-8 shows survey customer data expanded to represent southbound total trips across the Scudder Falls Bridge in terms of trip purpose. The expanded data shows that almost two-thirds of the trips (58 percent plus 5 percent) on the Scudder Falls Bridge are for commuting or work-related travel. Only 2 percent of the trips are made for school, and the remaining one-third of trips on the Scudder Falls Bridge are for more discretionary travel, such as personal trips, shopping, or vacation.

Figure 4-8: Scudder Falls Bridge Trip Purpose (Expanded Data)



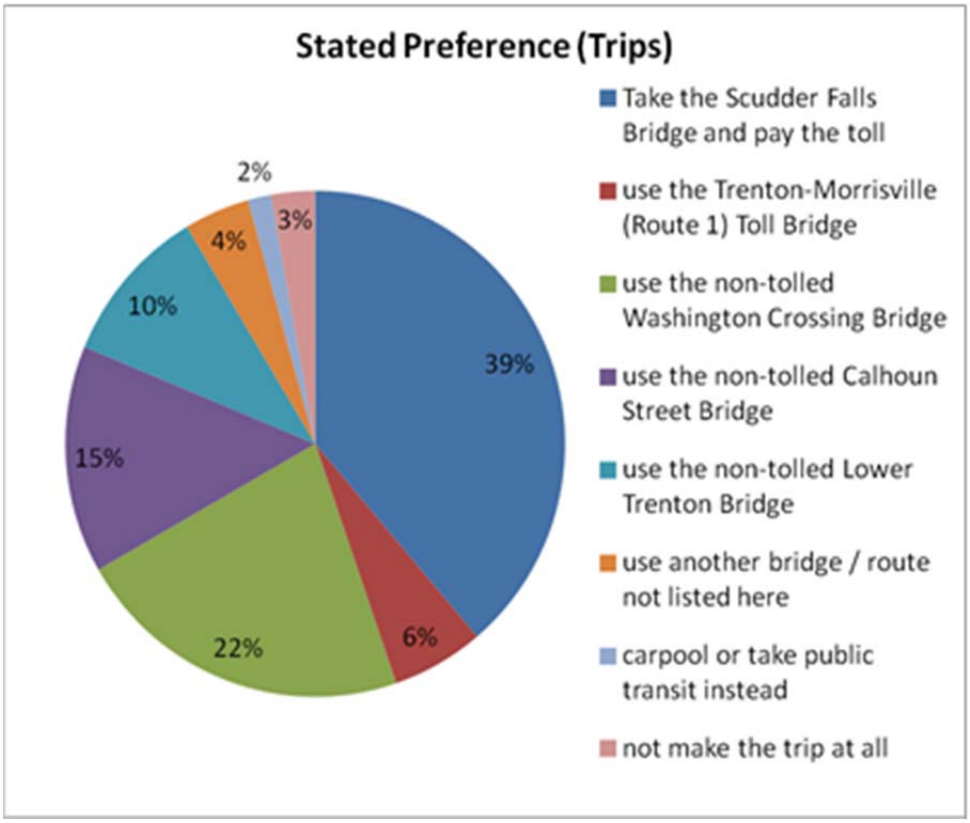
4.6.3.3 Stated Preference Survey Question

Customers had been asked what they would do if they were to make the same trip but with a southbound toll on the Scudder Falls Bridge that is similar to the toll on the Trenton-Morrisville (Route 1) Bridge. From a customer standpoint, a majority of the e-Rewards customers (56 percent) stated that they would stay on the Scudder Falls Bridge and pay the toll, while only 36 percent of SurveyMonkey respondents said they would; most of them stated that they would move to a non-tolled bridge. However, on a total trip (expanded data) basis, as shown in Figure 4-9, 39 percent of the trips would stay on the Scudder Falls Bridge after implementation of tolling, with six percent switching to the Trenton-Morrisville Toll Bridge, some 50 percent switching to non-tolled bridges, and five percent changing travel patterns.

It should be noted that stated preference surveys and their results rely on hypothetical questions to elicit preferences or values. Hypothetical bias arises in stated preference valuation studies when respondents report a willingness to do something in laboratory or field experiments that in fact they would not normally do in the real world, and hypothetical biases typically exceed the actual values. In this situation, many respondents were likely to state that they would take a free bridge as a protest against tolling on the Scudder Falls Bridge, or in the belief that the collective answers would be used to decide whether or not to toll the Scudder Falls Bridge. Therefore, the results of this particular question – and stated

preference data in general - should be looked at with a note of caution. The answers to this question were used to inform Jacobs' analyses and have not been used directly.

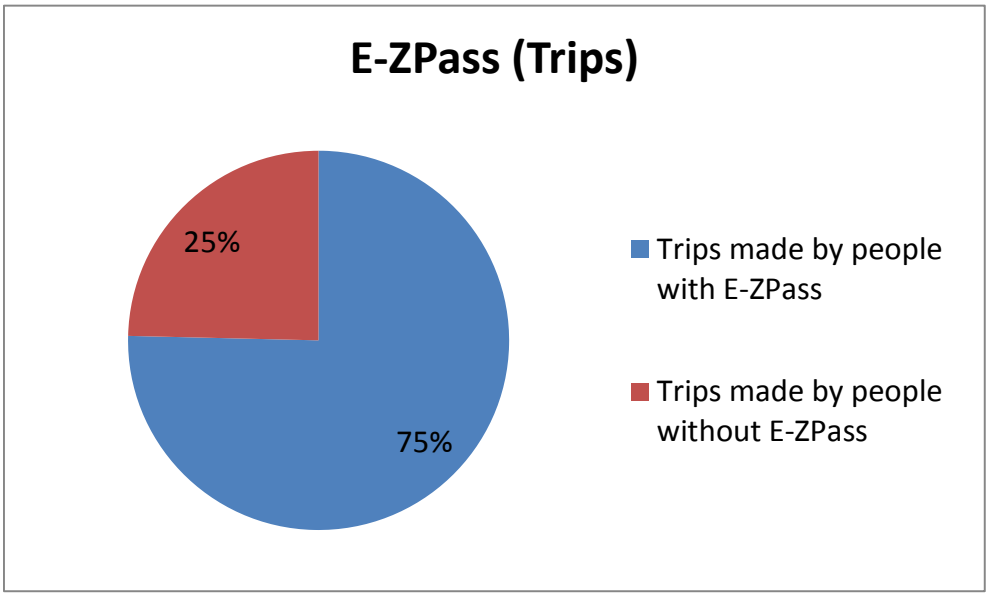
Figure 4-9: Stated Preference if the Scudder Falls Bridge were Tolled (Expanded Data)



4.6.3.4 E-ZPass Familiarity and Ownership

Figure 4-10 shows customer data expanded to percent E-ZPass trips. Customers for this online survey were asked if they are familiar with E-ZPass and if they have E-ZPass. As may be seen in the figure, according to the data, three-quarters of the trips would be made by E-ZPass customers. However, it must be noted that as these surveys were administered and completed online, therefore the results are somewhat skewed to the more tech-savvy person, who would in fact be more likely to have and use E-ZPass than would a non-tech-savvy person. As such, one should keep in mind while looking at these data that the answers noted herein would be on the high side of the range of E-ZPass usage.

Figure 4-10: Scudder Falls Bridge E-ZPass Familiarity and Usage (Expanded Data)



5.0 ECONOMIC BACKDROP AND OUTLOOK FOR THE FUTURE

Historically, socioeconomic conditions have influenced DRJTBC traffic trends. Correlations exist between passenger car traffic growth and Gross Domestic Product (GDP) and population, and between commercial vehicle traffic growth and the Industrial Production Index (IPI). As such, we started our socio-economic research and analyses to focus in on those parameters. Additionally, we researched and analyzed the key economic variables that affect traffic in general, and present our work in this chapter.

Jacobs used a consensus forecast based on a variety of sources as an input into our traffic growth forecasts. The consensus outlook of economists is that moderate economic growth will continue in the near future, with real GDP estimated to increase by 1.5 percent in 2016 and 2.2 percent in 2017. Our estimate also assumed no significant changes in gasoline pricing in the near future, though we believe that a moderate increase in the price of gas will not result in major declines in traffic, as prices are currently not high by historical standards.

Any estimate of toll traffic and revenues will recognize the significant variations that can and do occur in the national, regional and local economies, and the population changes within the facility corridors. With this in mind, Jacobs performed a detailed analysis of the historical economic trends seen over the last few decades.

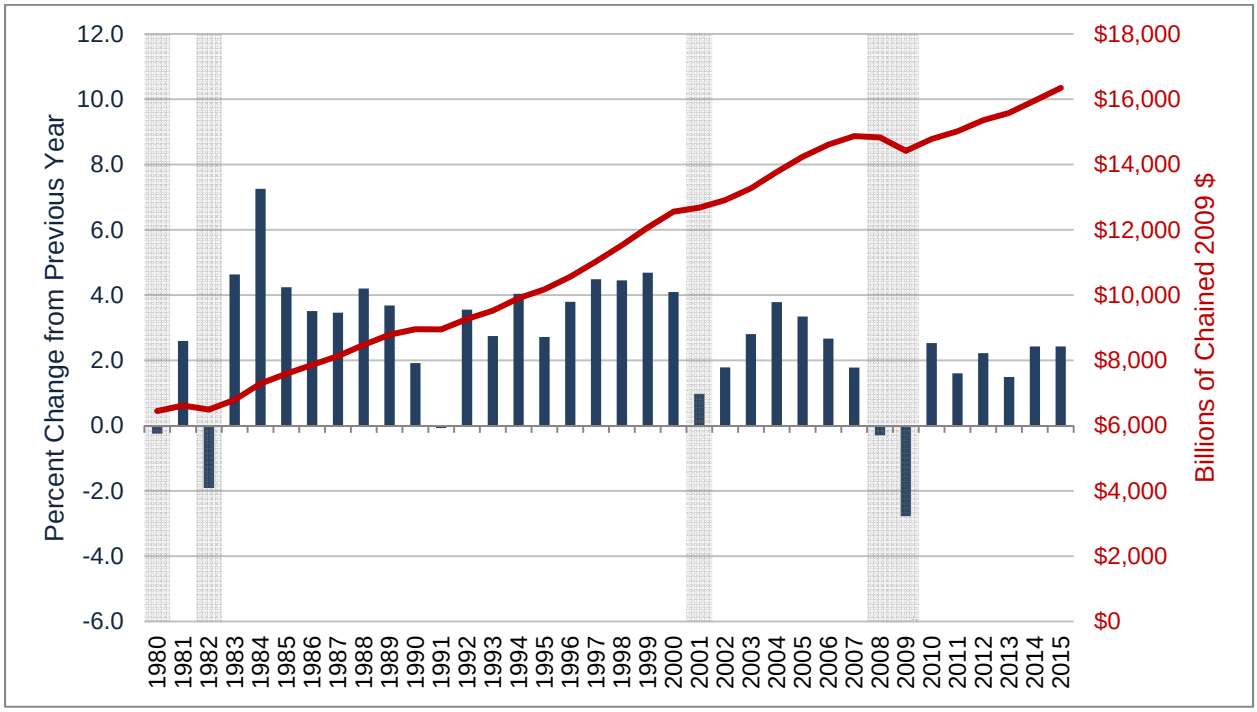
This chapter presents a summary of socioeconomic trends as well as an analysis of growth in nationwide vehicle miles traveled.

5.1 Recent Macroeconomic Trends

From 2000 to 2015, real Gross Domestic Product (GDP) and the Industrial Production Index (IPI) in the United States increased by an average of 1.8 percent and 0.7 percent per year, respectively. This time period included the recession that began and ended in 2001 and the recession, which began in December 2007 and ended in June 2009. The 2007-09 recession was more severe compared to previous recessions, resulting in large decreases in real GDP, industrial production, and employment, among other economic indicators.

As the U.S. economy began to recover, real GDP increased on an annual basis by between 1.5 and 2.5 percent in the years 2010 to 2015. As of 2015, real GDP reached $16.3 trillion. Industrial production, as measured by the IPI, also recovered – it increased annually by between 1.3 and 5.6 percent from 2010 to 2015. Figure 5-1 summarizes the annual percentage change in real GDP from 1980 through 2015; details on the IPI are presented in Section 5.2.3.

Figure 5-1: Real Gross Domestic Product



Source: U.S. Census Bureau, Bureau of Economic Analysis, National Bureau of Economic Research

The economy has experienced moderate growth in recent years and there are signs that this level of growth will continue into the near future. The yield curve remains positive with short term interest rates (0-12 months) on U.S. Treasuries trading at or below 0.5 percent and the interest rates on 10-year U.S. Treasuries trading at 1.7 percent as of October 2016. The market for crude oil remains moderate with the price for North Sea Brent Crude Oil trading near $52 per barrel as of the end of 2016. Barring unforeseen events in the international political environment, the Energy Information Administration (EIA)'s Annual Energy Outlook for 2016 anticipates that average crude oil prices will remain near $50 per barrel into 2017.

Moreover, the housing market is recovering. After steadily declining from 2006 to 2011, housing prices have stabilized or started to increase in numerous markets. By the fall of 2016, the Case-Shiller 10-City Index and 20-City Index both increased by over 5 percent over the previous year. The consensus forecast is that there will be 1,250,000 housing starts in 2016, which would represent an improvement from the 1,106,000 units started in 2015. Analysts believe this segment of the housing market will continue to improve – the consensus forecast is that new housing starts will equal 1,370,000 in 2017.

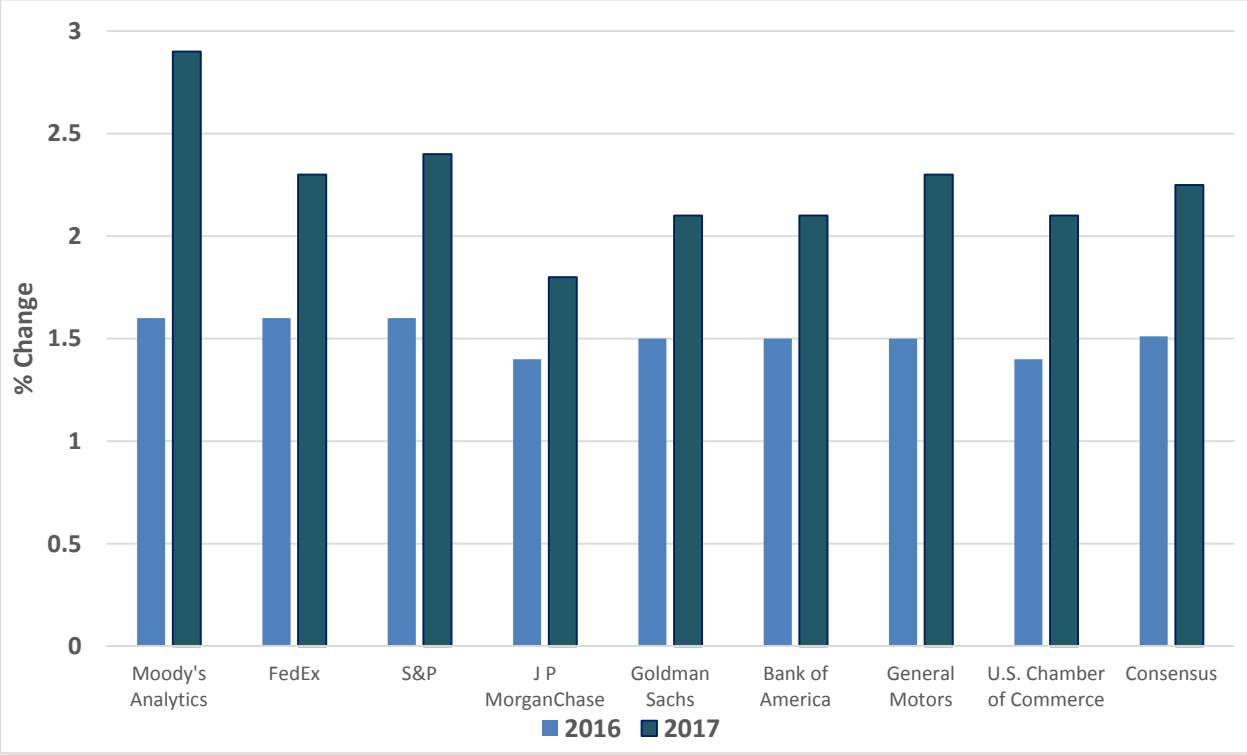
5.2 Short-Term Economic Forecast

The United States has experienced low to moderate real GDP growth over the last six years. While many economists believe the U.S. economy will continue to experience this type of tepid growth in the near term, there are signs that the economy could also slow. The strength of the dollar relative to other currencies has continued to undermine export growth, hurting the manufacturing sector of the economy. Furthermore, major trading partners, such as China, have experienced slowing economic growth, contributing to a decrease in demand for goods and services around the world. Financial market fluctuations are also contributing to a decline in consumer sentiment over the last 12 months. Nevertheless, forecasters are still predicting growth in real GDP and in the IPI for the next two years although some prognosticators have revised their growth estimates slightly downward.

5.2.1 Gross Domestic Product

Figure 5-2 summarizes the real GDP forecast provided by selected financial institutions, manufacturers, and shippers over the short-term. As of September 2016, the consensus forecast is that real GDP will increase by 1.5 percent in 2016 and 2.2 percent 2017.

Figure 5-2: Forecasted Percentage Change in Real GDP, 2016 and 2017



Source: Blue Chip Economic Indicators (BCIE)

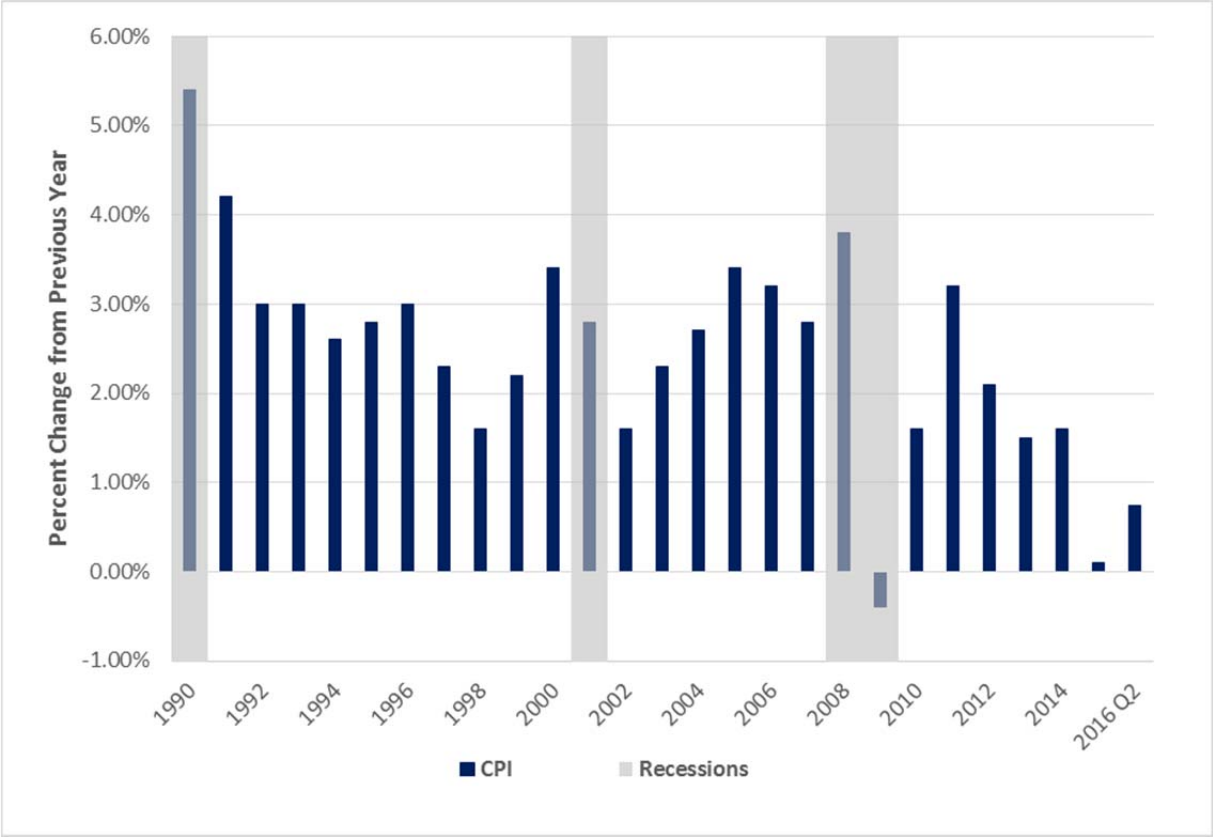
It is anticipated that moderate economic growth will continue in the short-term although there is a risk that this level of economic growth will not materialize. Factors that may negatively impact future real GDP growth in the short-term include the following:

- Weakness in the manufacturing sector caused in part by a strong dollar, which makes it difficult for export oriented firms to sell goods abroad.
- Weaknesses in the economic growth of major trading partners, including China and countries in Europe.
- Volativity in financial markets, which may negatively impact consumer sentiment and spending patterns.
- Geopolitical instability – especially in Eastern Europe, the Middle East, and with the exit of Great Britain from the European Union – continues to be a concern. The possibility of financial stress resulting from political unrest remains a very real risk to the global economy.

5.2.2 Inflation

Since 1990, the Consumer Price Index (CPI) has increased by an average annual rate of 2.5 percent. This captures the relatively higher inflation of the early 1990s as well as the deflationary conditions that occurred in 2009 and the near-deflationary conditions in 2015. Figure 5-3 summarizes the annual percentage change in CPI from 1990 to through the first half of 2016.

Figure 5-3: Annual Percentage Change in CPI, 1990 to 2016 Q2



Source: U.S. Department of Labor, Bureau of Labor Statistics (BLS)

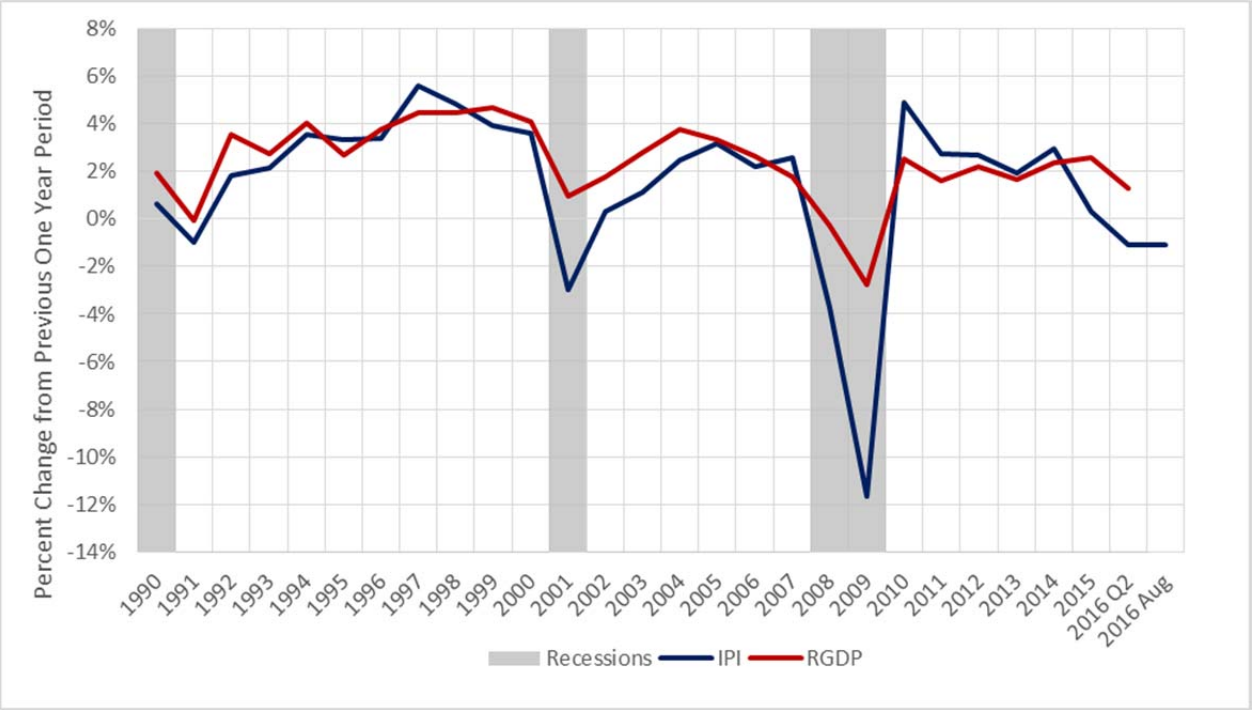
5.2.3 Industrial Production

We expect that the growth in the shipment of goods across the nation's highways will be tempered, resulting in a more modest rate of growth in commercial traffic on the DRJTBC's facilities than had been experienced in the past. This trend is also seen on other toll facilities in the northeast.

Changes in U.S. industrial production have historically moved in tandem with GDP, albeit with steeper decreases during recessions and larger increases during recovery periods. During the lowest point of the 2001 recession, the Industrial Production Index (IPI) decreased by 4.0 percent. Due to the severity of the 2007-09 recession, the IPI declined 11.3 percent in 2009. Since then, the IPI recovered and grew from 2010 to 2014 at an average annual rate of 2.5 percent. The total IPI indexed to 2012 returned to its pre-recession peak in November 2014. During 2015, the IPI grew a tepid 0.3 percent on an average annual basis. The first two quarters of 2016, IPI fell 1.7 and 1.0 percent from the previous quarter respectively. Causes cited by the Federal Reserve System Board of

Governors in their monthly reports for the recent downturn included losses in the mining sector and low demand for utilities during the warmer than usual winter of 2015-2016. Figure 5-4 compares the growth in real GDP with IPI from 1990 through 2016.

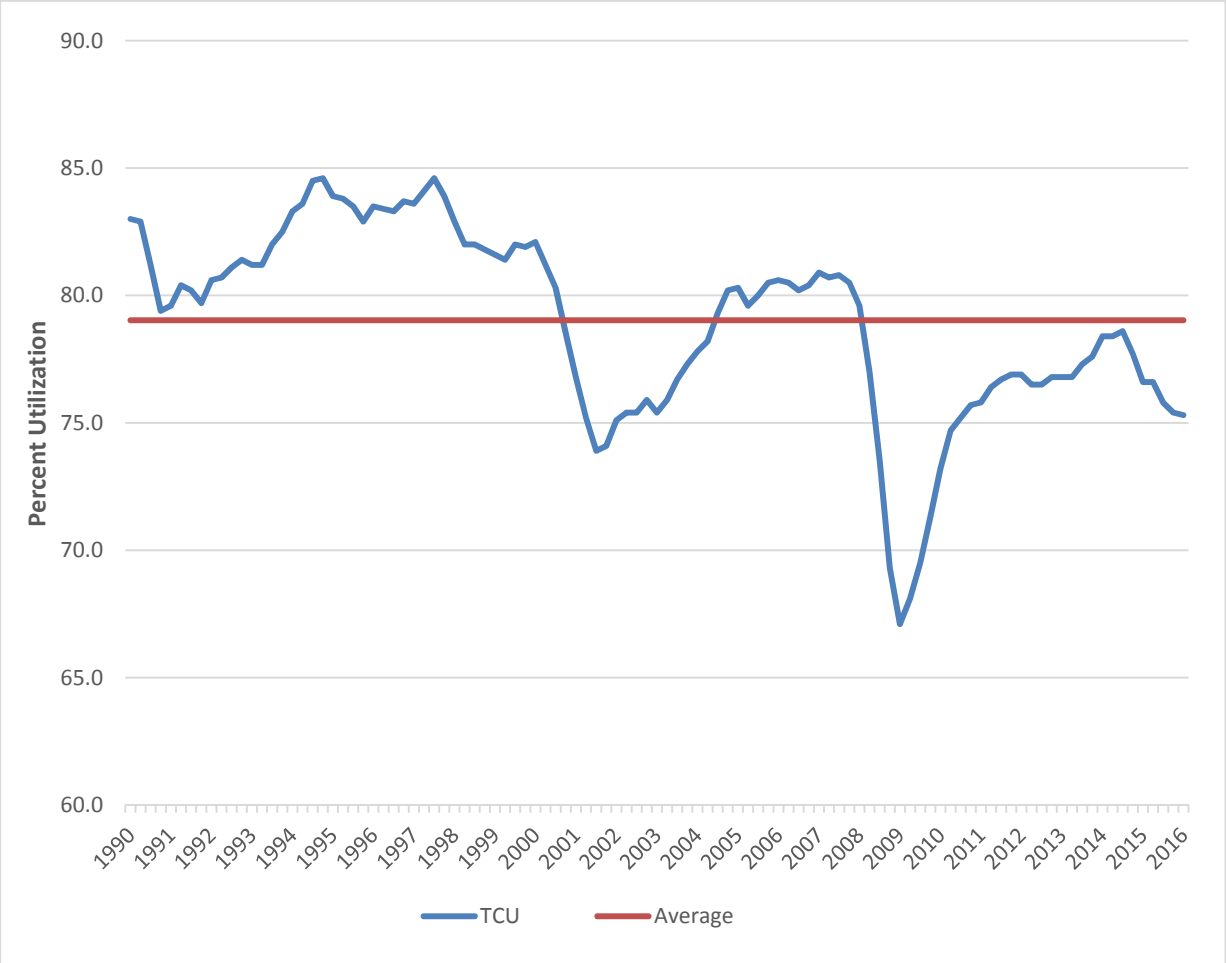
Figure 5-4: Historical Real GDP and IPI, 1990 to 2016



Source: Bureau of Economic Analysis and the U.S. Federal Reserve Bank

Similar to the IPI, the utilization of U.S manufacturing capacity decreased significantly in 2009, declining to 65.5 percent. Since then, capacity utilization increased to 78.6 percent during the first quarter of 2014, but has since declined and was at 75.5 percent as of August 2016. A utilization rate of 75.5 percent is 4.5 percent below the average between 1990 and 2015. Figure 5-5 summarizes manufacturing capacity utilization from 1990 through August 2016.

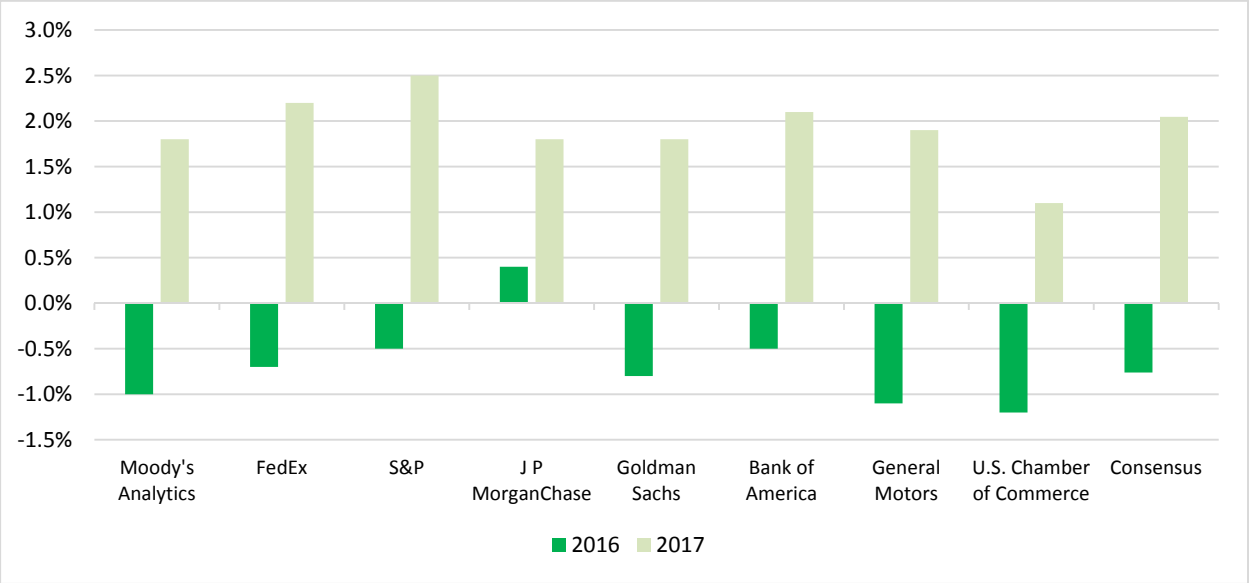
Figure 5-5: Manufacturing Capacity Utilization, 1990 through August 2016



Source: U.S. Federal Reserve Bank

Based on forecasts developed by financial institutions and industry analysts, as of September 2016 the Blue Chip Economic Indicators has the IPI forecasted to decrease by 0.8 percent in 2016 with a rebound of 2.0 percent in 2017. This forecast factors in the potential impact to U.S. exports due to sluggish growth in Europe and China. As a result, we expect that the growth in the shipment of goods across the nation's highways will be tempered, resulting in a relatively modest rate of growth in commercial traffic. Figure 5-6 summarizes selected forecasts in the IPI.

Figure 5-6: Forecasted Percentage Change in Industrial Production, 2016 and 2017



Source: Blue Chip Economic Indicators (BCIE)

5.3 National Trends and Outlook

National trends in employment, labor participation, real household income, and fuel prices were used to inform Jacobs' growth forecasts. In addition, recent growth in national vehicle-miles traveled (VMT) was taken into consideration in the development of our toll traffic and revenue forecasts for the DRJTBC.

5.3.1 Employment

The labor market in the United States has improved since the last recession and although there are signs that it has not fully recovered most analysts expect to see continued strength in the job market into the near future.

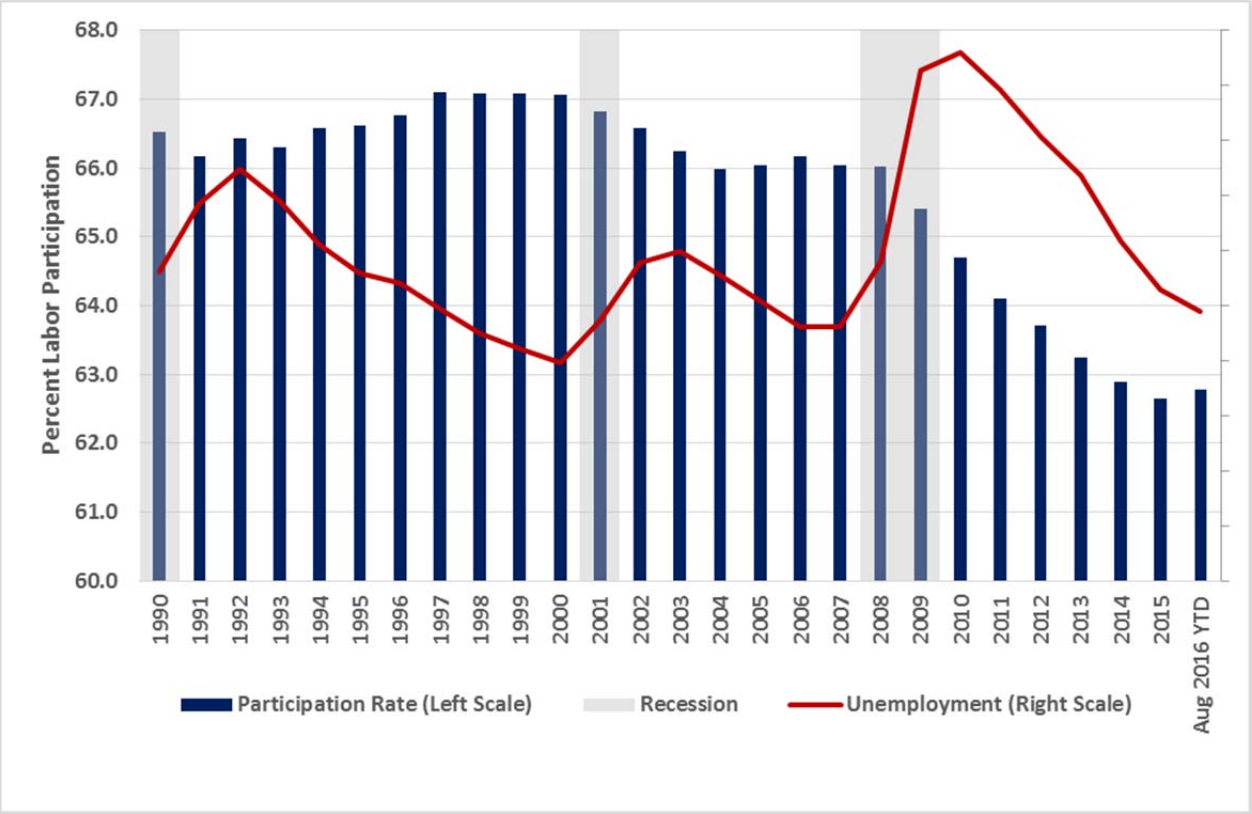
During the height of the most recent recession, the unemployment rate in the United States reached 10.0 percent, a level not witnessed since the early 1980s. As the U.S. economy began to grow again in the summer of 2009, the unemployment rate slowly began to fall, reaching 4.9 percent as of January 2016, a rate that still holds as of August 2016.

Other measures of labor market health, however, have not recovered as well. The civilian labor force participation rate remains low at 62.8 percent as of August 2016 and the civilian employment to population ratio also remains low although beginning to improve. These two measures demonstrate that their remains room for improvement in the labor market.

Despite some challenges, analysts generally predict the market for jobs to remain strong in the immediate future. The consensus forecast published in the *Blue Chip Economic Indicators* states that the unemployment rate should be 4.8 percent in 2016 and 4.6 percent in 2017. The Congressional Budget Office (CBO) expects the unemployment rate to remain below 4.9 percent until 2020, at which point the CBO forecasts it to stabilize at 5.0 percent until 2026.

Figure 5-7 displays recent trends in the unemployment and civilian labor participation rates.

Figure 5-7: Labor Participation Rate and the Unemployment Rate, 1984 through Aug 2016

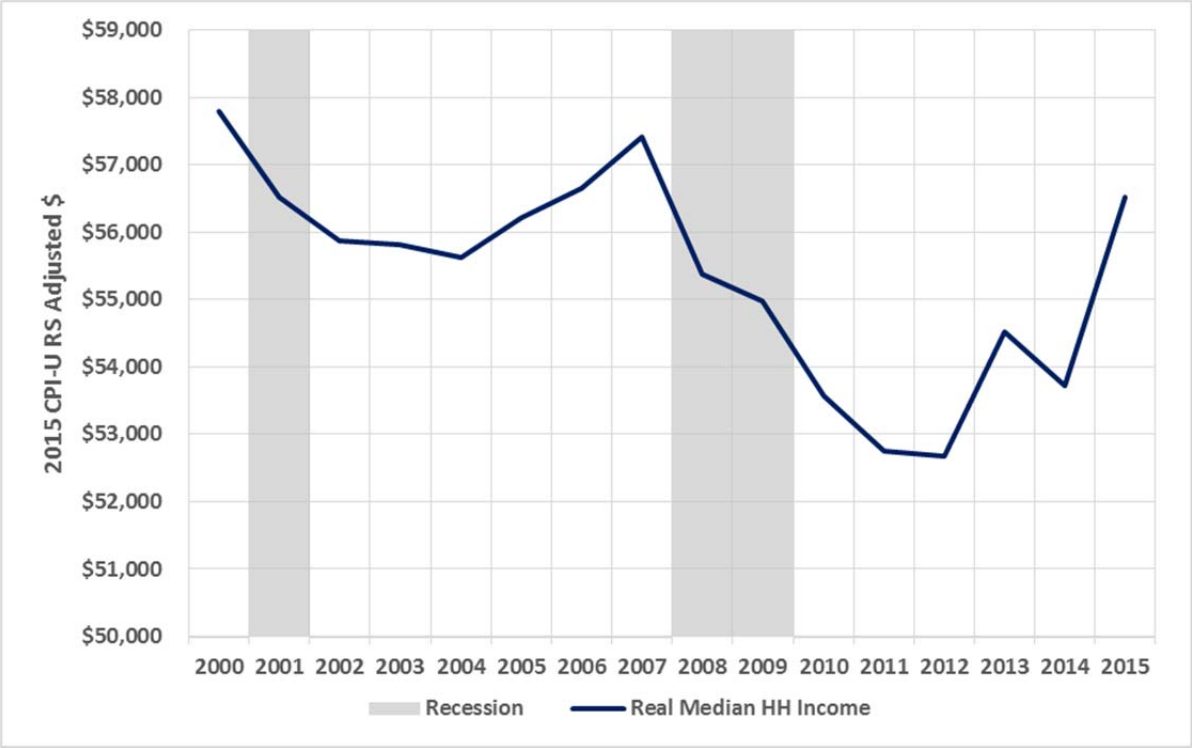


Source: Bureau of Labor Statistics (BLS), U.S. Department of Labor

5.3.2 Income

The recent recession impacted income, which affects consumer purchasing power and economic growth. Recently, real household median income peaked at $57,724 in 2000 but then declined to $52,666 by 2012 before eventually rising approx. 7% to the level of $56,516 in 2015. The 2015 level was 98 percent of the year 2000 level. Figure 5-8 shows annual real household income during economic expansionary periods and recessions.

Figure 5-8: Real Household Income, 2000 - 2015



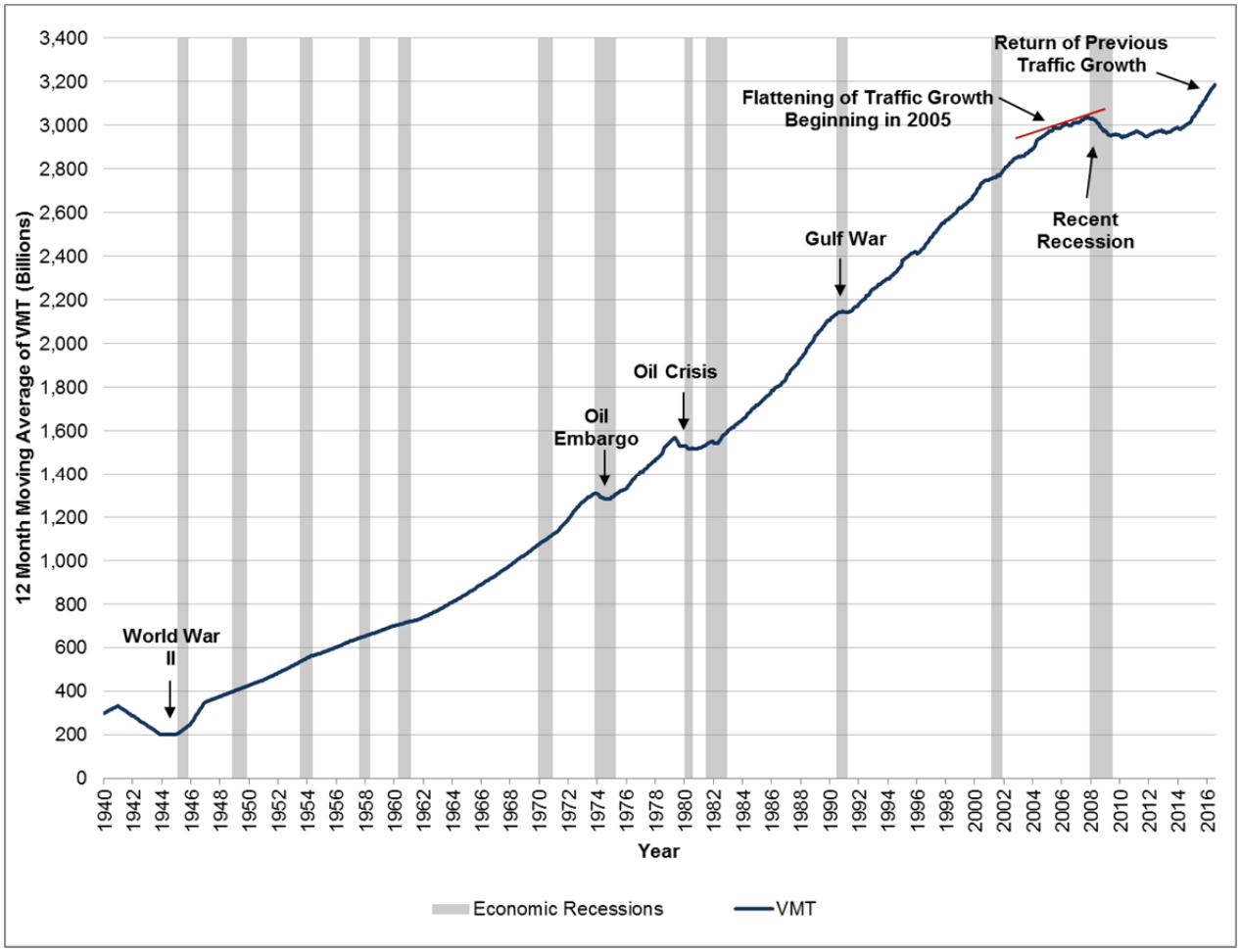
Source: U.S. Bureau of the Census, most recent available data (2014).

5.3.3 National Trends in Vehicle Miles Traveled (VMT)

Figure 5-9 depicts the 12-month moving average of national travel mileage on all U.S. highways, from 1940 through 2016. As seen in this figure, there were temporary reductions in vehicle-miles traveled (VMT) during World War II, oil crises, and economic recessions. Despite these temporary "dips", the VMT continued to grow rapidly over the years. It shows that, in recent years, with the exception of short, flat periods during the 1991 and 2001 recessions (each less than one year), VMT grew at a steady pace through about 2005.

Then, between 2005 and 2007, the United States experienced an historic flattening in the growth of nationwide VMT. This was followed by a significant reduction in VMT during the recession. A reduction in VMT means less revenue – in the form of gas tax or tolls – for funding transportation operation, maintenance and capital expenses. It is therefore encouraging for providers of transportation infrastructure and related services to see VMT growth return to more historic trends, as it did in 2014 through 2016. While VMT was generally flat from the end of the 2008 until the beginning of 2014, after that point if began to grow. Increased economic growth and a reduction in real retail gas prices have undoubtedly influenced this trend. It remains to be seen whether this resumption in growth will continue into the future or stall once again.

Figure 5-9: U.S. Annual Vehicle Miles Traveled (VMT), 1940-2016

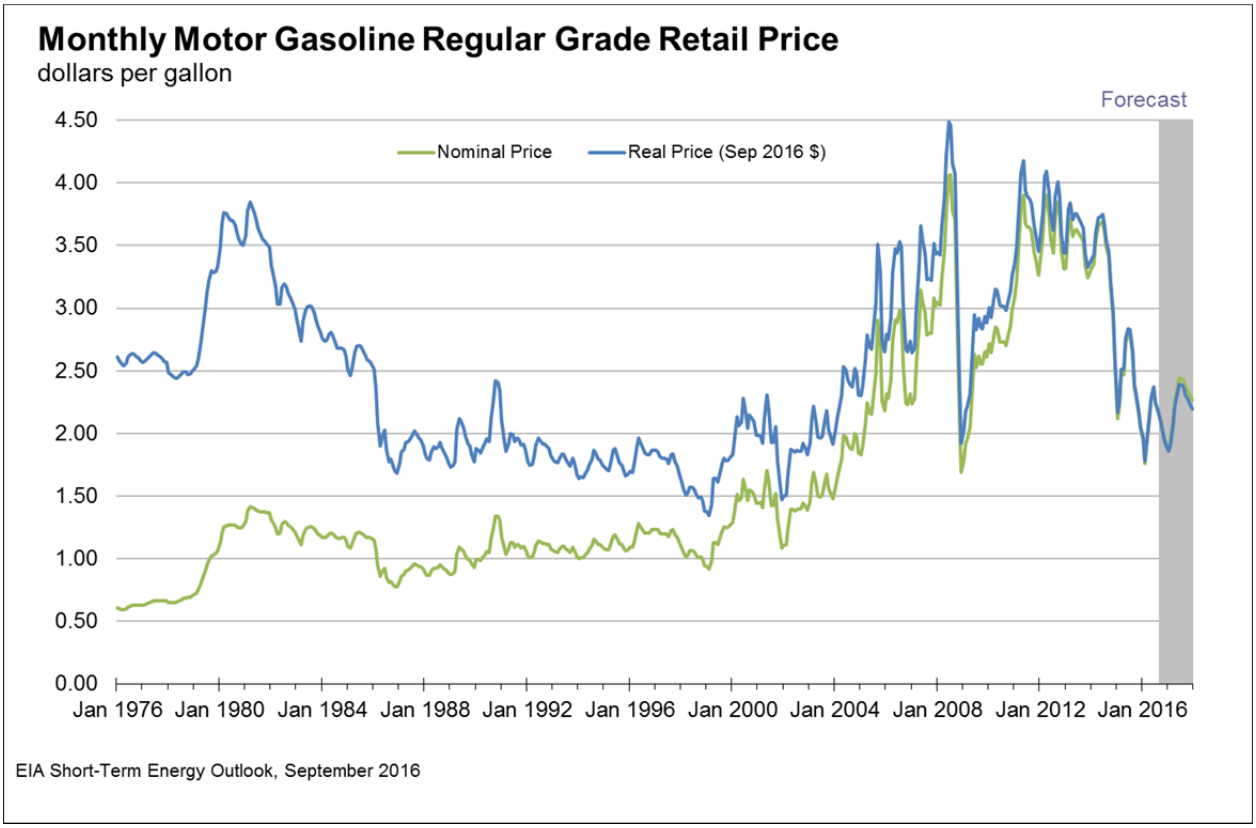


Source: Federal Highway Administration (FHWA)

5.3.4 Fuel Cost Impacts on Travel

Figure 5-10 presents historical as well as forecasted changes in gasoline and crude prices prepared by the U.S. Energy Information Administration (EIA). The graph illustrates the peaking of gasoline prices in the summer of 2008, the precipitous drop in late 2008, the spike in gasoline prices that occurred in the middle of 2011, subsequent fluctuations thereafter, and finally another drop in the fall of 2015. This relatively large reduction in prices is mainly due to the increased production of oil and natural gas in the U.S. from fracking and other innovative techniques. In its most recent report, the EIA projected that gasoline prices, which averaged $2.10 per gallon in the first half of 2016, would average approximately $2.20 per gallon for the first half of 2017.

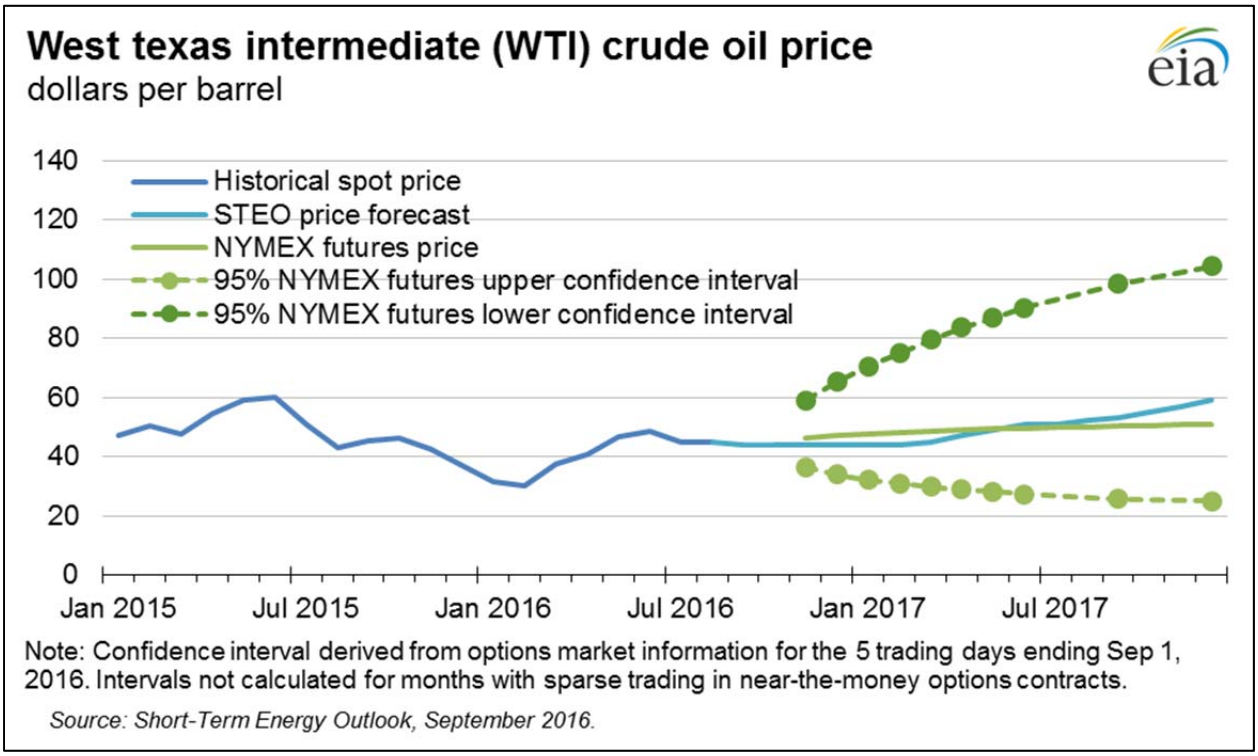
Figure 5-10: Historical and Projected U.S. Gasoline Prices, 1976 to 2016



Source: Short-Term Energy Outlook, U.S. Energy Information Administration (EIA), September 2016

This forecast of relatively low future oil and gas prices may be reassuring; however, what this graph does not show is the level of uncertainty in these projections. Much of this forecast is based on the increased production due to relatively new technological improvements, such as fracking, increased production from renewable energy sources, and long-term improvements in motor vehicle efficiency as well as relatively economic weakness in certain parts of the world. However, it remains to be seen whether these trends are sustainable over time. Figure 5-11 displays historical and forecasted price information for crude oil.

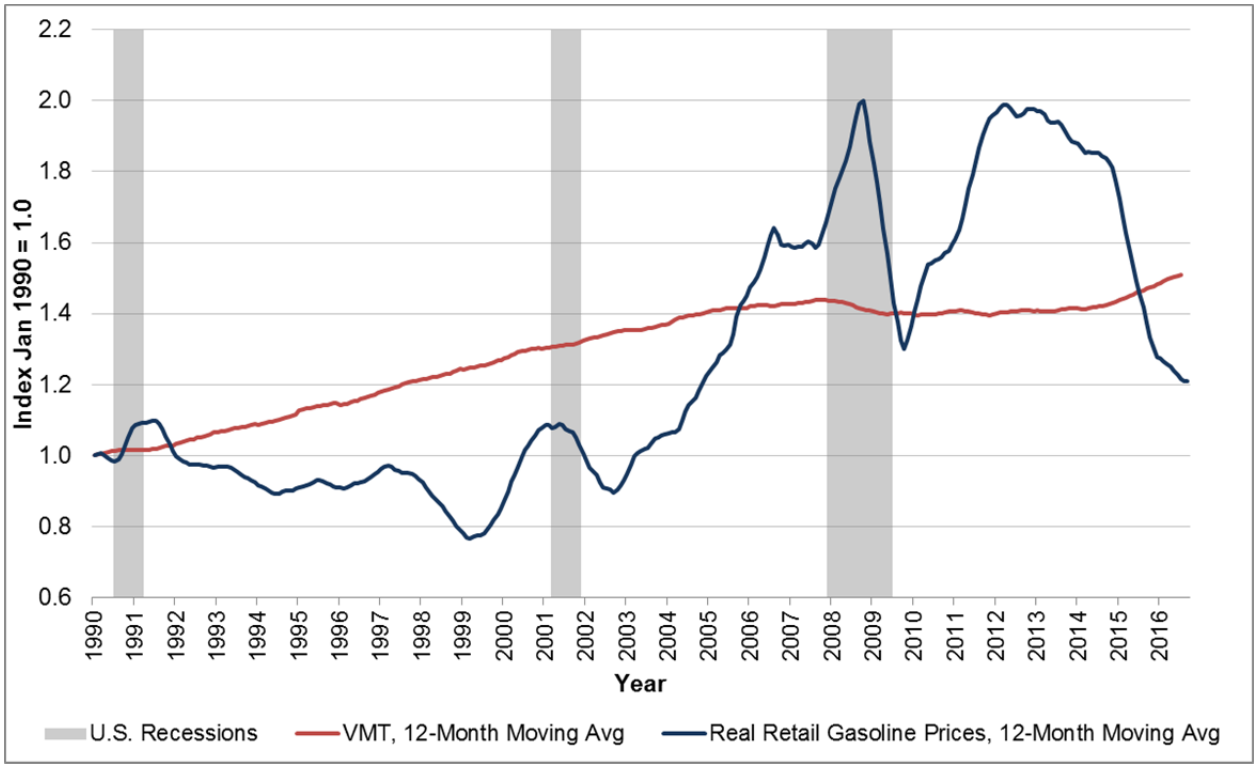
Figure 5-11: Short-Term Oil Price Forecast



To understand the potential impact of future gas prices on traffic, we can look at historical reactions to changes in gas prices. Figure 5-12 presents historical VMT across the United States as compared to real gasoline prices from 1990 through 2016. Both the VMT and real gas prices represent a 12-month moving average to remove any seasonality factors; all data has been indexed to January 1990.

The increase in real gasoline prices that began in the early 2000s and the recession that commenced in 2008 contributed to a flattening, then decrease, in the amount of VMT in the United States. The 12-month moving average of VMT remained relatively unchanged in 2009 and 2010 despite relatively low real gasoline prices. In fact, VMT only started to increase again at a rate approaching its historical trend in 2014. 2014 through early 2016 saw a steep growth in VMT which corresponded with a precipitous drop in gas prices during those two years.

Figure 5-12: National VMT vs. Real Gas Prices, 12-Month Moving Average, 1990 - 2016



Sources: U.S. Energy Information Administration (EIA) and Federal Highway Administration (FHWA)

5.4 Regional Economic and Demographic Outlook

The demographic area that is in relatively close proximity to the Delaware River Joint Toll Bridge Commission (DRJTBC) facilities encompasses all or part of two states, four metropolitan statistical areas (MSA) – New York, Philadelphia, Allentown, and East Stroudsburg – three Metropolitan Planning Organizations (MPO) and nineteen counties. Ten of the 19 counties analyzed are located in New Jersey and nine are in Pennsylvania. This study area had a combined population of 8.6 million in 2010 and accounted for approximately 3 percent of U.S. GDP in 2012. Drawing from definitions developed by the U.S. Office of Management and Budget, for the purposes of this analysis, Philadelphia, Allentown-Bethlehem, East Stroudsburg, Trenton-Ewing, and Edison-New Brunswick are considered to be separate economic regions. The greater New York City area, including the Newark-Union area, has not been included due to the relatively greater distances to DRJTBC facilities. Notwithstanding, two outlying counties—Hunterdon and Sussex—have been included in this analysis.

5.4.1 Regional Population

The total population of this nineteen county area has grown from 7.6 million in 1990 to 8.7 million in 2010, representing a compound average growth rate (CAGR) of 0.63 percent during this period. Using recent forecasts prepared by the Delaware Valley Regional Planning Commission (DVPRC), North Jersey Transportation Planning Authority (NJTPA), the Lehigh Valley Planning Commission (LVPC), total population within this area is estimated to reach 9.1 million in 2020, 9.6 million in 2030, and 10.1 million by 2040. This represents a compound annual growth rate (CAGR) of 0.5 percent from 2010 to 2040. The ten New Jersey counties had a total population of 3.8 million and are estimated to increase to 4.4 million by 2040. Table 5-1 summarizes historical and forecast population in the New Jersey counties that form part of the DRJTBC study area from 1990 to 2040. This table represents the most recent consistent set of data and forecasts from various sources. We recognize that the table shows 2015 as a forecast, but any differences are minimal and will not change our forecasts.

Table 5-1: New Jersey County Population, 1990 to 2040

Population	Actual				Forecast						
New Jersey	**1990**	**2000**	**2010**	**1990-2010 CAGR**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2010-40 CAGR**
Burlington County	395,066	423,394	448,734	0.64%	450,915	457,126	471,732	486,343	492,552	494,732	0.33%
Camden County	502,824	508,932	513,657	0.11%	514,351	516,331	520,980	525,629	527,609	528,303	0.09%
Gloucester County	230,082	254,673	288,288	1.13%	292,455	304,311	332,202	360,097	371,953	376,117	0.89%
Hunterdon County	107,776	122,000	127,400	0.84%	130,460	133,594	136,803	140,089	143,454	147,100	0.48%
Mercer County	325,824	350,761	366,513	0.59%	367,660	370,543	377,428	384,309	388,385	390,729	0.21%
Middlesex County	671,780	750,200	809,900	0.94%	841,566	874,471	908,662	944,190	981,106	1,023,100	0.78%
Monmouth County	553,124	615,300	630,400	0.66%	640,954	651,686	662,597	673,690	684,969	696,900	0.33%
Somerset County	240,279	297,500	323,400	1.50%	331,629	340,068	348,722	357,596	366,696	376,600	0.51%
Sussex County	130,943	144,166	149,300	0.66%	156,548	164,147	172,115	180,470	189,231	199,500	0.97%
Warren County	91,607	102,437	108,700	0.86%	112,202	115,817	119,549	123,401	127,376	131,800	0.64%
New Jersey Counties	**3,249,305**	**3,569,363**	**3,766,292**	**0.74%**	**3,838,741**	**3,928,094**	**4,050,789**	**4,175,814**	**4,273,332**	**4,364,881**	**0.49%**

Sources: Delaware Valley Regional Planning Commission (DVPRC), Lehigh Valley Planning Commission (LVPC), North Jersey Transportation Planning Authority (NJTPA), and the U.S. Census Bureau

The nine Pennsylvania counties had a total population of 4.9 million in 2010 and are expected to increase to 5.7 million by 2040. Although population has decreased in Philadelphia County since 1990, the DVPRC forecasts that the county's population will increase to 1.6 million by 2040. Table 5-2 summarizes historical and projected population in the Pennsylvania counties included in the DRJTBC study area and for the area, as a whole. This table represents the most recent consistent set of data and forecasts from various sources. We recognize that the table shows 2015 as a forecast, but any differences are minimal and will not change our forecasts.

Table 5-2: Pennsylvania County and Total DRJTBC Study Area Population, 1990 to 2040

Population	Actual				Forecast						
Pennsylvania	**1990**	**2000**	**2010**	**1990-2010 CAGR**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2010-40 CAGR**
Bucks County	541,174	597,635	625,249	0.72%	634,880	654,140	673,290	692,440	709,793	727,150	0.50%
Chester County	376,396	433,501	498,886	1.42%	516,582	538,809	573,114	607,407	629,634	647,330	0.87%
Delaware County	547,651	551,974	558,979	0.10%	559,498	560,989	564,481	567,978	569,463	569,982	0.06%
Lehigh County	291,131	312,090	349,497	0.92%	352,965	385,710	389,537	427,162	431,400	469,975	0.99%
Monroe County	95,709	138,687	176,842	3.12%	190,414	205,027	220,762	239,824	245,820	251,965	1.19%
Montgomery County	678,111	750,097	799,874	0.83%	808,534	824,166	849,690	875,214	889,516	896,741	0.38%
Northampton County	247,105	267,066	297,735	0.94%	312,955	329,516	346,361	365,766	384,464	403,979	1.02%
Philadelphia County	1,585,577	1,517,550	1,526,006	-0.19%	1,536,124	1,551,247	1,572,342	1,599,436	1,618,512	1,630,589	0.22%
Pike County	27,966	46,306	57,369	3.66%	64,598	72,737	81,902	94,374	96,733	99,152	1.84%
Pennsylania Counties	**4,390,820**	**4,614,906**	**4,890,437**	**0.54%**	**4,976,549**	**5,122,341**	**5,271,479**	**5,469,601**	**5,575,335**	**5,696,863**	**0.51%**
Total	**7,640,125**	**8,184,269**	**8,656,729**	**0.63%**	**8,815,290**	**9,050,435**	**9,322,268**	**9,645,415**	**9,848,667**	**10,061,744**	**0.50%**

Sources: Delaware Valley Regional Planning Commission (DVPRC), Lehigh Valley Planning Commission (LVPC), North Jersey Transportation Planning Authority (NJTPA), and the U.S. Census Bureau

5.4.2 Regional Economic Output

Economic activity within the DRJTBC study area is driven largely by the New York City and Philadelphia metropolitan areas, but also includes the considerably smaller Allentown and East Stroudsburg MSAs. Although economic activity within each Metropolitan Division had been significantly impacted by national and international trends, economic growth in each region is driven by different factors. A brief description and economic profile of each region is provided below:

- Philadelphia Metropolitan Statistical Area: Economic activity in the Philadelphia area, which was once dominated by manufacturing, is now strongly driven by knowledge-based industries, such as life sciences, information technology, professional services, health and education and financial services sectors. In particular, the region is home to nearly 400 life science, pharmaceutical, biotech, and research and development companies, making it one of the largest science industrial clusters in the U.S. The Philadelphia area also includes a solid information technology industry, including major employers such as Lockheed Martin, Comcast, Verizon, SAP AG, Sungard Data Systems, and Unisys. Although comprising eight percent of the real Gross Regional Product (GRP) in 2012, the manufacturing activity includes the production of electronics, defense systems, aerospace, shipbuilding, and chemicals.

- Trenton-Ewing Metropolitan Area: Trenton is the state capital of New Jersey, and government activity accounted for 14.5 percent of GRP in 2014. Although forming part of the greater New York City area, the Trenton-Ewing area is located in close proximity to and influenced by economic activity in the Philadelphia area. The Trenton area also benefits from having a relatively large high-skilled labor force due to Princeton

University, large pharmaceutical and energy companies, such as Bristol-Myers Squibb and NRG Energy, and government-related activity. Manufacturing activity, which was once an important component of the local economy, has experienced a recent resurgence. However, manufacturing continues to be a relatively small slice of the local economy, accounting for 7 percent of GRP in 2014.

- Edison-New Brunswick Metropolitan Division: This area was among the hardest hit by Superstorm Sandy in 2012, which has impacted economic activity. Recovery efforts are ongoing with some recent economy activity resulting from reconstruction of damaged facilities. The professional and business services sector is a key component of the local economy. Large pharmaceutical companies, e.g. Novo Nordisk, and Rutgers University are also located in this region.

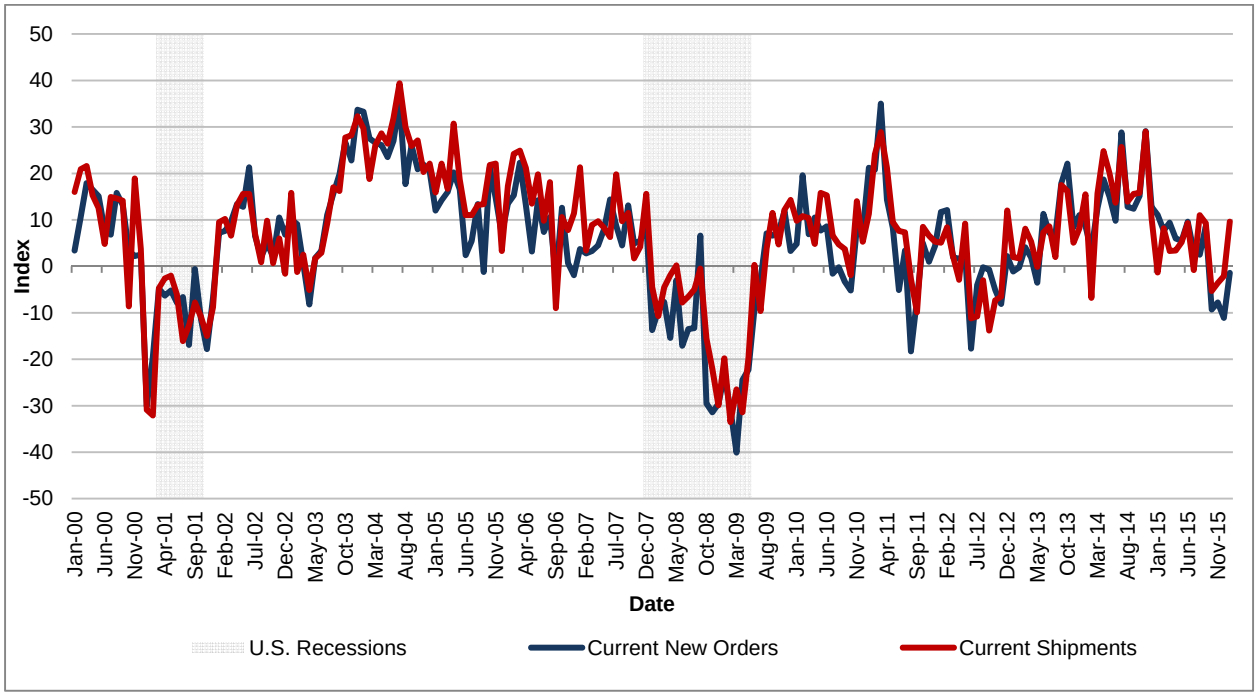
- Allentown-Bethlehem: Once strongly driven by mineral extraction (e.g., slate, iron ore, and limestone), manufacturing (e.g., steel and cement), and the construction industries, the area has attempted to diversify its economy in recent years as these sectors have declined in importance. From 2001 to 2014, manufacturing activity decreased from 23 percent to 14 percent of GRP, while construction has gone from 6 percent to 3 percent of GRP (latest data available). Additionally, some of the larger mining sites have been closed and repurposed as recreational areas or economic opportunity zones. Recent economic activity in this region has been driven by growth in professional services, health care, distribution centers, and retail trade sectors.

- East Stroudsburg: This metropolitan area is largely contained within Monroe County, Pennsylvania. During the housing boom, many New York commuters moved to the East Stroudsburg area to take advantage of its considerably lower cost of living despite the long travel times – average commuting time is nearly 40 minutes and is among the highest in the U.S.

5.4.3 Regional Manufacturing and Exports

Manufacturing activity can be measured by New Orders Index and the Shipments Index developed by the Federal Reserve Bank of Philadelphia, which tracks economic activity in New Jersey, Pennsylvania, and Delaware. Consistent with general economic conditions, there were decreases in both indices during the early 2000s recession, an increase in new orders and shipments from 2004 to 2007, and steep decreases during 2008 and 2009. These indices increased during 2010 and 2011, but decreased locally in 2012. Through September 2015, there have been relatively strong gains in both of these indices although the end of 2015 saw both indices contract. Current shipments picked up again in 2016. Figure 5-13 summarizes new orders and shipments indices prepared by the Federal Reserve Bank of Philadelphia from 2000 to January 2016.

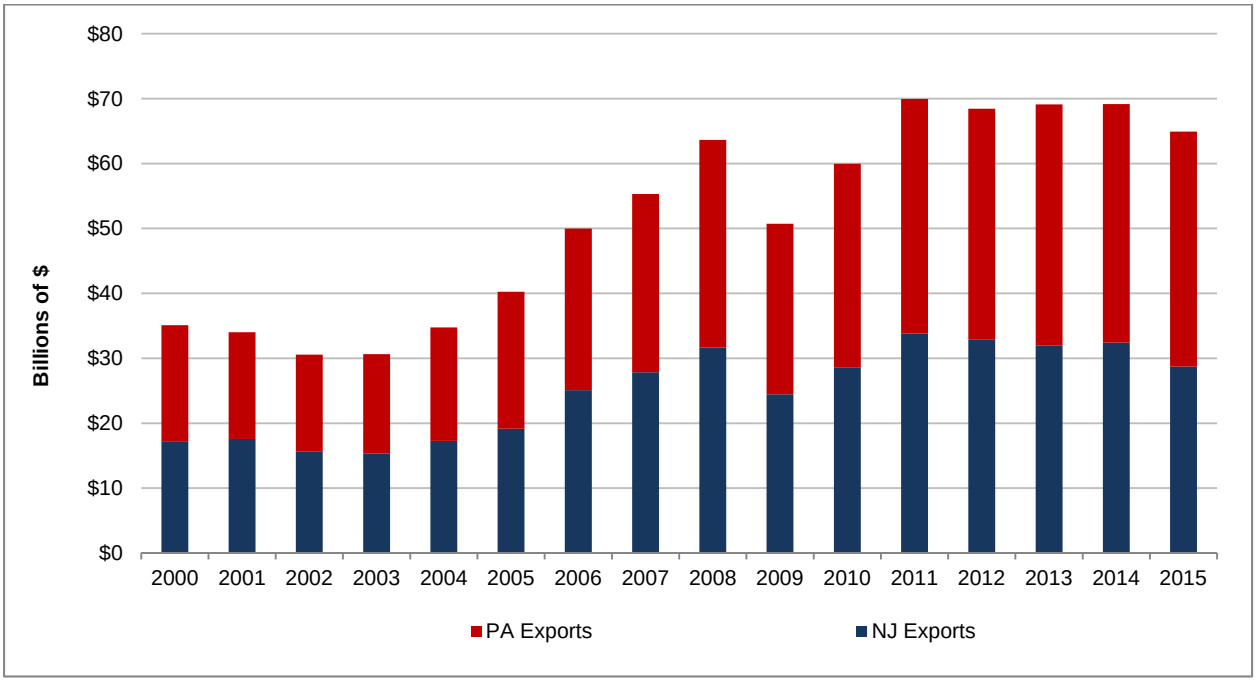
Figure 5-13: New Orders and Shipment Indexes, 2000 to January 2016



Source: Federal Reserve Bank of Philadelphia

Merchandise exports have increased by approximately 4 percent per annum since 2000 in New Jersey and Pennsylvania. In dollar terms, the value of statewide exports from New Jersey has nearly doubled from $17.2 billion in 2000 to $28.7 billion in 2015. Merchandise exports produced in Pennsylvania have exhibited similar patterns, increasing from $17.9 billion to $36.2 billion during this period. Using data compiled by the International Trade Administration (ITA) within the U.S. Department of Commerce, Figure 5-14 summarizes total manufactured exports produced in New Jersey and Pennsylvania from 2000 to 2015.

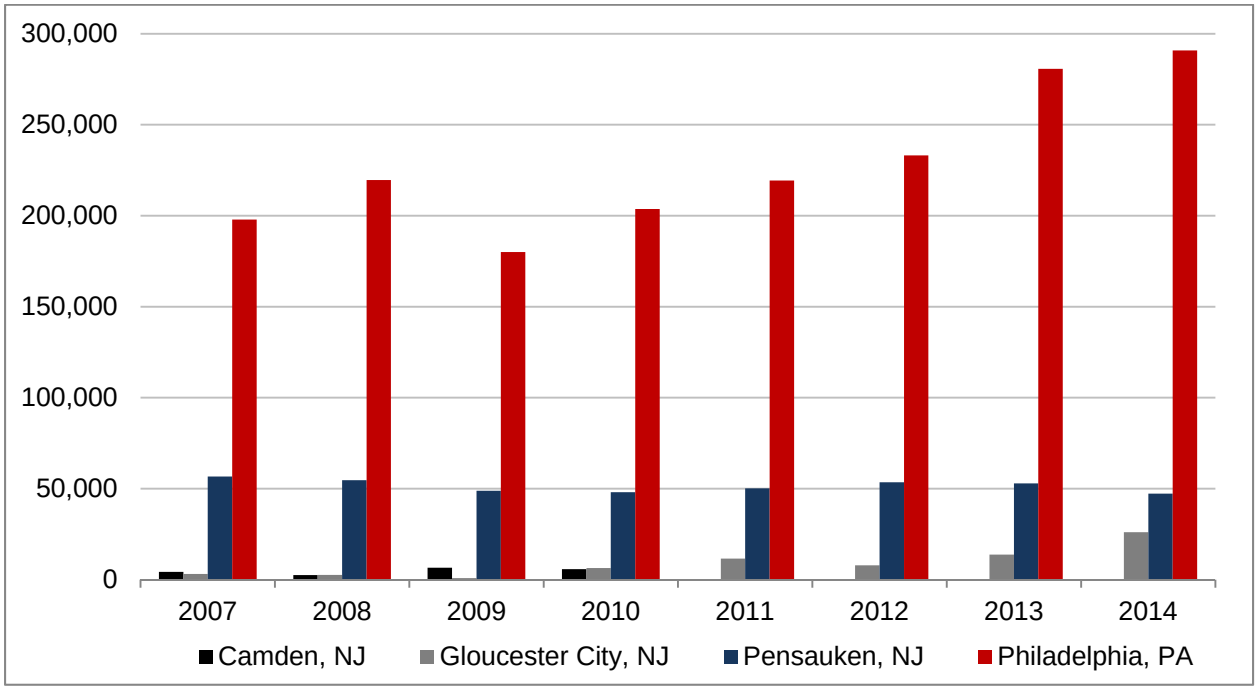
Figure 5-14: Manufactured Exports Produced in New Jersey and Pennsylvania, 2000 to 2015



Source: International Trade Administration, U.S. Department of Commerce

The largest waterborne port along the Delaware River is the Port of Philadelphia which handled 290,852 Twenty-Foot Equivalent Units (TEUs) in 2014, making it the 16th largest port in the U.S. by that measure, and a key gateway for imports from African countries. Total TEUs handled by the Port of Philadelphia accounted for approximately one percent of the 31.7 million TEUs accommodated through U.S. ports. Cargo moved through the Port of Philadelphia has subsequently recovered – total TEUs accommodated in 2014 have exceeded 2008 levels. Major commodities and goods exported through the Port of Philadelphia included refined petroleum products, automobiles and vehicle parts, iron and steel, paper, plastics products, and medical equipment. Major imported commodities included crude petroleum, refined petroleum products, meat, fruit, beverages, and paper products. Smaller ports located along the Delaware River in New Jersey include the ports of Camden, Gloucester City, and Pennsauken, handling an average of approximately 6,500 TEUs, from 2010 to 2014. Figure 5-15 summarizes the amount of TEUs handled by these Delaware River ports from 2007 to 2014.

Figure 5-15: TEUs Transported Through the Delaware River Ports, 2007 to 2014



Source: U.S. Department of Transportation, Maritime Administration, most recent data available.

5.4.4 Regional Employment

Total employment in the New Jersey counties included in the study area increased from 1.6 million in 1990 to 1.8 million in 2010, representing a compound annual growth rate of 0.8 percent period. Employment grew the most in the more populous counties: Somerset County (1.0 percent increase per year from 2000 to 2010), Mercer County (1.0 percent per year), Camden County (0.7 percent per year), Burlington County (0.6 percent per year), Middlesex County (0.6 percent per year) and Monmouth County (0.5 percent per year). Recent forecasts prepared by DRVPC and NJTPA estimate that total employment in these ten New Jersey counties will exceed 2.2 million by 2040. It should be noted that many New Jersey residents do not work in state, but instead commute to New York City, Philadelphia, Wilmington, and other regional employment centers. Table 5-3 summarizes historical and forecast employment for the New Jersey counties included in the DRJTBC study area from 1990 to 2040. This table represents the most recent consistent set of data and forecasts from various sources. We recognize that the table shows 2015 as a forecast, but any differences are minimal and will not change our forecasts.

Table 5-3: New Jersey Employment by County, 1990 to 2040

Employment	Actual				Forecast						
New Jersey	**1990**	**2000**	**2010**	**1990-2010 CAGR**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2010-40 CAGR**
Burlington County	191,345	205,886	217,229	0.64%	218,472	221,440	228,422	235,404	238,372	239,414	0.32%
Camden County	227,933	235,355	263,406	0.73%	265,886	267,425	269,769	272,076	273,581	274,124	0.13%
Gloucester County	86,079	99,467	116,151	1.51%	117,596	121,708	131,382	141,056	145,169	146,614	0.78%
Hunterdon County	37,966	56,800	49,600	1.35%	53,403	57,498	61,906	66,653	71,764	78,300	1.53%
Mercer County	220,373	209,758	266,672	0.96%	267,493	271,279	276,220	281,160	284,235	286,087	0.23%
Middlesex County	364,963	406,200	409,200	0.57%	427,254	446,105	465,788	486,339	507,797	532,600	0.88%
Monmouth County	221,217	252,600	246,200	0.54%	257,927	270,212	283,082	296,565	310,690	327,200	0.95%
Somerset County	144,916	154,032	177,700	1.02%	188,166	199,248	210,983	223,410	236,568	252,500	1.18%
Sussex County	29,953	40,200	37,600	1.14%	40,842	44,364	48,189	52,344	56,858	62,800	1.72%
Warren County	33,100	35,700	35,000	0.28%	36,380	37,814	39,305	40,855	42,466	44,300	0.79%
New Jersey Counties	**1,557,845**	**1,695,998**	**1,818,758**	**0.78%**	**1,882,662**	**1,937,093**	**2,015,047**	**2,095,862**	**2,167,499**	**2,243,939**	**0.70%**

Sources: DVRPC, NJTPA, LVPC, the New Jersey DOT, Pennsylvania Department of Planning and Industry

In the Pennsylvania counties that form part of the study area, total employment increased from 2.3 million to 2.5 million from 1990 to 2015. Table 5-4 summarizes the historical and projected change in employment through 2040. Recent forecasts estimate that total employment in these Pennsylvania counties will increase to 2.8 million by 2040.

Table 5-4 summarizes historical and forecast employment for the Pennsylvania counties in the DRJTBC area. This table represents the most recent consistent set of data and forecasts from various sources. We recognize that the table shows 2015 as a forecast, but any differences are minimal and will not change our forecasts. Overall, total employment in the DRJTBC study area is expected to increase from 4.4 million in 2010 to 4.5 million in 2020, 4.8 million in 2030, and 5.0 million in 2040. This increase represents a forecasted compound average growth rate of 0.5 percent.

Table 5-4: Pennsylvania Employment by County and Total DRJTBC Study Area Employment, 1990 to 2040

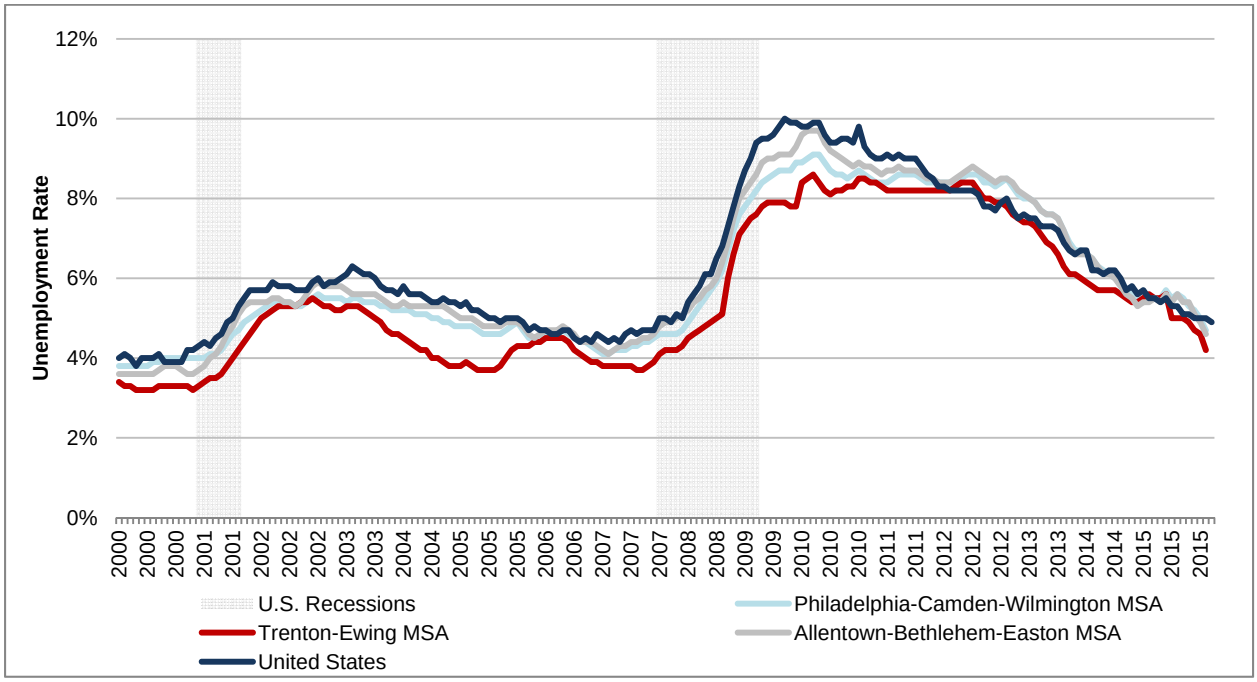
Employment	Actual				Forecast						
Pennsylvania	**1990**	**2000**	**2010**	**1990-2010 CAGR**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2010-40 CAGR**
Bucks County	245,360	267,124	293,325	0.90%	296,215	302,961	313,899	324,832	331,329	335,747	0.45%
Chester County	197,752	238,641	292,015	1.97%	301,075	312,456	330,019	347,581	358,962	368,022	0.77%
Delaware County	227,883	238,164	238,488	0.23%	238,733	239,431	241,072	242,713	243,410	243,655	0.07%
Lehigh County	179,696	208,260	218,507	0.98%	237,752	249,511	262,156	275,136	289,421	302,771	1.09%
Monroe County	47,000	66,300	74,400	2.32%	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Montgomery County	457,501	492,677	542,264	0.85%	548,136	558,371	575,496	592,621	601,597	605,507	0.37%
Northampton County	119,000	132,900	138,300	0.75%	141,808	148,575	154,978	161,722	169,440	176,761	0.82%
Philadelphia County	836,874	741,397	720,837	-0.74%	723,497	729,173	739,283	752,075	762,499	769,711	0.22%
Pike County	13,100	20,400	23,700	3.01%	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pennsylania Counties	**2,324,166**	**2,405,863**	**2,541,836**	**0.45%**	**2,487,216**	**2,540,478**	**2,616,903**	**2,696,680**	**2,756,658**	**2,802,174**	**0.33%**
Total	**3,882,011**	**4,101,861**	**4,360,594**	**0.58%**	**4,369,878**	**4,477,571**	**4,631,950**	**4,792,542**	**4,924,157**	**5,046,113**	**0.49%**

Sources: DVRPC, NJTPA, LVPC, the New Jersey DOT, Pennsylvania Department of Planning and Industry

5.4.5 Regional Unemployment

The metropolitan statistical area and metropolitan divisions located within the study area have closely tracked national trends in unemployment. These regions have had a lower unemployment rate than the U.S. average. As of December 2015, the seasonally adjusted unemployment rates in the Philadelphia, Trenton, and Allentown regions ranged between 4.2 percent and 4.7 percent, slightly lower than the national unemployment rate of 4.9 percent. Figure 5-16 below summarizes regional and national unemployment rates tracked by the Bureau of Labor Statistics (BLS) from 2000 through December 2015.

Figure 5-16: Study Area MSAs and National Unemployment Rate, 2000 to Dec 2015



Source: Bureau of Labor Statistics

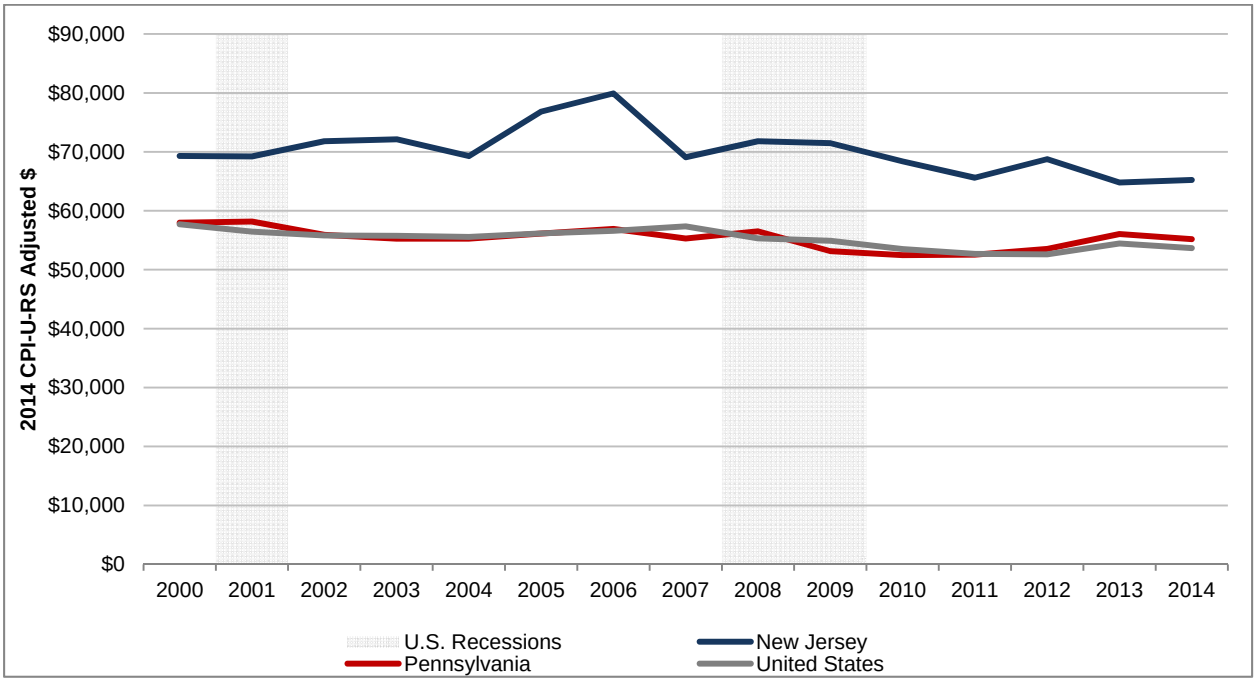
5.4.6 Regional Income

Real income is a key indicator of the direction and strength of the local economy. Figure 5-17 highlights that real median household income for the state of New Jersey has historically exceeded that of United States as a whole, while median household income in Pennsylvania has closely approximated national levels. The graph also highlights the impact of changes in national economic conditions on median household income at the state level.

Due to the importance of the financial services sector on New Jersey's economy, this relationship was particularly strong during the 2007-09 recession. Real median household income in New Jersey increased from $69,278 in 2004 to $79,915 in 2006 before falling to $65,243 in 2014. Income levels in New Jersey have yet to fully recover to their pre-recession highs. Despite this decline, median household income in New Jersey was approximately 22 percent higher than that of the national average in 2014. New Jersey also ranked as having the 7th highest median income in the United States.

In 2014, median household income in Pennsylvania was $55,173 or approximately 3 percent more than the national average. Pennsylvania ranked as the 24th highest state in the U.S in terms of income. Figure 5-17 summarizes real median household income in New Jersey, Pennsylvania, and the U.S. from 1984 to 2014.

Figure 5-17: Per Capita Income in New Jersey, Pennsylvania, and the U.S, 2000-2014



Source: Bureau of Economic Analysis, U.S. Department of Commerce

5.4.7 New Jersey and Pennsylvania Economic Forecast

Economic growth and employment in New Jersey and Pennsylvania have generally followed national trends. Current forecasts anticipate that this trend will continue in the short-term. Economic growth may be impacted due to the following:

- The Rutgers Economic Advisory Service/Rutgers University Center for Urban Policy Research forecasts that real Gross State Product (GSP) in New Jersey will increase by an average of 1.9 percent from 2016 to 2025;
- The State of New Jersey Department of the Treasury compiles the Garden State Activity Index – a composite of the Federal Reserve Bank of New York's coincident index, the Federal Reserve Bank of Philadelphia's coincident index, and the Philadelphia Fed's South Jersey Business Survey – to measure economic activity in the state. The Garden State Activity Index grew 3.1 percent in the year to September 2015.
- The Pennsylvania Department of Revenue forecasted that real Gross State Product (GSP) in Pennsylvania will increase 2.0 percent in 2016 and 2.1 percent in 2017. Total employment is expected to increase by 1.4 percent and 0.8 percent during this time period.
- New technology has improved access to vast reserves of natural gas in Pennsylvania. Natural resources and mining employment increased by 10,000 workers from 2010 to

2015. However, employment in the industry actually decreased during 2015 as relatively lower natural gas prices have dampened exploration activities.

- Employment growth is expected to continue. The Rutgers Economic Advisory Service/Rutgers University Center for Urban Policy Research forecasted that non-agricultural employment in New Jersey will increase by an average of 0.7 percent per year from 2016 to 2025;
- During 2014, home prices increased slightly in New Jersey and Pennsylvania. However, these indicators have increased at a slower rate than the U.S. as a whole.

6.0 TOLL TRAFFIC AND GROSS TOLL REVENUE FORECASTS

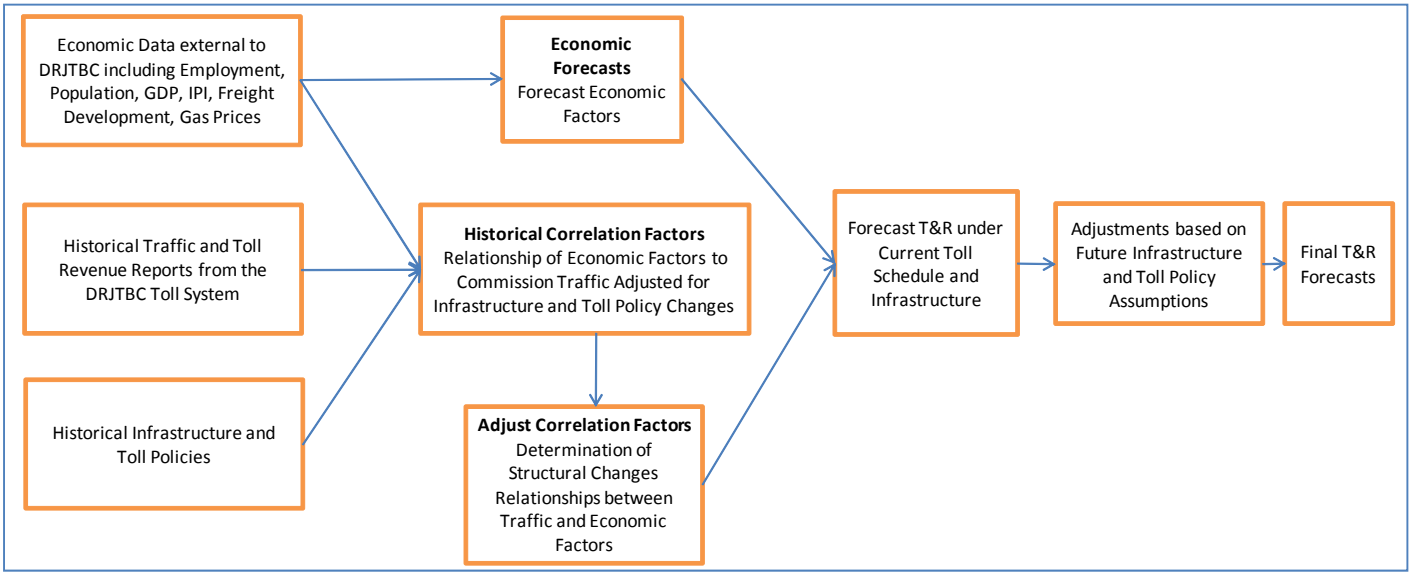
6.1 Seven Existing Toll Bridges

This section provides a narrative of the methodology used for developing the traffic and revenue forecasts for the seven (7) existing toll bridges, all which have a tolling history. The approach used for the Scudder Falls Bridge, which has no tolling history, is discussed in the preceding section of this report. Although the approaches are described independently in this report, the analyses overall consider the entire system and are reflected in the results.

6.1.1 Methodology Used for Forecasting

The forecasting model uses historical correlations between economic and demographic factors and normalized traffic levels on the Commission's toll facilities by vehicle and payment class, adjusts those correlation factors for the forecast when structural changes in relationships are becoming apparent, and then predicts traffic as a function of forecasted economic and demographic factors. These forecasts are then adjusted to reflect DRJTBC and non-DRJTBC system infrastructure construction and improvement projects. A flowchart of the modeling methodology is presented in Figure 6-1.

Figure 6-1: DRJTBC Model Methodology



Toll Traffic and Revenue forecasts were developed with the aid of a computerized modeling platform created specifically by Jacobs for the DRJTBC. The base function of this model is to take current traffic volumes by class and payment type for each DRJTBC toll facility and adjust them in the future years for various factors such as underlying socio-

economic/demographic growth in the corridor, both historic and current, as well as overall inflationary pressures. These adjustments result in forecasted traffic volumes being developed for each year of the forecast period. Gross toll revenues are then calculated based on these new adjusted traffic volumes by applying toll rates to the volume of each toll facility by payment type and vehicle class.

6.1.1.1 Inputs and Assumptions

In the creation of a base structure for forecasting calculations, it becomes necessary to assume some consistency in relationships between historical and future traffic and revenue trends. The following assumptions were used in the creation of the forecasting framework:

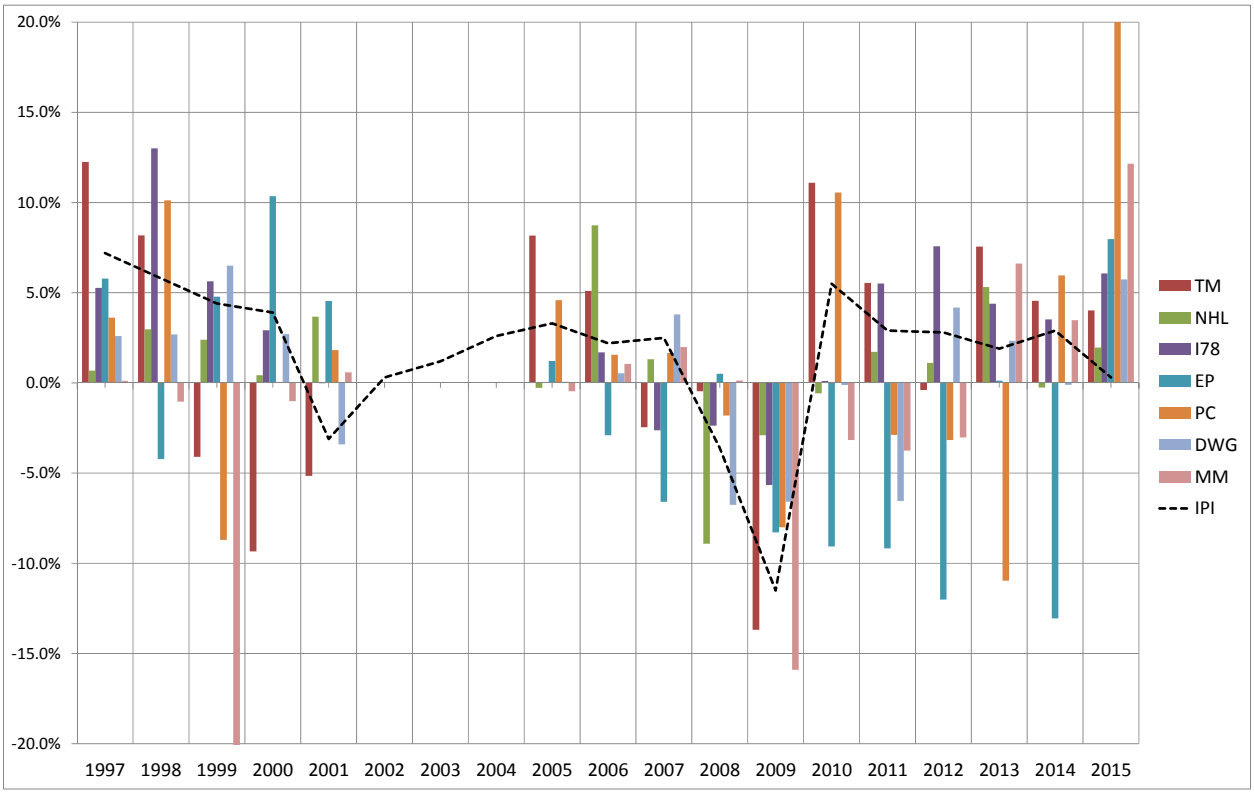
- Traffic Growth Trends: Correlations between historical traffic and socioeconomic indices such as Real Gross Domestic Product (GDP) and Industrial Production Index (IPI) will continue to exist. The correlation factors may slowly shift over time, but there will continue to be a correlation.
- E-ZPass Market Share Trends: In the past, on both the DRJTBC and other facilities offering electronic payment, the portion of trips paid for electronically has slowly increased over time until it approaches some level of market saturation, regardless of toll increases. It was assumed that this will hold true in the future.

6.1.1.2 Correlation to Economic Factors

In order to understand the correlation between socioeconomic factors and DRJTBC toll facility traffic, growth in historical traffic was compared to the growth in relevant socioeconomic factors, such as IPI and GDP. In the calculation of correlation constants for each of the DRJTBC facilities, years that experienced unusual events, such as toll increases, were left out of the calculation in an effort to “normalize” the correlation.

Figure 6-2 shows an example of traffic growth compared to a socioeconomic factor – in this case, the growth in truck traffic versus growth in IPI. On this graph, each of the individual DRJTBC toll facilities is represented by a different color bar, while IPI is represented by the black dashed line. As illustrated by this graph, truck growth and IPI growth tend to follow the same trends – a given year with strong positive truck growth on average, such as 1997 (far left) also saw strong IPI growth, while years with strong negative growth, such as 2009, also saw a large decrease in IPI.

Figure 6-2: Truck Growth versus IPI Growth



Correlations were also calculated between car growth and GDP, and population growth was considered as well. The correlation factors determined for each facility for GDP and IPI were used to relate growth forecasts to consensus forecasts for GDP and IPI throughout the forecast period.

6.1.1.3 Other Forecast Considerations

Some further considerations were made when developing our future traffic growth forecasts. Among these considerations are the historically-optimistic financial community economic forecasts (such as GDP and IPI) in recent years, as well as the estimated effects of construction projects, new regional development, changes to parallel corridors, and other factors not explicitly contained within the modeling process. This section includes a review of changes to nearby facilities, future transportation projects, and future developments that could influence traffic on the DRJTBC.

Modern route planning techniques used by many of the trucking companies are designed to optimize route selection and take into consideration factors such as travel time, fuel,

mileage, tolls, vertical grades, salaries, load optimization and other parameters in order to select the most important route for travel. Our analysis of potential diversions considers these important route choice factors. It should be noted that a majority of commercial vehicles using a particular DRJTBC bridge are doing so because they have already determined it to be the "best" route for the operation of their particular business needs. Similarly, the operators using the alternate routes have determined that those alternate routes are the "best" route to meet their needs.

Factors that have the potential to appreciably affect DRJTBC traffic levels would be activities in Pennsylvania and New Jersey immediately surrounding the DRJTBC toll facilities, including the construction of the new I-95 interchanges, and major development in adjacent areas. Changes to the toll rates on complementary and parallel roadways may also affect travel on DRJTBC facilities.

6.1.1.3.1 Transportation Projects, Potential Future or Completed

There are several highway projects either recently completed or that are scheduled for completion in the near term that were reviewed to determine their impact, if any, on DRJTBC traffic volumes.

I-95 / Pennsylvania Turnpike Interchange

Stage 1 of the project involves the construction of the I-95 mainline flyovers of the interchange between I-95 and the Pennsylvania Turnpike, a new mainline toll plaza west of this interchange, the replacement of the existing Delaware River Bridge toll plaza with a cashless tolling facility in the westbound direction, and the removal of the existing US 13 interchange toll facility.

Completed Stage 1 work includes the construction of the new Neshaminy Falls mainline toll plaza (opened in January 2016), located about two miles east of Exit 351 (US1). The toll plaza features Express E-Z Pass lanes which allow motorists to pass through the plaza at highway speeds. Conventional toll booths are provided in the outside lanes of the plaza for cash paying customers. This toll plaza phase also included the construction of a cashless tolling point (AET – EZ-Pass and Toll by Plate) at the Delaware River Bridge in the westbound direction and the removal of the Route 13 Interchange toll plaza. The I-95 mainline flyover connections of the Interchange are currently under construction and, upon their completion, I-95 will be re-designated onto the existing Pennsylvania Turnpike to the NJ Turnpike. At that time, I-95 north of the Turnpike will be re-designated in PA, as I-295 East/West, and in NJ up to US 1, as I-295 North/South. Signing, lighting and traffic operations work are being completed in phases throughout the construction period in order

to manage traffic during and after construction. Funding for Stage 1 improvements via the use of dedicated federal monies and Pennsylvania Turnpike Commission toll revenue has been fully identified and programmed at the statewide and regional level, and the total estimated cost of Stage 1 (all phases) is $424 Million.

A future Stage 2 will include construction of the remaining six new interchange ramp movements which do not have the I-95 designation, and completion of the mainline widening from 2 lanes in each direction to three lanes in each direction in addition to reconstruction work on the Turnpike and I-95. Construction of Stage 2 is not anticipated to begin until funding becomes available. A future Stage 3 will include a new parallel bridge over the Delaware River.

We are of the opinion that this project would not have a significant impact on future traffic levels on the current DRJTBC toll facilities. The current DVRPC model includes the interchange as it is currently envisioned to be funded and completed, with the first two ramps (Stage 1) completed at the end of 2018 and the other six ramps (Stage 2) completed in 2030.

Other Projects
The following is a list of several recently completed projects concerning DRJTBC Bridges that were reviewed for their potential impact to traffic. Our review determined that no adjustments to our forecast were warranted based on these activities.

- Easton-Phillipsburg Toll (Route 22) Bridge Rehab (completed), started June 2013, completed in spring 2015
- I-78 paving improvements (completed), 2012 and 2013
- New Hope-Lambertville Toll Bridge Improvements (completed), June-Nov 2013

6.1.1.3.2 Complementary Routes

Since 2009, there have been a number of toll rate increases on the Pennsylvania Turnpike. I-78 is an alternate to the Pennsylvania Turnpike for long distance trips. There have been increases in recent years of truck traffic on the I-78 Toll Bridge above and beyond its correlation to IPI. We are of opinion that there was some shift of truck traffic from the Pennsylvania Turnpike to I-78 due to the Pennsylvania Turnpike's toll increases, and that this accounts for a portion of the recent growth on the I-78 Toll Bridge. As we anticipate that there will be fewer and less substantial toll increases on the Pennsylvania Turnpike, we do not expect further significant perceptible shifts of truck traffic onto I-78 due to this reason.

6.1.1.4 E-ZPass Market Share Forecasts

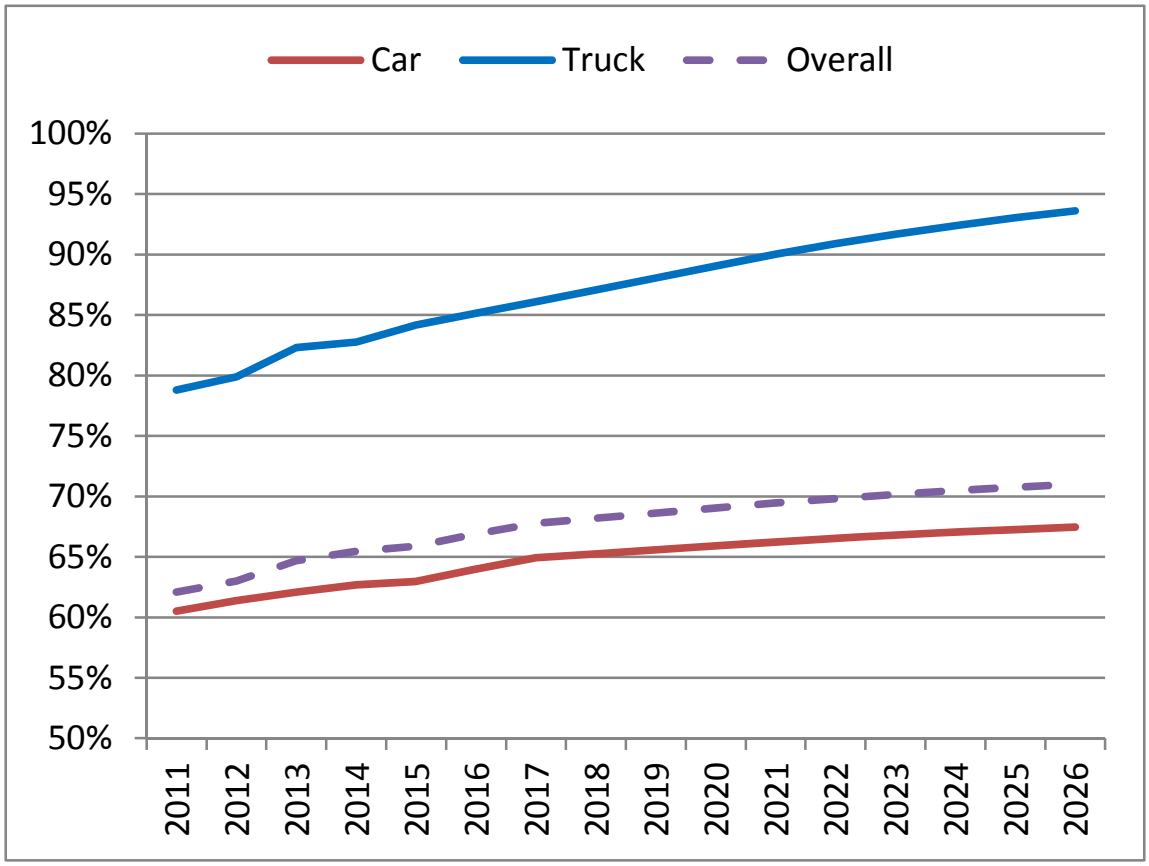
For the purpose of these forecasts, it was assumed that the DRJTBC's E-ZPass market share would continue to increase, but that the rate at which it increases would slow down over time.

Table 6-1 and Figure 6-3 present a summary of the historical and forecasted average trip market shares for cars and trucks for 2011-2026 and the projected overall market share through the forecast period.

Table 6-1: Historical and Forecasted E-ZPass Market Share of Trips

Year	Car	Truck	Overall
2011	60.5%	78.8%	62.1%
2012	61.4%	79.9%	63.0%
2013	62.1%	82.3%	64.7%
2014	62.7%	82.8%	65.5%
2015	63.0%	84.2%	65.9%
2016	64.0%	85.1%	66.9%
2017	64.9%	86.1%	67.8%
2018	65.2%	87.1%	68.2%
2019	65.6%	88.1%	68.6%
2020	65.9%	89.0%	69.0%
2021	66.2%	90.0%	69.4%
2022	66.5%	90.9%	69.8%
2023	66.8%	91.7%	70.2%
2024	67.1%	92.4%	70.5%
2025	67.3%	93.0%	70.7%
2026	67.5%	93.6%	71.0%

Figure 6-3: Historical and Forecasted E-ZPass Market Shares



6.1.1.5 Toll Rates Used in Preparing Forecast

We assumed the existing DRJTBC toll schedule throughout the forecast period in preparing the traffic and toll revenue forecasts, shown previously in Table 2-1.

6.1.1.6 Model Calculations

The model creates a framework based on the assumptions outlined above, and calculates the forecasted traffic and revenue by applying logic to the 2015 annual trips for each payment class. Some adjustment to traffic is necessary even with no changes in the toll schedule, as traffic grows and shifts between payment types based on historical trends. Estimated average toll rates based on historical data as well as any necessary adjustments due to traffic shifts and any toll increases are then applied to traffic estimates by class and payment type to produce a customized forecast resulting in precise estimates of total revenue.

6.1.2 Toll Trips and Gross Toll Revenue Forecasts

Table 6-2 and Table 6-3 present the forecasted toll transactions and toll revenues for the years 2016 through 2026. Figure 6-4 and Figure 6-5 present the forecasts graphically, while Figure 6-6 and Figure 6-7 show the future year-to-year growth in trips and gross toll revenues. Table 6-5 and Table 6-6 present traffic and revenue for the individual toll bridges.

Table 6-2: Forecasted DRJTBC Toll Transactions (in millions)

Facility		Delaware River Joint Toll Bridge Commission - Transaction Projections										
		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Trenton-Morrisville												
	Cars	8.41	8.58	8.65	8.70	8.76	8.81	8.86	8.92	8.97	9.03	9.08
	Trucks	0.59	0.59	0.59	0.60	0.61	0.62	0.63	0.64	0.65	0.66	0.67
	Total	***9.00***	***9.17***	***9.24***	***9.30***	***9.37***	***9.43***	***9.49***	***9.56***	***9.62***	***9.69***	***9.75***
New Hope-Lambertville												
	Cars	1.84	1.87	1.88	1.89	1.89	1.90	1.91	1.92	1.93	1.94	1.95
	Trucks	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.14
	Total	***1.96***	***1.99***	***2.01***	***2.02***	***2.02***	***2.03***	***2.04***	***2.05***	***2.07***	***2.08***	***2.09***
I-78												
	Cars	9.11	9.25	9.36	9.46	9.56	9.66	9.76	9.87	9.97	10.08	10.18
	Trucks	2.93	2.95	2.98	3.00	3.02	3.05	3.07	3.10	3.12	3.15	3.17
	Total	***12.04***	***12.20***	***12.34***	***12.46***	***12.58***	***12.71***	***12.83***	***12.97***	***13.09***	***13.23***	***13.35***
Easton-Phillipsburg												
	Cars	5.09	5.12	5.14	5.15	5.16	5.18	5.19	5.20	5.22	5.23	5.24
	Trucks	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
	Total	***5.42***	***5.45***	***5.47***	***5.48***	***5.49***	***5.51***	***5.52***	***5.53***	***5.55***	***5.56***	***5.57***
Portland-Columbia												
	Cars	1.19	1.20	1.21	1.22	1.23	1.23	1.24	1.25	1.26	1.27	1.27
	Trucks	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10
	Total	***1.28***	***1.29***	***1.30***	***1.31***	***1.32***	***1.32***	***1.33***	***1.35***	***1.36***	***1.37***	***1.37***
Delaware Water Gap												
	Cars	8.35	8.51	8.62	8.70	8.78	8.87	8.95	9.04	9.12	9.21	9.30
	Trucks	1.44	1.45	1.46	1.47	1.48	1.49	1.50	1.51	1.52	1.54	1.55
	Total	***9.79***	***9.96***	***10.08***	***10.17***	***10.26***	***10.36***	***10.45***	***10.55***	***10.64***	***10.75***	***10.85***
Milford Montague												
	Cars	1.30	1.32	1.33	1.33	1.34	1.34	1.35	1.35	1.35	1.36	1.36
	Trucks	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
	Total	***1.34***	***1.36***	***1.37***	***1.37***	***1.38***	***1.38***	***1.39***	***1.39***	***1.39***	***1.40***	***1.40***
Legacy Toll Bridges - SubTotal												
	Cars	35.29	35.85	36.19	36.45	36.72	36.99	37.26	37.55	37.82	38.12	38.38
	Trucks	5.54	5.57	5.62	5.66	5.70	5.75	5.79	5.85	5.90	5.96	6.00
	Total	***40.83***	***41.42***	***41.81***	***42.11***	***42.42***	***42.74***	***43.05***	***43.40***	***43.72***	***44.08***	***44.38***
Scudder Falls												
	Cars				5.5	9.5	9.6	9.7	9.8	9.8	9.9	10.0
	Trucks				0.4	0.7	0.7	0.7	0.7	0.7	0.7	0.7
	Trenton-Morrisville Diverted Traffic				0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	Total				***6.3***	***10.6***	***10.7***	***10.8***	***10.9***	***10.9***	***11.0***	***11.1***
All Toll Bridges												
	Cars	35.29	35.85	36.19	42.35	46.62	46.99	47.36	47.75	48.02	48.42	48.78
	Trucks	5.54	5.57	5.62	6.06	6.40	6.45	6.49	6.55	6.60	6.66	6.70
	Total	***40.83***	***41.42***	***41.81***	***48.41***	***53.02***	***53.44***	***53.85***	***54.30***	***54.62***	***55.08***	***55.48***

Note: 2016 data shown is unaudited.

Table 6-3: Forecasted DRJTBC Gross Toll Revenues (in millions)

Facility		Delaware River Joint Toll Bridge Commission - Toll Revenue Projections										
		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Trenton-Morrisville												
	Cars	$8.50	$8.64	$8.70	$8.75	$8.80	$8.84	$8.89	$8.94	$8.99	$9.04	$9.09
	Trucks	$7.56	$7.53	$7.59	$7.71	$7.83	$7.95	$8.08	$8.21	$8.34	$8.47	$8.61
	Total	***$16.06***	***$16.17***	***$16.29***	***$16.46***	***$16.63***	***$16.79***	***$16.97***	***$17.15***	***$17.33***	***$17.51***	***$17.70***
New Hope-Lambertville												
	Cars	$1.80	$1.82	$1.83	$1.84	$1.84	$1.85	$1.86	$1.87	$1.88	$1.89	$1.90
	Trucks	$1.44	$1.45	$1.47	$1.49	$1.51	$1.53	$1.55	$1.57	$1.59	$1.61	$1.63
	Total	***$3.24***	***$3.27***	***$3.30***	***$3.33***	***$3.35***	***$3.38***	***$3.41***	***$3.44***	***$3.47***	***$3.50***	***$3.53***
I-78												
	Cars	$9.63	$10.52	$10.64	$10.74	$10.85	$10.96	$11.07	$11.18	$11.29	$11.40	$11.52
	Trucks	$52.23	$52.43	$52.94	$53.34	$53.74	$54.15	$54.57	$54.98	$55.41	$55.83	$56.26
	Total	***$61.86***	***$62.95***	***$63.58***	***$64.08***	***$64.59***	***$65.11***	***$65.64***	***$66.16***	***$66.70***	***$67.23***	***$67.78***
Easton-Phillipsburg												
	Cars	$5.24	$5.04	$5.05	$5.06	$5.07	$5.08	$5.09	$5.10	$5.11	$5.12	$5.13
	Trucks	$4.29	$4.23	$4.24	$4.25	$4.25	$4.26	$4.27	$4.28	$4.29	$4.30	$4.31
	Total	***$9.53***	***$9.27***	***$9.29***	***$9.31***	***$9.32***	***$9.34***	***$9.36***	***$9.38***	***$9.40***	***$9.42***	***$9.44***
Portland-Columbia												
	Cars	$1.27	$1.21	$1.22	$1.23	$1.23	$1.24	$1.25	$1.26	$1.26	$1.27	$1.28
	Trucks	$1.35	$1.28	$1.29	$1.29	$1.30	$1.30	$1.31	$1.31	$1.32	$1.32	$1.32
	Total	***$2.62***	***$2.49***	***$2.51***	***$2.52***	***$2.53***	***$2.54***	***$2.56***	***$2.57***	***$2.58***	***$2.59***	***$2.60***
Delaware Water Gap												
	Cars	$8.47	$8.92	$9.03	$9.11	$9.19	$9.28	$9.36	$9.44	$9.53	$9.62	$9.71
	Trucks	$25.18	$25.31	$25.52	$25.71	$25.89	$26.08	$26.27	$26.46	$26.65	$26.84	$27.04
	Total	***$33.66***	***$34.23***	***$34.55***	***$34.82***	***$35.08***	***$35.36***	***$35.63***	***$35.90***	***$36.18***	***$36.46***	***$36.75***
Milford Montague												
	Cars	$1.28	$1.31	$1.31	$1.31	$1.32	$1.32	$1.32	$1.33	$1.33	$1.33	$1.33
	Trucks	$0.40	$0.39	$0.39	$0.39	$0.39	$0.39	$0.39	$0.39	$0.40	$0.40	$0.40
	Total	***$1.69***	***$1.70***	***$1.70***	***$1.70***	***$1.71***	***$1.71***	***$1.71***	***$1.72***	***$1.73***	***$1.73***	***$1.73***
Legacy Toll Bridges - SubTotal												
	Cars	$36.19	$37.46	$37.78	$38.04	$38.30	$38.57	$38.84	$39.12	$39.39	$39.67	$39.96
	Trucks	$92.46	$92.62	$93.44	$94.18	$94.91	$95.66	$96.44	$97.20	$98.00	$98.77	$99.57
	Total	***$128.65***	***$130.08***	***$131.22***	***$132.22***	***$133.21***	***$134.23***	***$135.28***	***$136.32***	***$137.39***	***$138.44***	***$139.53***
Scudder Falls												
	Toll Revenue				$10.06	$19.12	$19.31	$19.49	$19.68	$19.88	$20.07	$20.27
	Late Fees				$0.87	$2.20	$2.00	$1.85	$1.74	$1.65	$1.60	$1.55
	Trenton-Morrisville Additional Revenue				$0.94	$1.61	$1.62	$1.63	$1.64	$1.65	$1.67	$1.68
	Adtl Costs				-$2.42	-$3.72	-$3.49	-$3.32	-$3.20	-$3.11	-$3.05	-$3.01
	Total				***$9.46***	***$19.22***	***$19.44***	***$19.65***	***$19.86***	***$20.07***	***$20.29***	***$20.50***
All Toll Bridges												
	Total	***$128.65***	***$130.08***	***$131.22***	***$141.68***	***$152.43***	***$153.67***	***$154.93***	***$156.18***	***$157.46***	***$158.73***	***$160.03***

Note: 2016 data shown is unaudited.

Figure 6-4: Historical and Forecasted Toll Transactions, millions

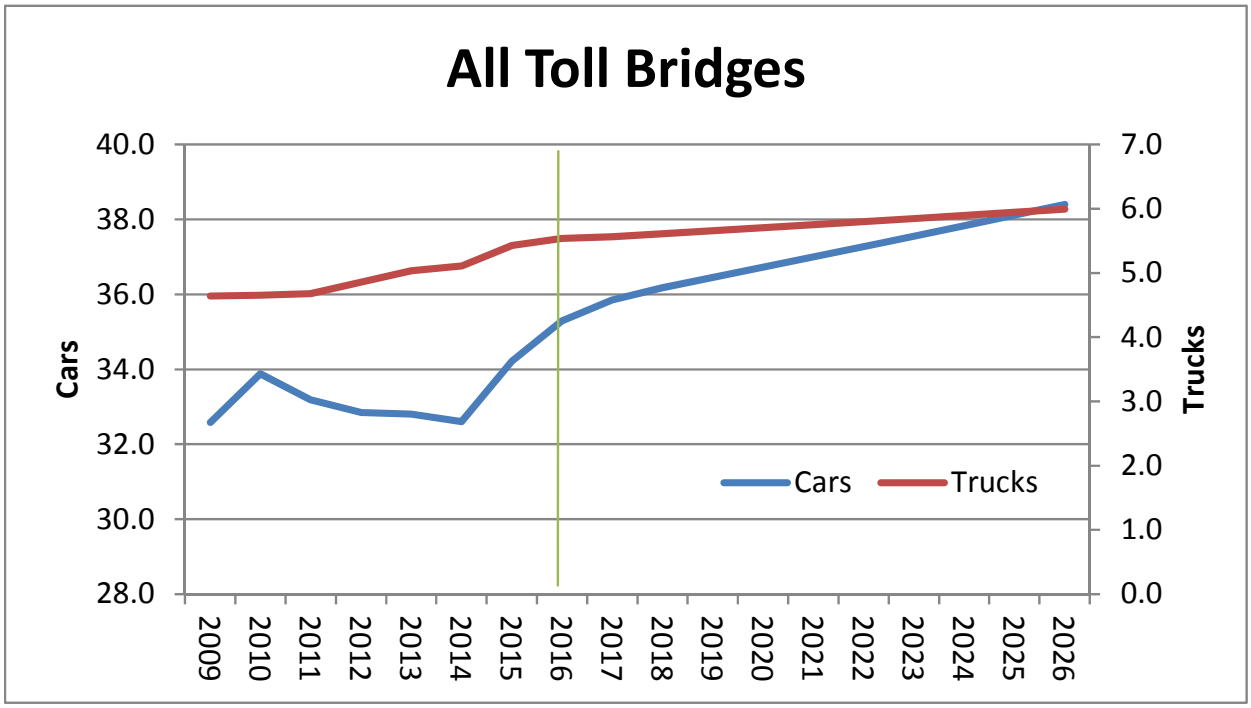


Figure 6-5: Historical and Forecasted Gross Toll Revenues, millions

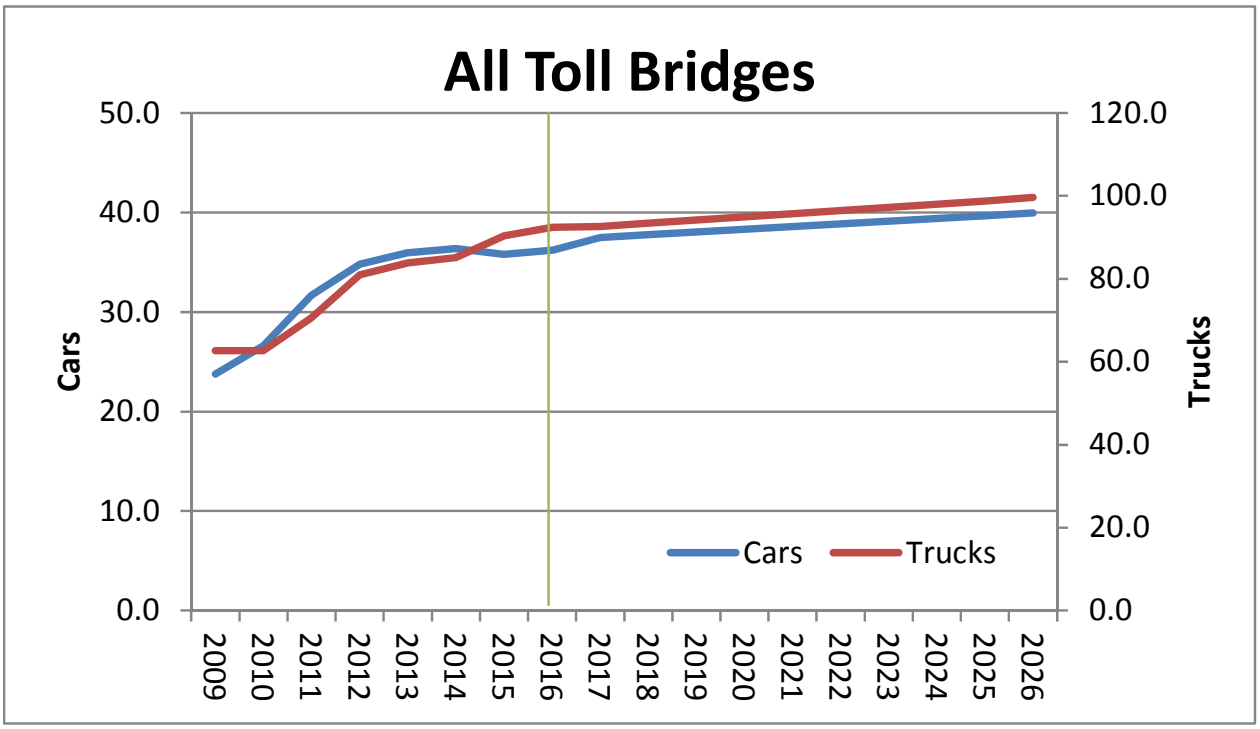


Figure 6-6: Historical and Forecasted Toll Transactions, by Facility

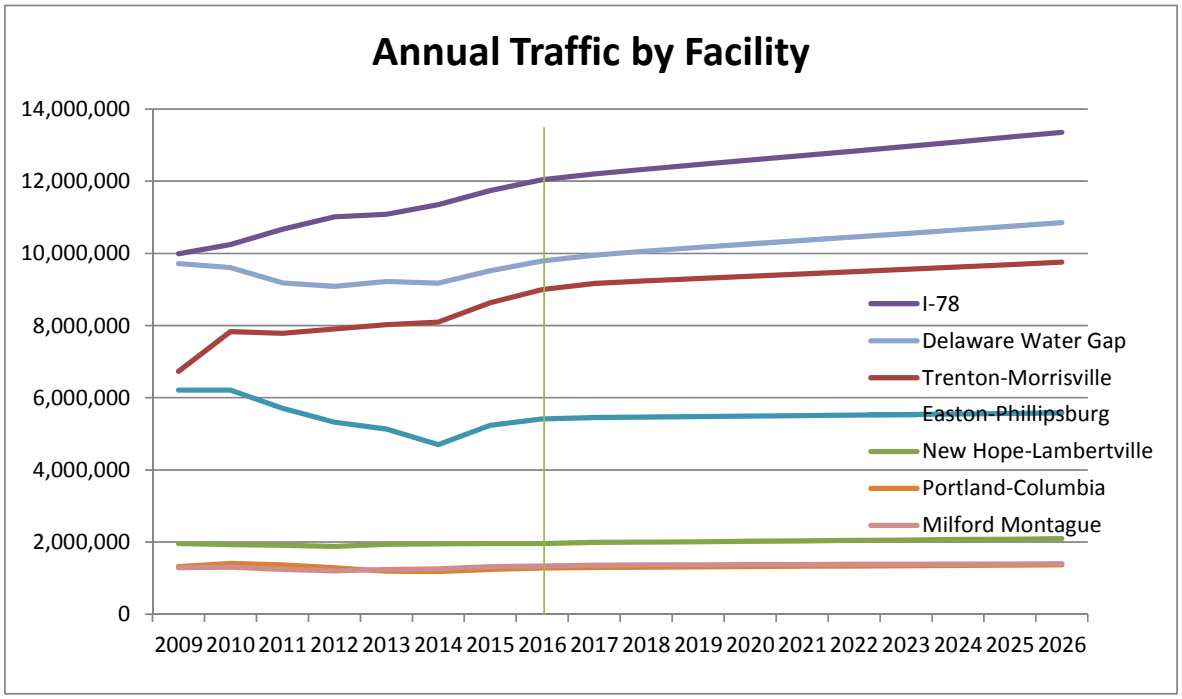


Figure 6-7: Historical and Forecasted Gross Toll Revenue, by Facility

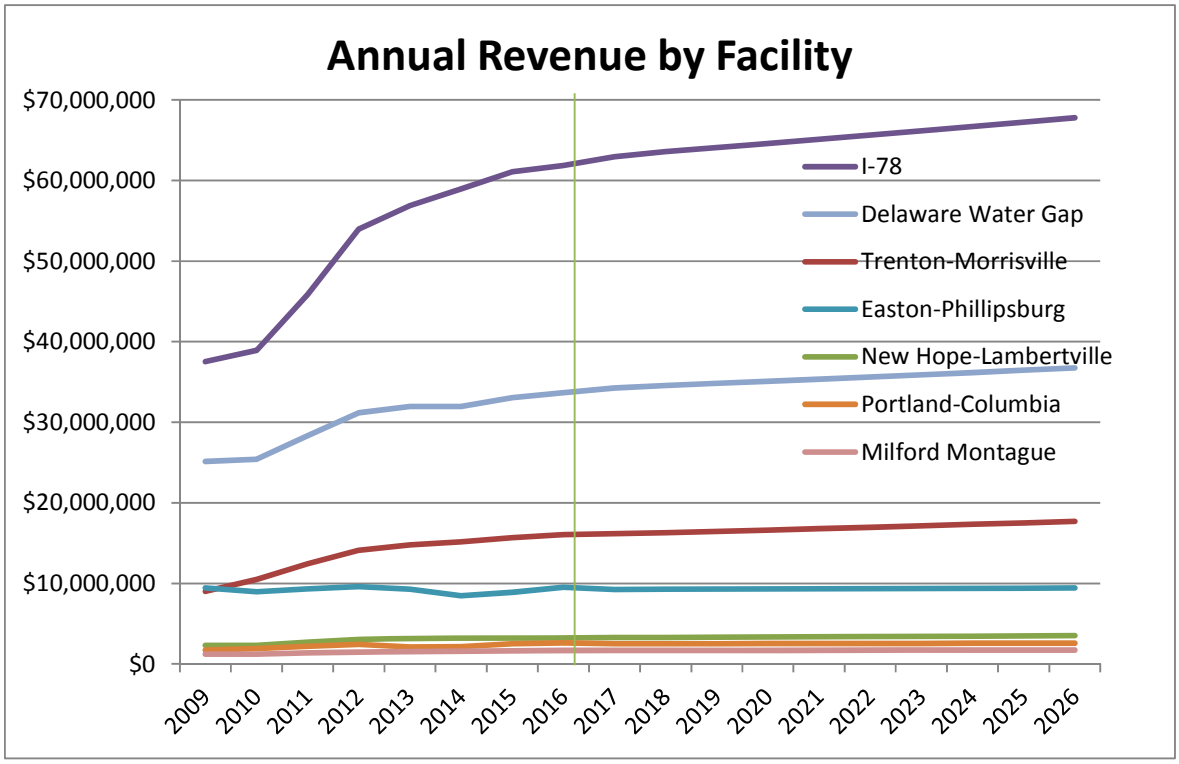


Table 6-4: Toll Transaction Growth Forecasts

Facility		Year													
		2013*	2014*	2015*	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Trenton-Morrisvil															
	Cars	1.05%	0.66%	6.77%	4.61%	2.0%	0.8%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
	Trucks	7.56%	4.56%	4.02%	0.68%	-0.5%	0.7%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
	Total	***1.46%***	***0.93%***	***6.57%***	***4.35%***	***1.9%***	***0.8%***	***0.7%***	***0.7%***	***0.7%***	***0.7%***	***0.7%***	***0.7%***	***0.7%***	***0.7%***
New Hope-Lambertville															
	Cars	2.78%	1.20%	0.35%	-0.19%	1.6%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
	Trucks	5.31%	-0.26%	1.97%	2.44%	-1.8%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%
	Total	***2.93%***	***1.12%***	***0.45%***	***-0.03%***	***1.4%***	***0.6%***	***0.6%***	***0.6%***	***0.6%***	***0.6%***	***0.6%***	***0.6%***	***0.6%***	***0.6%***
I-78															
	Cars	-0.50%	2.08%	2.57%	2.70%	1.5%	1.2%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
	Trucks	4.40%	3.53%	6.07%	2.20%	0.7%	1.0%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
	Total	***0.61%***	***2.42%***	***3.40%***	***2.58%***	***1.3%***	***1.1%***	***1.0%***	***1.0%***	***1.0%***	***1.0%***	***1.0%***	***1.0%***	***1.0%***	***1.0%***
Easton-Phillipsburg															
	Cars	-3.76%	-8.15%	11.56%	3.48%	0.6%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
	Trucks	0.13%	-13.06%	7.98%	3.78%	1.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
	Total	***-3.52%***	***-8.47%***	***11.34%***	***3.50%***	***0.6%***	***0.3%***	***0.3%***	***0.3%***	***0.3%***	***0.3%***	***0.3%***	***0.3%***	***0.3%***	***0.3%***
Portland-Columbia															
	Cars	-7.23%	-1.07%	3.20%	3.51%	1.2%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
	Trucks	-10.96%	5.97%	31.86%	-4.54%	-5.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
	Total	***-7.46%***	***-0.65%***	***5.02%***	***2.87%***	***0.7%***	***0.6%***	***0.6%***	***0.6%***	***0.6%***	***0.6%***	***0.6%***	***0.6%***	***0.6%***	***0.6%***
Delaware Water Gap															
	Cars	1.39%	-0.59%	3.40%	2.89%	1.9%	1.3%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
	Trucks	2.34%	-0.10%	5.74%	2.71%	0.9%	0.9%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
	Total	***1.52%***	***-0.52%***	***3.74%***	***2.86%***	***1.7%***	***1.2%***	***0.9%***	***0.9%***	***0.9%***	***0.9%***	***0.9%***	***0.9%***	***0.9%***	***0.9%***
Milford Montague															
	Cars	3.25%	0.84%	4.85%	1.70%	1.44%	0.5%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
	Trucks	6.62%	3.47%	12.15%	0.47%	1.28%	0.0%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
	Total	***3.34%***	***0.91%***	***5.05%***	***1.66%***	***1.43%***	***0.5%***	***0.3%***	***0.3%***	***0.3%***	***0.3%***	***0.3%***	***0.3%***	***0.3%***	***0.3%***
All Toll Bridges															
	Cars	-0.13%	-0.59%	4.94%	3.14%	1.58%	0.9%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
	Trucks	3.66%	1.53%	6.19%	2.13%	0.53%	0.9%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
	Total	***0.35%***	***-0.30%***	***5.11%***	***3.00%***	***1.44%***	***0.9%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***

**Actual (Annual Traffic Engineering Reports and Monthly Comparatives)*
Note: 2016 data shown is unaudited.

Table 6-5: Gross Toll Revenue Growth Forecasts

Facility		Year													
		2013*	2014*	2015*	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Trenton-Morrisville															
	Cars	2.78%	1.29%	2.75%	4.87%	1.7%	0.7%	0.5%	0.5%	0.5%	0.5%	0.6%	0.6%	0.6%	0.6%
	Trucks	6.82%	4.37%	3.72%	-0.15%	-0.4%	0.7%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
	Total	***4.65%***	***2.75%***	***3.22%***	***2.44%***	***0.7%***	***0.7%***	***1.0%***	***1.0%***	***1.0%***	***1.0%***	***1.0%***	***1.1%***	***1.1%***	***1.1%***
New Hope-Lambertville															
	Cars	4.06%	0.76%	-2.45%	-0.20%	1.2%	0.4%	0.4%	0.4%	0.4%	0.4%	0.5%	0.5%	0.5%	0.5%
	Trucks	3.41%	2.49%	3.13%	3.09%	0.7%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%
	Total	***3.79%***	***1.49%***	***-0.09%***	***1.24%***	***1.0%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***
I-78															
	Cars	11.49%	4.00%	-6.48%	-4.63%	9.2%	1.1%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
	Trucks	4.19%	3.49%	5.93%	2.43%	0.4%	1.0%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
	Total	***5.45%***	***3.59%***	***3.66%***	***1.26%***	***1.8%***	***1.0%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***
Easton-Phillipsburg															
	Cars	-5.91%	-3.64%	2.70%	8.10%	-3.8%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
	Trucks	0.39%	-14.89%	8.79%	5.63%	-1.5%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
	Total	***-3.03%***	***-8.96%***	***5.39%***	***6.97%***	***-2.8%***	***0.2%***	***0.2%***	***0.2%***	***0.2%***	***0.2%***	***0.2%***	***0.2%***	***0.2%***	***0.2%***
Portland-Columbia															
	Cars	-12.39%	-0.91%	0.40%	9.26%	-4.4%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
	Trucks	-11.98%	6.93%	34.17%	-1.30%	-5.4%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
	Total	***-12.21%***	***2.62%***	***16.26%***	***3.54%***	***-4.9%***	***0.5%***	***0.5%***	***0.5%***	***0.5%***	***0.5%***	***0.5%***	***0.5%***	***0.5%***	***0.5%***
Delaware Water Gap															
	Cars	2.98%	0.23%	-2.18%	-0.65%	5.3%	1.2%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%
	Trucks	2.47%	-0.25%	5.57%	2.75%	0.5%	0.8%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
	Total	***2.61%***	***-0.12%***	***3.45%***	***1.87%***	***1.7%***	***0.9%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***
Milford Montague															
	Cars	1.82%	2.83%	3.04%	1.57%	2.0%	0.4%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
	Trucks	5.45%	-0.03%	12.70%	2.02%	-3.21%	0.0%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
	Total	***2.62%***	***2.18%***	***5.19%***	***1.68%***	***0.74%***	***0.3%***	***0.2%***	***0.2%***	***0.2%***	***0.2%***	***0.2%***	***0.3%***	***0.3%***	***0.3%***
All Toll Bridges															
	Cars	3.31%	1.10%	-1.51%	1.08%	3.50%	0.9%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
	Trucks	3.49%	1.57%	6.09%	2.40%	0.18%	0.9%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
	Total	***3.44%***	***1.43%***	***3.81%***	***2.02%***	***1.11%***	***0.9%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***	***0.8%***

**Actual (Annual Traffic Engineering Reports and Monthly Comparatives)*
Note: 2016 data shown is unaudited.

6.2 Scudder Falls Bridge

This section provides a narrative of the methodology used for developing the traffic and revenue forecasts for the Scudder Falls Bridge, which has no direct tolling history. Although the approaches are described independently in this report, the analyses overall consider the entire system and are reflected in the results.

6.2.1 Toll Rate-Setting Goals and Assumptions

Jacobs conducted its most recent tolling policy forum for traffic and revenue forecasts with the Commission on March 22, 2016 in order to revisit policy decisions/assumptions used in 2014 traffic and revenue forecasting for the new Scudder Falls Bridge. The primary tolling decisions made by the Commission at this forum were as follows:

- There is no goal of achieving relative parity between the Scudder Falls Bridge tolls and those at the Trenton-Morrisville Bridge or any other Delaware River Crossings
- The goal is for revenues to cover only debt service for the debt incurred to finance the new Scudder Falls Bridge, not the facility's O&M costs
- Any potential extra toll revenue collected due to diversions from the Scudder Falls Bridge to Trenton-Morrisville will count towards the Scudder Falls Bridge revenue goal
- No toll increase will be assumed in the forecast period
- The premium for image-based vs. E-ZPass tolls will be based only on the increased cost to process these tolls, not on uncollectable revenues
- E-ZPass discounts will remain the same as today (off-peak discount for trucks; 40% automatic discount for commuters if 16 or more trips made in a calendar month)
- No discounts will be offered for Toll-by-Plate customers
- For Toll-by-Plate customers who do not pay their first invoice, a $5 fee per invoice will be charged on the second invoice and a $30 violation fee per transaction will be charged on the third invoice

Jacobs incorporated these policy decisions into our modeling process. We worked with the Commission to test various rates to meet their needs and goals, and developed a toll rate schedule (see Table 6-6), which was approved in September 2016. Tolls are assumed to begin June 1, 2019.

6.2.2 Methodology Used for Forecasting

Because the Scudder Falls Bridge is not currently tolled, it is not suited to a traditional trend line analysis for forecasting purposes. In addition, it will be an AET facility with no cash toll collection. Because of these factors, a much more comprehensive analysis of the facility was required to achieve the depth and quality of report required for an investment-grade study.

In order to determine future background growth (i.e., growth in traffic without tolling or any other changes), Jacobs used historical DRJTBC data, correlating it to GDP and IPI, then

used forecasts of future GDP and IPI to estimate traffic growth rates. We used results from the regional Delaware Valley Regional Planning Commission (DVRPC) model as run by DVRPC staff in order to estimate potential traffic changes due to the replacement of the Scudder Falls Bridge with a wider bridge, and also due to the new I-95/Pennsylvania Turnpike interchange.

Estimates of diversions from toll rate changes (i.e., toll elasticities) were based on differences in Pennsylvania-bound vs. New Jersey-bound traffic in the area, travel times using the Scudder Falls Bridge versus alternative crossings, and origin-destination patterns from the online survey results. The survey data were also used to develop a customer profile, such as state of vehicle registration and frequency of travel, which enabled us to estimate the number of Toll-by-Plate accounts and the number of invoices to be mailed to customers.

Data from existing AET facilities on uncollectable revenues were incorporated into our models. In addition, Jacobs and the Commission worked with Xerox (now Conduent Incorporated) to estimate the costs associated with Toll-by-Plate collection. As part of the Tolling Policy, DRJTBC needed to set a higher rate for Toll-by-Plate tolls to cover the additional cost of collecting these tolls. Part of Jacobs' modeling process was to estimate the higher amount to charge for Toll-by-Plate tolls. In addition, as is typical on AET facilities throughout the country, late fees will be imposed. The Commission will charge a $5.00 late payment fee *per invoice* on the second bill if tolls are not paid on the first invoice, and a $30 violation fee *per transaction* on the third Toll-by-Plate invoice if toll transactions are not paid on the first two invoices. The late payment and violation fee revenues were also estimated by Jacobs for each year of the estimate.

Our model is segmented by vehicle classification (truck vs. passenger car), travel frequency, and payment type. It is important to note that there may be some trips currently utilizing the Scudder Falls Bridge simply because it is free. Once tolling is introduced, it is probable that some trips that are currently using the Scudder Falls Bridge simply because it is free will move to other tolled facilities such as the Trenton-Morrisville Toll Bridge. Jacobs has also developed estimates of additional revenue at the Trenton-Morrisville Toll Bridge due to Scudder Falls Bridge tolling.

The work, analyses, and results for the DRJTBC included in this report are of investment-grade quality and are suitable for financing. The background and methodology for Jacobs' traffic and toll revenue projections for the DRJTBC are presented herein.

6.2.3 DVRPC Forecast Model

The Delaware Valley Regional Planning Commission (DVRPC) travel forecasting model was used to estimate the future traffic changes that may occur due to the new, wider Scudder Falls Bridge (the "Scudder Falls Bridge Improvement Project") and due to the Pennsylvania Turnpike/I-95 Interchange Project. DVRPC calibrated their latest model – Travel Improvement Model version 2.0 (TIM 2.0) – to match base year 2013 volumes on the Scudder Falls Bridge and other area bridges as closely as possible, and then ran their future year models to determine impacts of the completion of these two projects on southbound Scudder Falls Bridge traffic volumes.

"Stage 1" of the Pennsylvania Turnpike/I-95 Interchange Project, which includes the completion of northbound-to-eastbound and westbound-to-southbound ramps only, is expected to be completed by the time the first span of the Scudder Falls Bridge is completed (and before tolling begins) in May 2019. The effects of the two improvements on Scudder Falls Bridge southbound traffic, separate and combined, as predicted by the DVRPC Model, are as follows:

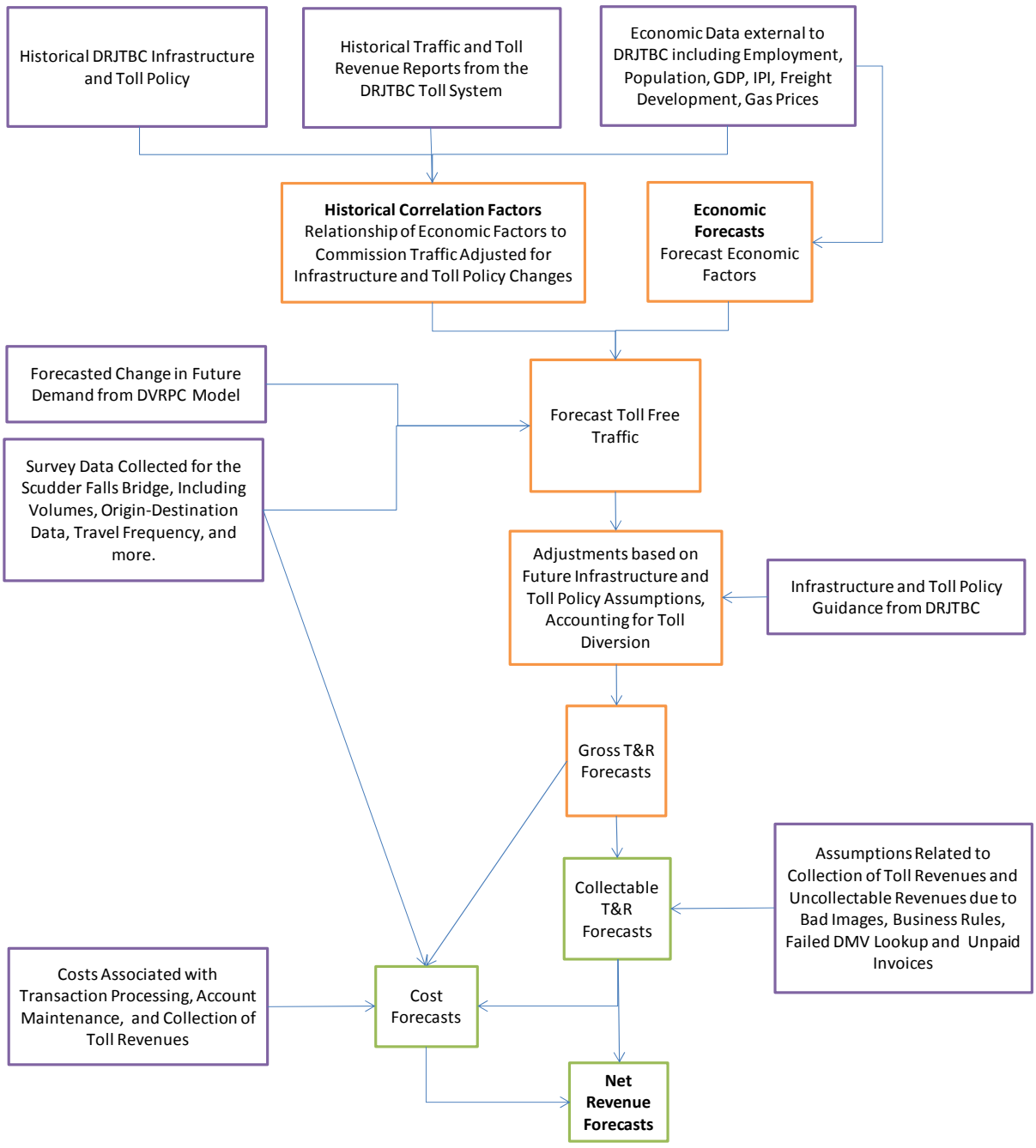
- Scudder Falls Bridge widening only: +8.3%
- I-95/Pennsylvania Turnpike interchange only: -3.8%
- Widening plus new I-95 Interchange: +3.6%

The impact of the two improvements together is an estimated 3.6 percent increase in southbound traffic on the Scudder Falls Bridge compared to a no build condition. This was applied to Jacobs' traffic and revenue forecasting model.

6.2.4 Scudder Falls Traffic and Toll Revenue Model

Jacobs developed a spreadsheet-based forecast model specifically for the Scudder Falls Bridge facility. The model was designed to estimate toll transactions and revenues, as well as costs associated with the collection of tolls. Figure 6-8 presents a diagram of the major inputs and steps in the modeling process.

Figure 6-8: Toll Traffic and Revenue Model Methodology



The forecasting model is built off of a base of historical and recent traffic volume data. Growth rates were developed based on correlation of traffic to socioeconomic factors, historical data at other DRJTBC facilities and professional judgment and were applied to the existing volumes, creating a forecast of toll-free traffic through 2026. The model considers how toll-free traffic volumes would be distributed amongst available payment options if a toll were implemented, and then estimates changes in traffic volumes due to the toll rates applied. Toll rates are applied to these resulting toll volumes to generate forecasts of toll revenue.

The second portion of the model then takes the estimated number of toll transactions and models them through the collection process, estimating losses due to bad or missing license plate images, business rules, bad addresses or no matching DMV records, and failure to respond to invoicing. The results of this collection process analysis are used to determine the portion of "collectable" toll revenue, as well as the number of Toll-by-Plate accounts to be maintained and invoices to be mailed. The various costs associated with toll collection are then calculated and compared to the "collectable" toll revenue. The model cycles back to incorporate specified tolls and fees in the estimate of collectable revenues, allowing for the calculation of net revenues.

6.2.5 Inputs and Assumptions

In the creation of a base structure for forecasting calculations, it is necessary to assume some information such as future infrastructure and consistency in historical trends on similar or nearby facilities. The following sections provide further detail on the assumptions used in the development of estimates for the Scudder Falls Bridge.

6.2.5.1 Potential Future Transportation Projects

It was assumed that widening of the Scudder Falls Bridge and the construction of the new mainline flyovers of the Pennsylvania Turnpike / I-95 Interchange and associated I-95 and PA Turnpike mainline widening and reconstruction would be completed by the time Scudder Falls Bridge tolling begins on June 1, 2019. As discussed previously in Section 6.2.3, we used results from the regional DVRPC model as run by DVRPC staff specifically for this work assignment to estimate traffic changes due to these two projects.

6.2.5.1.1 Scudder Falls Bridge Improvement Project

The Scudder Falls Bridge, currently two lanes per direction, will be replaced with a new bridge that is three lanes per direction, plus auxiliary lanes that will improve access on both sides of the bridge. The portions of I-95 from the Scudder Falls Bridge to NJ Route 29 and

from the Scudder Falls Bridge to PA Route 332 will also be widened to three lanes per direction. Other project improvements include the reconfiguration of the Taylorsville Road Interchange and the reconstruction and reconfiguration of the Route 29 interchange through the use of roundabouts. A pedestrian/bicycle path will be built as part of the construction of the Scudder Falls Bridge.

6.2.5.1.2 Pennsylvania Turnpike / I-95 Interchange Project, Bucks County, PA

As noted in Section 6.1.1.3.1 (Transportation Projects, Potential Future or Completed), this Interstate completion project will connect I-95 and I-276 in Pennsylvania, facilitate a revised routing of I-95 in Pennsylvania and New Jersey, and make I-95 continuous along the east Coast from Florida to Maine. For details, see Section 6.1.1.3.1.

6.2.5.2 Historical Traffic Correlation to Economic Factors

In order to estimate future traffic growth, the growth in historical DRJTBC toll facility traffic was correlated to the growth in relevant socioeconomic factors. In the calculation of these correlations for each of the DRJTBC toll facilities, years that experienced unusual events, such as toll increases, were left out of the calculation in an effort to "normalize" the correlation.

Truck growth and IPI growth tend to follow the same trends – a given year with strong positive truck growth on average, also saw strong IPI growth, while years with strong negative growth, such as during the recent recession, also saw a large decrease in IPI.

Correlations were also calculated between car growth and GDP, and population growth was considered as well. The correlation factors were applied to consensus forecasts for GDP and IPI to estimate future background traffic growth on the Scudder Falls Bridge.

6.2.5.3 Drivers' Potential Reaction to Tolls

When drivers are charged a new (or higher) toll for travel than they have previously been accustomed to paying for the roadway, they face the decision of whether or not to alter their travel behavior in reaction to the change in cost. They do this by changing their travel route, combining trips, abstaining from unnecessary trips, or by making no change to their behavior. In an effort to assess the willingness of drivers to continue travel on the toll facility, we must consider the driver's "Willingness to Pay". Willingness to pay (WTP) is defined as the "maximum amount an individual is willing to sacrifice to procure a good or avoid something undesirable."

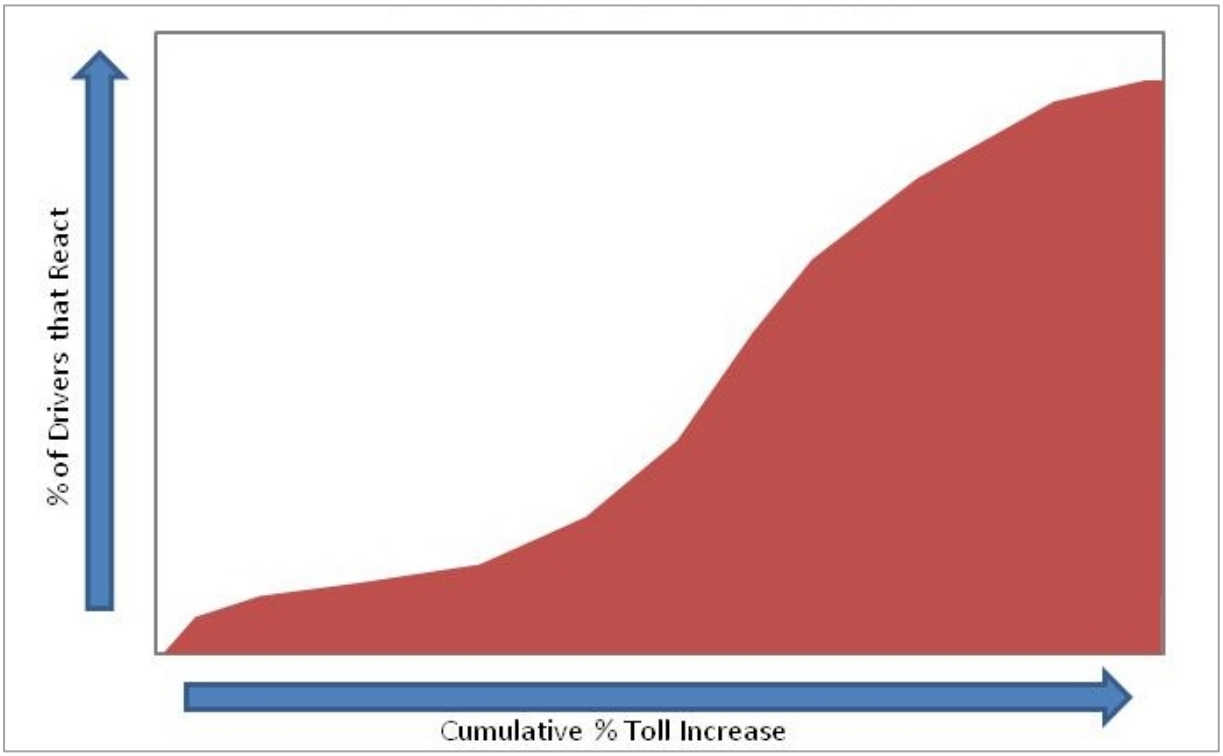
In terms of tolling, the driver's WTP is based on their consideration of cost, time, convenience, and reliability of travel on the toll route versus alternative route options. When they decide that the toll route is their best option, they are willing to pay the toll.

On a route where tolls already exist, such as the Trenton-Morrisville Toll Bridge (a competitor of the Scudder Falls Bridge), toll changes also elicit a reaction from drivers. Since a toll already exists and there is some history of how many drivers have chosen to pay the toll at certain toll rates, some relationship can often be determined between the change in traffic due to the change in toll rate. This relationship is referred to as "Toll Elasticity".

The amount of traffic that chooses to avoid a toll facility due to the inception of tolling or due to a toll increase is referred to as "Toll Diversion". Jacobs developed a methodology to estimate toll diversion due to initial tolling, and for any increases to this toll we used toll elasticity factors developed from data from other toll facilities.

Figure 6-9 presents a general representation of the relationship between toll increases and driver reaction. In general, the larger the toll increase, the larger the percentage of drivers that will react.

Figure 6-9: Representative Driver Reaction to Toll Increase



6.2.5.3.1 Diversion Due to the Inception of Tolling

Jacobs employed a methodology for estimating toll diversion similar to what was used in our previous Traffic and Revenue Studies and Toll Diversion Study completed for the Commission over the past seven years. Those diversions were estimated by grouping the origin-destination (O-D) data and estimating the likelihood of diverting versus remaining on the Scudder Falls Bridge based on travel time savings, traveler value of time, willingness to pay, and characteristics of customers.

One reason a driver would chose a toll route over a free route is time savings; in effect, time equals money. There is no one standard to determine how much a minute or ten minutes of driving is worth monetarily; however in the toll forecasting industry a good rule of thumb is that the value of time (VOT) is 33 percent to 60 percent of the median household income divided by 2080 (the approximate number of hours worked per year). A road with more commuters – who value their time higher than someone making a discretionary trip – should use a higher percent of the household income. Fifty percent was used for this study.

For this area we determined that $1.00 is slightly more than three minutes travel time savings. What this tells us is that the average regular customer in this area will choose to use the Scudder Falls Bridge for a $1.00 toll if it saved them a little over three minutes or more.

Travel time savings is not the only consideration; we also have to consider other characteristics such as trip purpose, frequency and length and well as method of payment. Long-distance travelers are typically infrequent customers who, since they will only be taking the toll bridge occasionally, are less likely to seek an alternate route. They are also less likely to be commuters. Commuters value their time higher than other travelers because they are on a schedule, and commuters also have a better understanding of the time savings available to them during their peak-period travel when choosing one local route versus another. Even though there may be time savings using an alternate route, long-distance and infrequent travelers are likely to stay with the route they know best.

Initial Scudder Falls Bridge diversion was estimated based on survey data and assumed the same toll rates as are currently charged on the other Commission bridges. O-D data for the Scudder Falls Bridge was divided into three “superzones”, which were used to approximate the number of local, mid-distance, and long-distance customers currently using the Scudder Falls Bridge. When the Scudder Falls trip diversion estimated for each superzone is multiplied by the share of trips in each, the combined total result is 17 percent diversion with a toll of $1.00 for all cars on the AET facility. Trucks were estimated to have about double the amount of diversion – 34 percent – with a $4.00 per axle toll. Greater diversion for trucks is expected due to the higher toll and the presence of many other less expensive

alternatives on their typically longer-distance trips. Since the chosen toll rate schedule for the Scudder Falls Bridge has rates different from these, toll elasticity factors were used to refine the traffic diversion estimates as described in this next section.

6.2.5.3.2 Toll Elasticity

Toll elasticity due to toll increases on facilities that already charge a toll is usually estimated based on historical data for the facility itself and other similar facilities. While no toll increases have been assumed at the Scudder Falls Bridge after tolling commences, expected on June 1, 2019, toll elasticity factors were applied to account for additional traffic diversion due to the difference between the base toll rates (as discussed in the previous section) and the approved toll rates. For the modeling of the future Scudder Falls Bridge toll schedule, toll elasticities were assumed based on experience at other toll facilities. An elasticity of -0.10 was used for passenger cars, while -0.20 was assumed for the estimation of truck diversion. These elasticities are similar to those on other similar toll facilities throughout the Northeast.

6.2.5.4 E-ZPass Market Shares

Historically, electronic toll collection (E-ZPass) market share on DRJTBC and other facilities offering electronic payment has slowly increased over time until it approached some level of market saturation, regardless of toll increases. The market share typically increases at a decreasing rate – rapidly in the first few years after implementation, and then at a decreasing rate until eventually leveling out as the market share approaches a maximum sustainable level for the toll facility.

E-ZPass market share on the current DRJTBC toll facilities varies dramatically by vehicle class with 2015 totals showing an average of 63.0 percent for car trips and 84.2 percent for truck trips. This calculates to an overall average E-ZPass market share of 68.0 percent. The market share has continued to grow. With the implementation of AET on the Scudder Falls Bridge expected on June 1, 2019, using recent measurements of E-ZPass market penetration and estimates of trips that will become E-ZPass when AET begins (from experience at other AET facilities), we have estimated that car market share will begin around 75 percent E-ZPass, with around 79 percent E-ZPass for heavy trucks. It is projected that the market share will increase quickly within a couple years of the inception of tolling as drivers realize that they could save money by using E-ZPass, and then growth will slow, reaching a maximum market penetration of roughly 85 percent E-ZPass for both cars and trucks in 2026.

6.2.5.5 Toll Rates and Late/Violation Fees

Jacobs tested a number of toll scenarios for the Commission in order to meet its financial goals. The final, approved toll rate schedule is as follows in Table 6-6:

Table 6-6: Scudder Falls Bridge Toll Rate Schedule- Approved September 2016

VEHICLE TYPE	
Passenger Vehicles Vehicles with up to two axles and less than 8-feet in height.	
CLASS 1	
2-axle Class 1 vehicle with *E-ZPass*	$1.25
E-ZPass Class 1 Commuter Discount Toll	$0.75
Discount available for customers with passenger-vehicle transponders issued by the New Jersey *E-ZPass* Group.	*40% Discount credited to eligible E-ZPass equipped vehicles that record 16 or more trips during a calendar month.*
2-axle Class 1 vehicle Toll-by-Plate	$2.60
Light Trucks Vehicles with two axles and eight feet and above in height.	
CLASS 2	
2-axle Class 2 vehicle with *E-ZPass*	$7.00
2-axle Class 2 vehicle with E-ZPass Off-Peak Discount	$6.30
2-axle Class 2 vehicle Toll-by-Plate	$8.35
Heavy Trucks Vehicle-types with three or more total axles.	
CLASS 3	
3-axle vehicle with *E-ZPass*	$12.75
3-axle vehicle with *E-ZPass* Off-Peak Discount	$11.48
3-axle vehicle Toll-by-Plate	$14.25
CLASS 4	
4-axle vehicle with *E-ZPass*	$17.00
4-axle vehicle with *E-ZPass* Off-Peak Discount	$15.30
4-axle vehicle Toll-by-Plate	$19.00
CLASS 5	
5-axle vehicle with *E-ZPass*	$21.25
5-axle vehicle with *E-ZPass* Off-Peak Discount	$19.13
5-axle vehicle Toll-by-Plate	$23.75
CLASS 6	
6-axle vehicle with *E-ZPass*	$25.50
6-axle vehicle with *E-ZPass* Off-Peak Discount	$22.95
6-axle vehicle Toll-by-Plate	$28.50
CLASS 7	
7-axle vehicle with *E-ZPass*	$29.75
7-axle vehicle with *E-ZPass* Off-Peak Discount	$26.78
7-axle vehicle Toll-by-Plate	$33.25
Off-Peak Hours: 9:01 PM to 5:59 AM	
E-ZPass **per-axle truck rate is $4.25; Toll-by-Plate per-axle rate is $4.75**	
Class 1 Passenger vehicles with a trailer will be charged an additional $1.00.	
Class 2 through Class 7 vehicles with a trailer and/or towed vehicle will be charged for the total combined axles at the current per axle rate.	
Vehicles with a fifth wheel/gooseneck trailer will be charged for the total combined axles at the current per axle rate.	

The standard E-ZPass rates at the Scudder Falls Bridge will be $1.25 for cars, $7.00 for 2-axle trucks and $4.25 per axle for three or more axle vehicles. These are relatively proportional to the $1.00/$6.50/$4.00 rates, respectively, charged at the Commission's current toll facilities.

Similar to the Commission's other tolled facilities, E-ZPass passenger car commuters at the Scudder Falls Bridge will receive a 40 percent discount for 16 or more trips during a calendar month, thereby paying $0.75 per trip. This frequency discount is offered as an automatic rebate for cumulative travel on any of the DRJTBC toll facilities (not bridge-specific) for all transponders that are attached to NJ E-ZPass Regional Consortium accounts.

Commercial vehicles at the Scudder Falls Bridge with E-ZPass traveling between 9:01AM and 5:59AM will receive a 10 percent off-peak discount, as they do at the other DRJTBC toll facilities. This discount applies to commercial vehicles with E-ZPass transponders issued by any toll agency that has E-ZPass.

Vehicles without E-ZPass, or Toll-by-Plate vehicles, will be charged a higher toll to help recover the additional costs associated with processing Toll-by-Plate transactions (over the cost to process E-ZPass transactions). This additional cost is discussed in Section 7.2.

In addition, Toll-by-Plate customers will be subject to violation fees if tolls are not paid on time. The billing method and associated late fees are as described below:

- 1st invoice sent 30 days after the 1st transaction, tolls only (at the Toll-by-Plate rate); 30 days to pay; will include all transactions made during that period.
- If 1st invoice is unpaid, 2nd invoice sent 30 days after the 1st invoice; a $5 fee will be added to cover mailing and processing costs.
- If 2nd invoice is unpaid, Violation Notice sent 30 days after the 2nd invoice; customer now a violator and charged $30 per transaction on top of tolls. Violation notice will indicate that account will be sent automatically to a collections agency if not paid in 30 days (no additional notice to customer will be sent).
- If Violation Notice not paid in 30 days, no further notice is sent by DRJTBC; it is then handled by a collections agency.

6.2.6 Average Daily Tolled Traffic Forecasts

Tolling in the Pennsylvania-bound direction on the Scudder Falls Bridge is expected to commence on June 1, 2019. As traffic reacts to the implementation of tolling on the Scudder Falls Bridge, some drivers who currently choose the Scudder Falls Bridge as a toll-free alternative to the Trenton-Morrisville Toll Bridge would instead choose to pay the toll on the Trenton-Morrisville Toll Bridge rather than on the Scudder Falls Bridge. Directional differences in traffic volumes on the Scudder Falls Bridge indicate that some drivers are currently using the Scudder Falls Bridge as toll-free alternative to the Trenton-Morrisville Toll Bridge in the Pennsylvania-bound direction; count data shows that Pennsylvania-bound volumes on the Scudder Falls Bridge are roughly 10 percent higher than New Jersey-bound volumes.

Moderate traffic growth has been assumed through 2026. Annual average daily traffic (southbound, in the toll direction only) at the Scudder Falls Bridge, along with the traffic volumes expected to shift from the Scudder Falls to Trenton-Morrisville Bridge, are shown in Table 6-7. More detail on these forecasts is included in the Appendix.

Table 6-7: Average Annual Daily Tolled Traffic Forecasts

Year	Scudder Falls Bridge AADT	Growth	New Trenton- Morrisville Bridge AADT*
2019	27,624		1,805
2020	27,968	1.2%	1,761
2021	28,225	0.9%	1,751
2022	28,464	0.8%	1,743
2023	28,689	0.8%	1,740
2024	28,905	0.8%	1,736
2025	29,114	0.7%	1,744
2026	29,317	0.7%	1,750

Note: Assumes tolling begins on June 1, 2019.
**Traffic shift due to Scudder Falls Bridge tolling*

6.2.7 Gross Toll Revenue Forecasts

Forecasted revenues for the Scudder Falls Bridge after tolling commences are shown in Table 6-8. At the Scudder Falls Bridge, revenues collected from E-ZPass tolls and Toll-by-Plate tolls are shown separately, along with the revenues collected from late and violation fees. In addition, the table includes the new toll revenue generated at the Trenton-Morrisville Bridge due to a shift in traffic from the Scudder Falls Bridge when it is tolled. More detail on these forecasts is included in the Appendix.

Table 6-8: Annual Gross Toll and Fee Revenue Forecasts, $millions

Year	SFB E-ZPass Tolls	SFB Toll-by-Plate Tolls	Total Collected SFB Toll Revenue	SFB TBP Violations & Late Fees	**TOTAL SFB**	Trenton-Morrisville Add'l Toll Rev*	**TOTAL**
2019	$8.8	$1.3	$10.1	$0.9	**$10.9**	$0.9	**$11.9**
2020	$15.8	$3.4	$19.1	$2.2	**$21.3**	$1.6	**$22.9**
2021	$16.2	$3.1	$19.3	$2.0	**$21.3**	$1.6	**$22.9**
2022	$16.6	$2.9	$19.5	$1.8	**$21.3**	$1.6	**$23.0**
2023	$16.9	$2.7	$19.7	$1.7	**$21.4**	$1.6	**$23.1**
2024	$17.2	$2.6	$19.9	$1.7	**$21.5**	$1.7	**$23.2**
2025	$17.5	$2.6	$20.1	$1.6	**$21.7**	$1.7	**$23.3**
2026	$17.7	$2.5	$20.3	$1.6	**$21.8**	$1.7	**$23.5**

Note: Assumes tolling begins on June 1, 2019.
**Due to traffic shifting to the Trenton-Morrisville Bridge from the Scudder Falls Bridge when it is tolled*

It is important to note that a level of uncollectability has been factored into these forecasts. Collectability of Toll-by-Plate tolls is discussed in the following section.

7.0 AET TOLL OPERATION COSTS AND UNCOLLECTABLE TOLLS AT SCUDDER FALLS BRIDGE

This section describes the collectability of tolls with AET at the Scudder Falls Bridge, and details the expected costs of toll collection at the Scudder Falls Bridge.

7.1 Collectible Toll-by-Plate Tolls

Jacobs developed a "transaction waterfall" approach to estimating costs and collectable Toll-by-Plate revenues. A waterfall showing base assumptions for cars and sample transaction volumes is shown in Figure 7-1. With the implementation of AET, there are numerous independent variables that will each cause changes to the ultimate amount of revenue collected and the operating costs incurred. A set of base assumptions was developed that, in our opinion, is a reasonable estimation of what might be expected for AET in this region. The estimates were established based on experience at other currently operating AET facilities around the country.

Figure 7-1: Car Sample Toll Transaction Waterfall

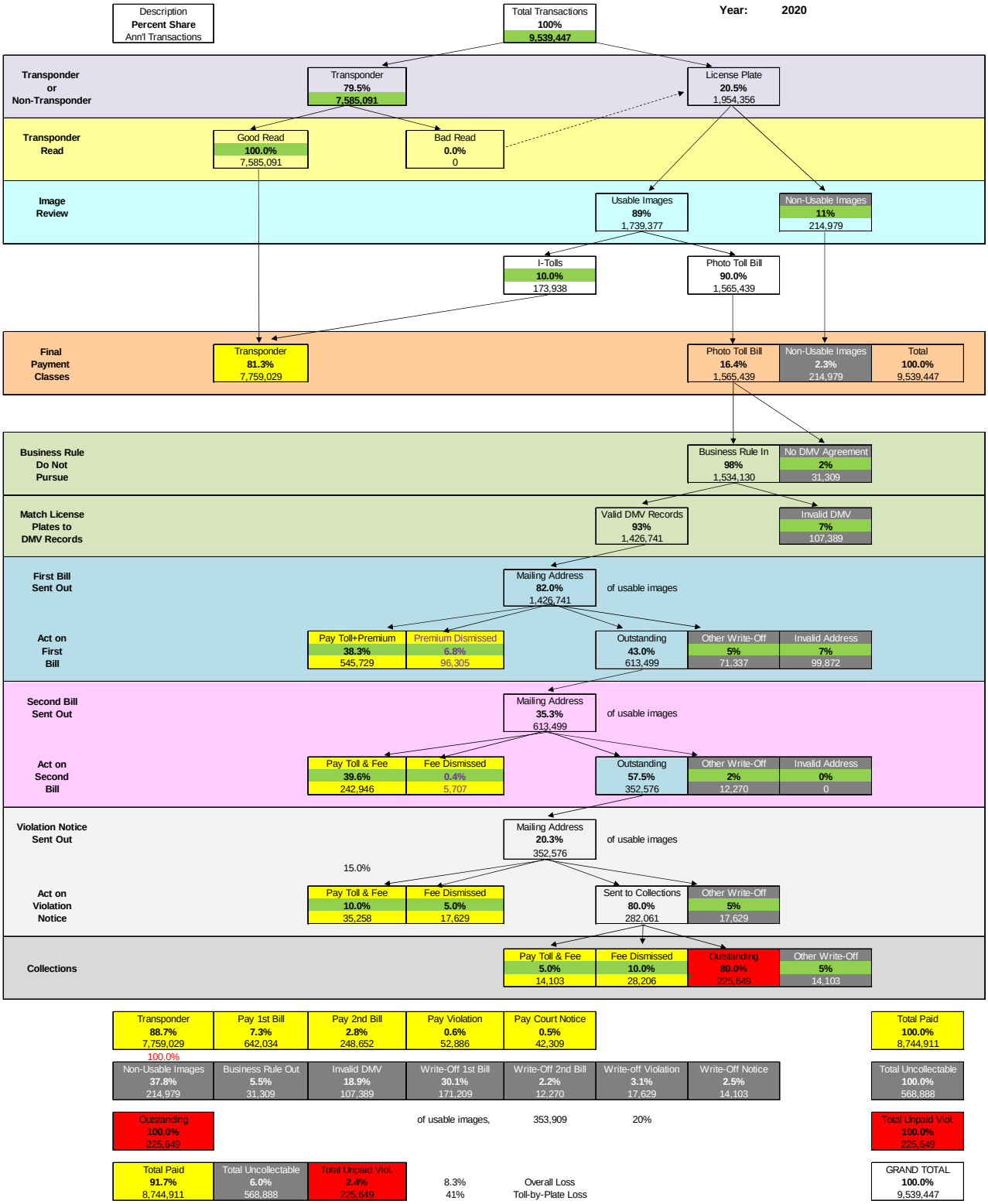


Table 7-1 summarizes the variables applied to the transaction waterfall for passenger cars. Included in this table are the actual performance characteristics of four other operating AET facilities. Each tolling agency requested anonymity with respect to its data. Table 7-2 presents additional variables for which we do not have comparable results from other agencies.

Each of these variables shown in the tables is described in detail in the following sections.

Table 7-1: Summary of Factors Influencing Toll-by-Plate Revenue Collectability

Category	Estimate for Cars	Estimate for Trucks	Agency A	Agency B	Agency C	Agency D
Non-Usable Images	11%	15%	4%	6%	10%	5%
Business Rule Out	2%	2%	1%	2%	Unavailable	1%
Invalid DMV Record	7%	2%	4%	2%	16%	1%
Invalid Addresses, 1st Bill Sent	7%	15%	9%	Unavailable	Included in Invalid DMV	4%
Invalid Addresses, 2nd Bill Sent	0%	0%	3%	Unavailable	Included in Invalid DMV	9%
Invalid Addresses, Violation Notices Sent	0%	0%	1%	Unavailable	Included in Invalid DMV	15%
% Paying 1st Bill (of those received)	45%	35%	44%	35%	28%	56%
% Paying 2nd Bill (of those received)	40%	60%	20%	Included in First Bill Pail	40%	45%
% Paying Violation Notice (of those received)	15%	15%	5%	26%	23%	27%
% Paying Collections Agency Notice	15%	15%	N/A	N/A	N/A	N/A

Table 7-2: Summary of Additional Factors Influencing Toll-by-Plate Revenue Collectability

Category	Estimate for Cars	Estimate for Trucks
1st Bill Toll-by-Plate Premium Dismissed (of those paid)	15%	15%
1st Bills Dismissed (of those sent)	5%	5%
2nd Bill Late Fee Dismissed (of those paid)	1%	1%
2nd Bills Dismissed (of those sent)	2%	2%
Violation Notice Fee Dismissed (of those sent)	5%	5%
Violation Notices Dismissed (of those sent)	5%	5%
Court Notice Fee Dismissed (of those sent)	10%	10%
Court Notices Dismissed (of those sent)	5%	5%

7.1.1 Non-Usable Images

Not all license plates would be readable due to various reasons such as weather, dirt on the plate or other obstructions, a missing plate, or a temporary plate in the window of the vehicle. Current AET facilities, primarily located in the southern and western U.S., have four to 10 percent non-usable images, while attrition files provided by DRJTBC for 2012 and 2013 showed a range of 12 to 17 percent of images that were rejected system wide. It was assumed that with the installation of new equipment at the Scudder Falls Bridge, image statistics would be closer to current AET facilities than the Violation Processing Equipment currently in use on other DRJTBC toll facilities. For passenger cars, Jacobs estimated 11 percent non-usable images for the base case. This estimate was higher than the current AET facilities because the data from other facilities were from geographic locations that were not as impacted by winter weather.

Jacobs estimated that there would be a higher share of non-usable images for commercial vehicles; this was estimated based on a March 2013 survey conducted by staff at toll plazas on the New York State Thruway to see how many cash-paying commercial vehicles were missing a front license plate or had other issues with their plate. The survey revealed that 5 percent of commercial vehicles had no front license plate at all, while about 7 percent had a plate that was difficult to read because it was broken, dirty, bent, or covered with a dark plastic shield. This led to Jacobs' base assumption that 15 percent of commercial vehicle license plate images would not be usable for customers identified by license plate.

7.1.2 Business Rule Out

We expect that, like current AET facilities, the Commission would develop business rules that will determine which Toll-by-Plate customers they will and will not pursue. For example, they may choose that it is not feasible to pursue a customer with a Canadian

license plate. Current AET facilities do not pursue one to two percent of customers with readable license plates. We have assumed that the Commission would rule out two percent each for both passenger cars and commercial vehicles.

7.1.3 Invalid DMV record

Jacobs estimated that seven percent of passenger cars and two percent of commercial Toll-by-Plate vehicles would not have a valid DMV record, and would therefore not be sent a toll invoice at all. Owner-operator vehicles comprise a large portion of the cash paying commercial vehicles. These types of commercial vehicles are subject to regular inspections and are owned by businesses, or individuals. Because of the regulatory environment and continual inspections, we are of the opinion they are likely to keep their addresses up-to-date and to remain compliant with motor vehicle laws. Other AET facilities have a range of one to four percent of total vehicles with invalid DMV records.

7.1.4 Invalid Addresses – Passenger Cars

Many people who move do not change their address attached to their DMV vehicle registration and do not have mail forwarded; therefore, they would not receive a Toll-by-Plate invoice. On current AET facilities where information is available, four to nine percent of Toll-by-Plate vehicles who have a valid DMV record would not receive their first invoice. Jacobs estimated this share to be seven percent for passenger cars at the Scudder Falls Bridge.

When the first invoice is returned to the Commission because of a bad address, another invoice would not be sent. Because of this, it was assumed that the share of invalid addresses on the second bill and violation notice would be zero.

7.1.5 Invalid Addresses - Commercial Vehicles

Other AET facilities did not differentiate between passenger cars and commercial vehicles when providing their share of invalid addresses. However, it is estimated that the share of commercial vehicles with invalid addresses would be higher than for passenger cars. Jacobs assumed 15 percent as a base. A primary reason for this is the difficulty of identifying vehicle owners and operators based upon the rear plate of multi-unit vehicles. The actual operator of the vehicle is often several layers removed from the owner of the trailer as identified by the rear plate. Similar to passenger cars, it was assumed that the share of invalid addresses on the second bill and violation notice would be zero.

7.1.6 Percent of Bills and Violation Notices Paid

The most difficult factors to pinpoint are the percent of first bills, second bills, and violation notices paid. These factors would have the highest effect on the potential net revenues.

7.1.6.1 First Bill

On current AET facilities there is a wide range in the share of transactions that are paid on the first toll invoice. Jacobs assumed that 45 percent of passenger car transactions on the first invoice would be paid. This was estimated based on the 28 to 56 percent first bill payment range on current AET facilities.

Because owner-operator commercial vehicle drivers are often on the road for a long period of time, we considered the possibility that they may not actually return to their home location and have the invoice in-hand to pay it on time. Therefore, a lower rate of first bill payment was estimated at 35 percent when compared to passenger cars.

7.1.6.2 Second Bill

On current AET facilities, 20 to 45 percent of transactions are paid on the second toll bill. Jacobs estimated 40 percent of Scudder Falls Bridge passenger car transactions invoiced on the second bill would be paid. On both the Scudder Falls Bridge and on current AET facilities a late fee is incurred on the second bill.

To avoid hefty violation fees on their third bill, a higher share of commercial vehicle drivers that missed payment on their first bill are expected to pay on the second bill, estimated at 60 percent of transactions.

7.1.6.3 Violation Notices

The third bill sent to customers who did not pay for the tolls on the first two bills is a violation notice. The share of violation notices paid is an important factor affecting the revenues collected, because of the substantial violation fee of $30 per transaction. Most of the current AET facilities have a range of 23 to 27 percent paying their violation notices. Jacobs estimated that about 15 percent of violation notices for both passenger cars and commercial vehicles would be paid.

7.1.6.4 Collections Notices

If a violation notice is not paid, the information is sent to a collections agency which then sends a notice. Jacobs estimated that 15 percent of transactions in collections would be paid in some form: five percent of the toll transactions and violation fees would be paid by

both cars and commercial vehicles, and another ten percent would pay their late tolls only and have the fees dismissed.

7.1.7 Customer Frequency of Travel

In addition to transaction assumptions, it was also necessary to assume general frequency of travel for both E-ZPass and Toll-by-Plate patrons for the estimation of number of accounts and transactions per invoice. Overall frequency profiles were generated from 2014 survey data, and these profiles were found to be consistent with survey data collected previously by Jacobs in 2009.

Overall frequency data was used as a base for estimating frequency profiles for E-ZPass customers and Toll-by-Plate customers, separately. This allowed for the more precise estimation of E-ZPass accounts and Toll-by-Plate accounts.

7.1.8 Dismissals and Forgiveness of Tolls and Late/Violation Fees

Other AET facilities typically offer forgiveness of fees, and some transactions are fully dismissed or written off. Reasons include incorrect identification of license plates, a transponder already charged for a trip, and other similar circumstances.

It was assumed that one percent of customers paying their second bill would have their late fee dismissed. Two percent of customers sent a second bill would have their entire bill dismissed or written off. Five percent of customers sent a violations notice were assumed to have their violation fees forgiven, with another five percent having their entire transaction dismissed. Of those customers that are sent a collections notice, we have estimated 10 percent would have their violation fee dismissed while five percent would be fully dismissed or written off.

It was also assumed that some of the Toll-by-Plate premium (i.e., the additional rate charged to these vehicles over the E-ZPass rate) would be dismissed for those that pay their tolls on the first bill: 15 percent for both passenger and commercial vehicles. This is due to potential incentives for Toll-by-Plate customers to get E-ZPass.

7.1.9 Resulting Uncollectable Toll-by-Plate Tolls

As a result of all the “waterfall” factors discussed above, Toll-by-Plate revenue from an estimated 41 percent of passenger cars and 42 percent of commercial vehicles would be uncollectable. This is within the norm seen on other AET facilities within the United States.

In addition, because Toll-by-Plate toll revenue is not collected at the time of transaction, a lag of three months has been built into our forecasts of Toll-by-Plate toll revenue. This was applied to the first year of tolling, 2019.

7.2 Costs of Toll Collection

This section presents a discussion of the assumptions used in the formulation of toll collection cost estimates.

7.2.1 Proposed Toll Collection Methods for Scudder Falls Bridge

The Scudder Falls Bridge will have a one-way AET barrier toll, where tolls would be collected each time a vehicle passes a single point in the southbound direction. The toll barrier will most likely consist of a series of stand-alone overhead gantries. We assumed that a toll barrier would be located between the Route 29 interchange in New Jersey and the Taylorsville Road interchange in Pennsylvania. It is envisioned that tolls would be collected via the following two methods:

1. E-ZPass – Tolls will be collected using E-ZPass transponders. If customers do not already have an E-ZPass account, it is assumed that some of them will choose to become E-ZPass customers.

2. Toll-by-Plate – Tolls will be collected via camera images of license plates. This would entail image capture and review to identify the customer from an external vehicle registration database (e.g. DMV) and send an invoice to the registered owner of the vehicle. A monthly Toll-by-Plate invoice cycle is planned based on the AET experience of other agencies, the costs savings over more frequent billings, and the fact that people are accustomed to receiving monthly bills.

In previous analyses, Jacobs also had considered a third payment option, registered/prepaid Toll-by-Plate, which would allow customers to establish a Toll-by-Plate toll account before or immediately after their trip based on their license plate number. However, at the 2014 and 2016 tolling policy forums with the Commission, it was discussed that when this account option was available at other agencies with AET, it was used by very few customers; therefore, it has not been included as a payment method for this study.

The planned process for Toll-by-Plate invoicing at Scudder Falls is as follows:

- 1st invoice: 30 days after 1st transaction. Customer has 30 days to pay.

- 2nd invoice (late invoice): 30 days after 1st invoice. Customer is now late in paying, and will be charged $5 per invoice. The customer has 30 days to pay.
- 3rd invoice (violation invoice): 30 days after 2nd invoice. Customer is now a violator, and will have a $30 fee per violation transaction plus the toll charge.
- If Violation Notice not paid in 30 days, no further notice is sent by DRJTBC; it goes to a collections agency which receives a portion of the late fees collected.

An estimate of the costs to collect from a violator after the violation notice is not included in this estimate.

7.2.2 Jacobs' Methodology for AET Cost Estimate

The Commission has a contract with the New Jersey E-ZPass Regional Consortium Customer Service Center to provide E-ZPass Customer Service Activities for all of the DRJTBC facilities. There are some uncertainties as to precisely how Toll-by-Plate transactions would be handled by the New Jersey E-ZPass Customer Service Center under the current contract. Therefore we have prepared a unit pricing method for estimating the cost of toll collection for the Scudder Falls Bridge.

The 2020 cost estimate shown in Table 7-3 is based upon actual unit cost components that are representative of actual costs for similar facilities. Using information collected during our surveys on frequency of travel and forecasts from our traffic and toll revenue model, we developed an estimate of the various quantities such as the number of invoices and accounts. We estimated a total cost of about $3.7M.

Table 7-3: Year 2020 Cost for AET Collection on the Scudder Falls Bridge

Description	Scudder Falls Quantity	Unit Price	Estimated Total Price
E-ZPass Transactions	8,129,000	$0.0754 per Transaction	$600,000
Toll-by-Plate Transactions	1,954,000	$0.325 per Transaction	$600,000
Toll-by-Plate Customer Accounts	98,000	$15.72	$1,500,000
Invoicing Costs	873,000	$0.67	$600,000
Credit Card Fees for E-ZPass	$15,760,000	1.7986% of revenues	$300,000
Credit Card Fees for Toll-by-Plate	$5,564,000	1.7986% of revenues	$100,000
Total Cost			**$3,700,000**

Splitting this out into the two different payment methods, $900,000 are expected in E-ZPass toll collection costs versus $2.8M in Toll-by-Plate collection costs. Xerox (now Conduent), which runs the NJ E-ZPass Regional Consortium, has validated this estimate.

7.2.3 AET Future Cost Estimates

We have applied the unit cost method shown in Table 7-3 to our estimates for each year. These collection costs have not been escalated because we believe that as the scale of AET increases regionally it is likely the unit costs would remain constant or may decline.

The cost of tolling will vary from year to year, as it is based on the number of transactions by payment type, the number of Toll-by-Plate customer accounts, and the total revenue collected. Collection cost estimates for the years 2019 through 2026 are presented in Table 7-4. The decrease in the first few years is due to an estimated increase in E-ZPass participation.

Table 7-4: Scudder Falls Bridge Annual Toll Collection Costs Estimates

2019	$2.4
2020	$3.7
2021	$3.5
2022	$3.3
2023	$3.2
2024	$3.1
2025	$3.0
2026	$3.0

Note: Assumes tolling begins on June 1, 2019.

7.2.4 Costs and Toll-by-Plate Rate Setting

Toll collection costs figured into the analysis of the toll rate setting process. One of the Commission's goals was to set the toll rate for Toll-by-Plate vehicles to cover the extra cost to process these vehicles over the cost to process an E-ZPass transaction. Xerox (now Conduent) produced a ROM collection cost estimate of $1.33 per Toll-by-Plate transaction; Jacobs had estimated a processing cost of $1.35 per Toll-by Plate transaction. With an E-ZPass cost per transaction of $0.08, the extra cost of Toll-by-Plate over E-ZPass was calculated to be about $1.27 per transaction. The approved rates will cover slightly more than this, with an additional $1.35 charged for 2-axle Toll-by-Plate tolls over the standard E-ZPass rate. Since three-or-more axle trucks are charged a per-axle rate, the Commission decided that their incremental rate for Toll-by-Plate would be $0.50 per axle (or $1.50 for a three-axle vehicle, $2.00 for a four-axle vehicle, etc.).

8.0 NET REVENUES AND DEBT SERVICE COVERAGE RATIOS

In this section of the report, the net revenue and debt service coverage ratios are presented. Previously presented gross revenues are reduced as a function of various costs including additional toll collection costs for Scudder Falls Bridge and operations and maintenance costs for the full system to arrive at net revenues. These net revenues are then compared to existing and anticipated debt service by year and coverage ratios are presented.

8.1 Scudder Falls Bridge Net Revenues

The toll revenues for the Scudder Falls Bridge, netting out the costs of toll collection, are presented in Table 8-1. As stated previously, the toll rates on the Scudder Falls Bridge were set such that the extra price charged to Toll-by-Plate customers would cover the additional costs incurred by Toll-by-Plate over E-ZPass transactions, as described in the previous section.

Table 8-1: Scudder Falls Bridge Net Revenues (millions of dollars)

	Scudder Falls Bridge								
Year	E-ZPass Toll Revenues	Toll-by-Plate Toll Revenues	Total Collected Toll Revenues	Toll-by-Plate Violations & Late Fees	Total Revenues	Trenton-Morrisville Add'l Toll Revenue*	Total Gross Revenues	SFB Toll Collection Costs	Net Revenues
2019	$8.8	$1.3	$10.1	$0.9	**$10.9**	$0.9	**$11.9**	($2.4)	**$9.5**
2020	$15.8	$3.4	$19.1	$2.2	**$21.3**	$1.6	**$22.9**	($3.7)	**$19.2**
2021	$16.2	$3.1	$19.3	$2.0	**$21.3**	$1.6	**$22.9**	($3.5)	**$19.4**
2022	$16.6	$2.9	$19.5	$1.8	**$21.3**	$1.6	**$23.0**	($3.3)	**$19.6**
2023	$16.9	$2.7	$19.7	$1.7	**$21.4**	$1.6	**$23.1**	($3.2)	**$19.9**
2024	$17.2	$2.6	$19.9	$1.7	**$21.5**	$1.7	**$23.2**	($3.1)	**$20.1**
2025	$17.5	$2.6	$20.1	$1.6	**$21.7**	$1.7	**$23.3**	($3.0)	**$20.3**
2026	$17.7	$2.5	$20.3	$1.6	**$21.8**	$1.7	**$23.5**	($3.0)	**$20.5**

**Due to traffic shifting to the Trenton-Morrisville Bridge from the Scudder Falls Bridge when it is tolled*

Note: may not add due to rounding.

Note: Scudder Falls Bridge assumed to commence tolling June 1, 2019, which is half-way through the Fiscal Year.

8.2 System Operations and Maintenance Costs

Jacobs has reviewed historical and projected annual operating expenses provided by DRJTBC and the section below summarizes key observations and findings. The Commission's operating expenses include expenses associated with the operation,

maintenance, and repair of the bridges, and general administrative expenses. It can be generally summarized under the following categories:

- Labor: covers all DRJTBC employee salaries and benefits.
- General & Administrative: covers costs associated with office expenditures, utilities, communication, information system, and educational, subscriptions, conference & training.
- Operating and Maintenance: covers costs associated with maintenance of facilities, buildings and grounds, automotive repairs and expenses and uniform.
- Professional Fees: covers third party costs associated with Electronic Surveillance/Detection System (ESS) and operation, state police bridge security and ESS management.
- E-ZPass Costs: covers costs associated with E-ZPass transponder issuance, transaction processing and account maintenance.
- Miscellaneous Expenses: covers all other costs including advertising, insurance premiums, general emergency contingency and any other third party professional services.

Note that expenses associated with Other Postemployment Benefits (OPEB) were not accounted as part of annual operating expenses. Other non-operating expenses principally include expenses attributable to the Commission's interest on bonded debt and the compact authorized investment program.

Table 8-2 lists the Commission's historical actual operating expenses and budgets from 2011 through 2015 and Table 8-3 summarizes the Commission's projected operating expenses from 2017 to 2026. It shall be noted that ESS Maintenance/Operating Costs were grouped under Operation and Maintenance in Table 8-2 and the same costs were grouped under Professional Services in Table 8-3.

The actual operating expenses have been consistently under budget each year. The Commission's 2016 actual expenses are estimated to be under budget by almost $6.0 million from the 2016 budget expenses.

Table 8-2: Historical Budgeted and Actual Operating Expenses (2011 to 2016)

Operating Expenses		2011		2012		2013		2014		2015*		2016	
		Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual
Labor	Salaries and wages	$18,735,384	$18,852,340	$18,317,698	$18,189,803	$18,327,703	$18,008,542	$17,849,495	$18,021,867	$19,125,129	$18,833,823	$20,315,353	$19,514,589
	Employee benefits	10,109,036	9,389,178	10,383,965	10,134,034	11,747,249	11,675,099	14,993,789	13,051,865	14,867,513	15,737,706	18,353,507	15,777,895
General & Administrative	Heat, light, and power	887,836	862,318	919,041	736,574	923,841	775,839	884,041	774,546	918,041	674,067	937,041	619,706
	Office expense	265,445	139,988	255,375	124,425	257,621	137,779	255,820	198,286	274,626	181,666	274,607	197,125
	IT and communications	1,006,421	783,090	1,044,570	770,492	1,069,770	894,294	1,099,903	887,697	1,134,525	1,033,754	1,215,506	1,040,844
	Travel, meetings, and education	146,911	120,612	156,766	127,710	156,690	101,664	194,530	117,990	228,980	122,671	251,680	122,816
Operating and Maintenance	Operating and maintenance & ESS Maintenance/Operating Cost	3,044,851	2,541,243	2,886,064	2,422,018	2,860,753	2,746,068	3,153,236	2,824,886	3,063,292	2,821,444	3,619,725	2,440,073
Professional Fees	State police bridge security	4,327,561	4,152,027	4,293,084	4,223,512	4,525,601	4,482,337	4,685,759	4,693,830	5,213,396	5,062,527	5,634,648	5,391,356
E-ZPass Charges	E-ZPass operating and maintenance	4,497,500	4,190,776	4,836,785	4,901,416	4,861,557	4,846,585	5,518,360	5,814,397	5,714,272	6,495,763	6,518,885	6,720,886
Miscellaneous Expenses	Insurance	2,896,013	2,410,179	2,775,215	2,438,954	2,885,859	2,879,048	2,753,987	2,889,489	2,950,846	2,737,619	2,914,531	2,917,674
	Professional service fees	1,123,250	1,178,663	1,153,950	1,070,383	1,183,950	1,251,015	1,146,616	1,348,895	1,119,700	976,298	1,347,000	1,217,427
	Advertising and marketing	64,200	37,794	51,500	44,321	51,500	28,808	60,500	29,183	60,500	15,579	60,500	23,047
	Contingency	300,000	-	300,000	-	300,000	189,341	300,000	32,599	300,000	11,009	300,000	500
Total Operating Expenses		**$47,404,408**	**$44,658,208**	**$47,374,013**	**$45,183,642**	**$49,152,094**	**$48,016,419**	**$52,896,036**	**$50,685,530**	**$54,970,820**	**$54,703,926**	**$61,742,983**	**$55,983,938**
Growth over previous year (Actual)			**n/a**		**1.2%**		**6.3%**		**5.6%**		**7.9%**		**2.3%**
Difference (Actual less Budget)			**($2,746,200)**		**($2,190,371)**		**($1,135,675)**		**($2,210,506)**		**($266,894)**		**($5,759,045)**

** Employee benefit expense is higher by $1,126,380 in the 2015 audit report due to a non-cash entry related to the adoption of GASB 68 (Accounting and Financial Reporting for Pensions).*

Table 8-3: Projected Operating Expenses (2017 to 2026)

Operating Expenses	Projected Operating Expenses									
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Labor	$38,695,713	$40,870,021	$42,787,452	$44,407,620	$47,427,602	$49,321,587	$51,410,350	$53,185,548	$55,434,343	$57,785,376
General & Administrative	2,858,611	2,472,586	2,773,836	2,792,765	2,781,862	2,909,764	2,966,011	3,030,997	3,118,812	3,191,764
Operating and Maintenance	2,120,112	2,068,680	2,133,223	2,178,164	2,283,557	2,331,769	2,391,986	2,453,581	2,513,020	2,576,516
Professional Fees*	6,927,711	7,037,466	7,177,402	7,349,524	7,526,810	7,739,848	7,960,343	8,224,555	8,497,655	8,779,943
EZ Pass Charges**	5,713,790	5,814,208	8,391,955	9,764,943	9,733,561	9,738,140	9,849,539	9,967,988	10,093,726	10,326,999
Miscellaneous Expenses	4,424,882	4,458,954	4,688,219	5,141,688	5,039,368	5,172,441	5,289,786	5,420,978	5,554,569	5,688,182
Total Operating Expenses	**60,740,819**	**62,721,915**	**67,952,087**	**71,634,704**	**74,792,760**	**77,213,549**	**79,868,015**	**82,283,647**	**85,212,125**	**88,348,780**
Growth over previous year		3.3%	8.3%	5.4%	4.4%	3.2%	3.4%	3.0%	3.6%	3.7%

** including both ESS Maintenance/Operating Costs and State Police Bridge Security/ESS Management.*

*** assume additional E-ZPass cost of $2.4 million in 2019 due to the opening of new toll Scudder Fall Bridge in June 2019.*

After further review of the estimate and through discussion with the DRJTBC staffs, some of the key factors/assumptions affecting the future projections are listed below:

- The forecasting methodology uses a 3-year running average plus inflation on many of the expenses. The annual inflation rate is assumed to be 2.5%.
- Salaries and benefits are assumed to grow at a higher pace than inflation. For example, salaries and pensions are assumed to grow around 3.5% annually and health care benefit will grow at nearly 6% annually in future years.
- The 2017 operating expenses are based on a conservative average of prior years' actual expenditures to budget.
- The additional spikes in 2019 and 2021 are mainly due to the following:
    - The Commission is coming off a number of years with no salary increases in the recent years prior to 2015. Although there are some salary increases in 2015 and 2016, numerous vacancies have held down the rate of increase. These vacancies are not anticipated to continue into the future years.
    - It is anticipated that there are some additional staff that would be added around 2021 for the operation of the Scudder Falls toll bridge.
    - Pension matching rates have been increasing significantly for a number of years. The increases are anticipated to peak in the next several years and then decrease.
    - 2019 has additional expense of $100,000 for the new Administration building which will go online.
    - It is assumed that the new Scudder Falls Bridge will begin tolling in June 2019 and additional costs associated with Scudder Falls Bridge E-ZPass transactions have been added in 2019 and onward.

- The merger of the DRJTBC E-ZPass customer service center with the NJ Customer Service Center (CSC) in 2014 will continue to lower expenses associated with E-ZPass in future years. With the NJ CSC agencies entering into a new agreement with Conduent (formerly Xerox) to begin operating in July 2017, the Commission should save approximately $2 million per year in operating expenses for the existing seven toll bridges. The Commission also could realize further savings as system upgrades and enhancement costs are shared among the other member agencies in the NJ E-ZPass Regional Consortium. The Commission, which operates seven (7) toll bridges between Pennsylvania and New Jersey, had 137,725 active E-ZPass transponders in circulation and 67,066 accounts as of December 2016. In contrast,

the NJ CSC manages more than 2 million accounts with approximately 4 million transponders.

The overall projected growth rate for future operating expenses is in line with the historical averages, and the projected future operating expenses are considered reasonable and include the consideration of the opening of the Scudder Falls Bridge as a tolled facility.

8.3 Debt Service Coverage Ratios

The debt service coverage ratios for the DRJTBC system are presented in Table 8-4. The coverage ratios range from 1.97 to 1.71. There remains capacity from the DRJTBC system to generate additional revenue if needed through future toll adjustments because of the current relatively low toll rates, and lack of alternate competitive routes.

Table 8-4: DRJTBC Net Revenues (millions of dollars) and Debt Service Coverage Ratios

Year	Gross Revenues Scudder Falls Bridge [1]	Gross Revenues Existing System	Other Revenues [2]	Operations and Maintenance Costs	Total Net Revenues	Estimated Net Debt Service [3]	Debt Service Coverage Ratio [4]
2017		$130.1	$1.1	$60.7	$70.5	$36.3	1.94
2018		$131.2	$1.1	$62.7	$69.6	$36.1	1.93
2019	$11.9	$132.2	$1.1	$68.0	$77.2	$39.2	1.97
2020	$22.9	$133.2	$1.1	$71.6	$85.6	$48.0	1.78
2021	$22.9	$134.2	$1.1	$74.8	$83.4	$48.0	1.74
2022	$23.0	$135.3	$1.1	$77.2	$82.2	$48.0	1.71

[1] Includes additional revenue to Trenton-Morrisville.
[2] Other revenues include interest income and other miscellaneous income.
[3] Debt Service is net of capitalized interest; net debt service projection provided is an estimate and is subject to change based on final pricing.
[4] Ratio is not calculated pursuant to terms of Indenture.

Notes: May not add due to rounding.
Other Revenues and Debt Service payments provided by the Commission.
The terms used in Table 8-4 in are not intended to be the defined terms set forth in the Indenture.

9.0 LIMITS AND DISCLAIMERS

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

i. This report presents the 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.

ii. The traffic and gross toll revenue forecasts will be subject to future economic and social conditions, demographic developments and regional transportation construction activities that cannot be predicted with certainty.

iii. The forecasts 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 an operating agency 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.

iv. Jacobs' traffic and gross toll revenue forecasts only represent our best judgment and we do not warrant or represent that the actual gross toll revenues will not vary from our forecasts.

v. 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.

vi. No other competing projects, tolled or non-tolled, are assumed to be constructed or significantly improved in the project corridor during the project period as to negatively impact DRJTBC toll traffic, except those identified within this report.

vii. Major highway improvements that are currently underway or fully funded will be completed as planned.

viii. The system will be well maintained, efficiently operated, and effectively signed to encourage maximum usage.

ix. No reduced growth initiatives or related controls that would significantly inhibit normal development patterns will be introduced during the estimate period.

x. There will be no future serious protracted recession during the estimate period.

xi. There will be no protracted fuel shortage during the estimate period.

xii. No local, regional, or national emergency will arise that will abnormally restrict the use of motor vehicles.

In Jacobs' opinion, the assumptions underlying the study provide a reasonable basis for the analysis. 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 in this Report.

This document, and the opinions, analysis, evaluations, or recommendations contained herein are for the sole use and benefit of the contracting parties. There are no intended third party beneficiaries, and Jacobs Engineering Group, Inc., (and its affiliates) shall have no liability whatsoever to any third parties for any defect, deficiency, error, omission in any statement contained in or in any way related to this document or the services provided.

Neither this document nor any information contained therein or otherwise supplied by Jacobs Engineering Group, Inc. in connection with the study and the services provided to our client shall be used in connection with any financing solicitation, proxy, proxy statement, proxy soliciting materials, prospectus, Securities Registration Statement or similar document without the express written consent of Jacobs Engineering Group, Inc.

* * * * *

We greatly appreciate the invaluable assistance provided by the staff of the Delaware River Joint Toll Bridge Commission.

APPENDIX

- Memorandum: Scudder Falls Bridge Data Collection and Survey Results (Conducted in 2014 for the previous Traffic and Revenue Study)

- Scudder Falls Bridge Annual Traffic and Revenue Details

Scudder Falls Bridge

2014 Data Collection and Survey Results Memo

Technical Memorandum

2 Penn Plaza Suite 603
New York, NY 10121
212.944.2000

Date	**9 May 2014**
To	Delaware River Joint Toll Bridge Commission
From	Jacobs Engineering Group Inc.
Subject	Scudder Falls Bridge Data Collection and Survey Results Delaware River Joint Toll Bridge Commission C-549AR – Level 3 - Investment Grade Traffic and Revenue Forecasts Capital Project No. 0920A

Introduction

Jacobs is providing an investment-grade traffic and revenue study for the Scudder Falls Bridge. As part of the study, Jacobs is collecting relevant data to support the forecasts. In addition to data readily available, Jacobs conducted an extensive data collection program in and around the Bridge specifically for this project. These studies included:

- hourly traffic counts on the Bridge
- license plate surveys
- counts of vehicles equipped with *E-ZPass*
- travel time surveys, and
- Bridge customer characteristic surveys via Jacobs-designed online surveys.

The results of these data collection efforts have been incorporated into Jacobs' traffic and revenue forecasting model, and are discussed and presented herein.

Traffic Counts

Traffic counts were conducted on the Scudder Falls Bridge by Arora and Associates, PC, between March 31st and April 7th 2014. The automatic traffic recorders (ATRs) were placed on the Pennsylvania side of the bridge separately for northbound and southbound traffic, as shown in Figure 1. Figure 2 and Figure 3 show the daily counts by hour for southbound and northbound traffic.

Figure 1: Scudder Falls Bridge Count Locations

Data from the Commission's facilities reveals that April is an average month in terms of daily traffic volumes. Therefore, 2014 AADT and AAWDT were estimated to be the same as the counted traffic.

Table 1: 2014 Estimated AADT and AAWDT, based on March 31-April 7 2014 Count Data

	Southbound	Northbound*
Annual Average Daily Traffic (AADT)	29,799	26,159
Annual Average Weekday Traffic (AAWDT)	32,207	27,980

**Eight hours during the one week period had missing or faulty counts in the Northbound direction; Jacobs estimated counts for these hours.*

The count data also separated vehicles by class. It was calculated from the data that 8.0 percent of average daily traffic is trucks – 6.4 percent light trucks, with fewer than five axles, and 1.6 percent heavy trucks, with five or more axles. The light trucks on the Bridge have an average of 3.1 axles per vehicle, while heavy trucks have an average of 5.2 axles. The overall average number of axles per truck is 3.5.

Figure 2: Southbound Hourly Traffic on Scudder Falls Bridge, 3/31/14-4/7/14

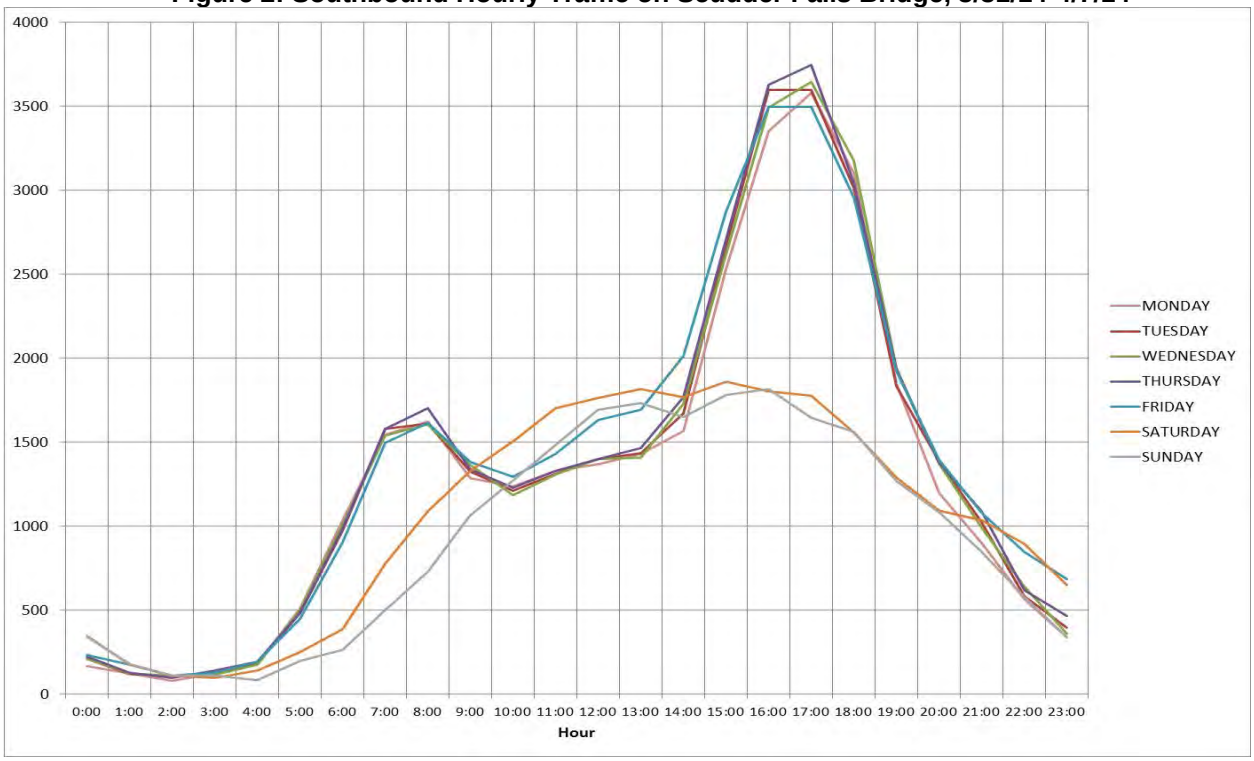
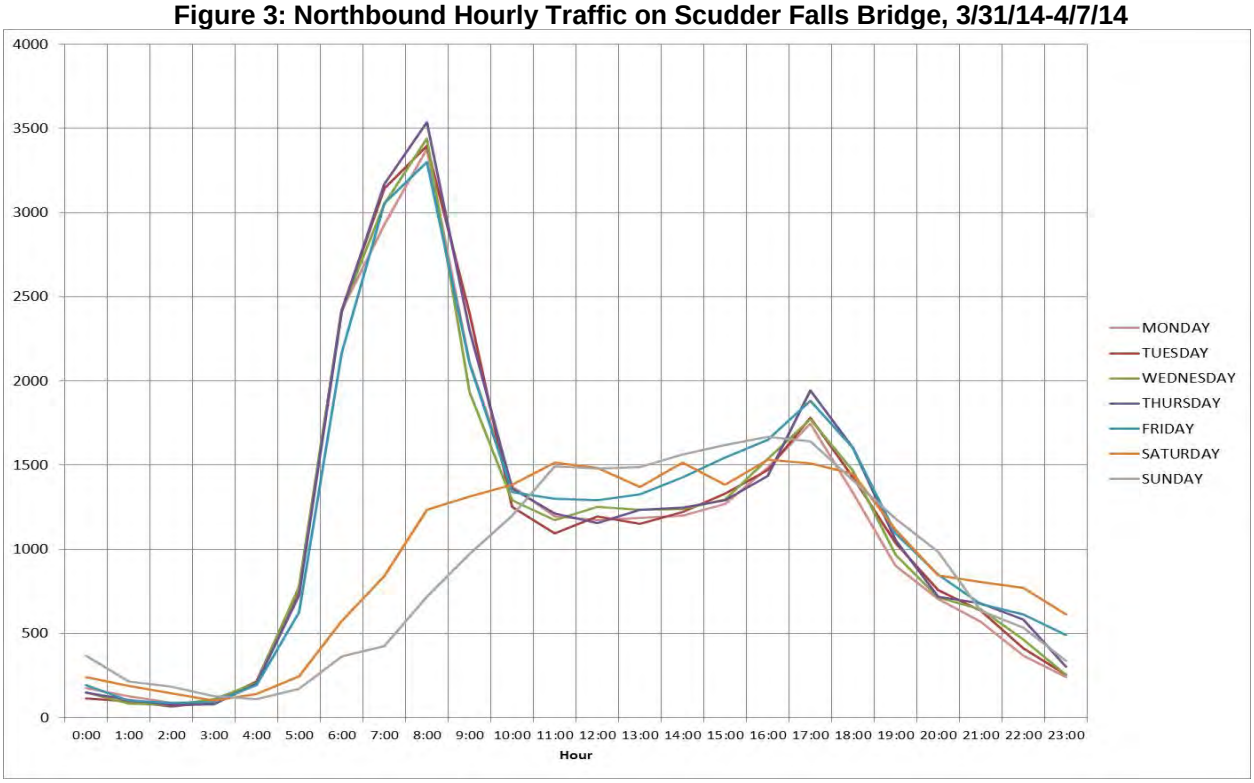


Figure 3: Northbound Hourly Traffic on Scudder Falls Bridge, 3/31/14-4/7/14



License Plate Surveys

In order to determine the amount of traffic currently using the Bridge that is from New Jersey and Pennsylvania, and in order to help us determine potential invoicing for an All Electronic Toll Facility (AET), a license plate survey was conducted on the Scudder Falls Bridge by Arora and Associates, PC, on Tuesday, April 1st for two hours each during the AM peak, midday and PM peak periods. This survey was done in the southbound direction only (the direction of potential future tolling). Results are shown in Table 2. As expected, the majority of vehicles (some 90 percent) are registered in PA or NJ, with more from PA overall (as Pennsylvania to New Jersey is the major commute direction). Note that 8 percent of peak period and 12 percent of off-peak vehicles are from neither PA nor NJ.

Table 2: Southbound Scudder Falls Bridge License Plate Count Results

	Traffic Volume by State License Plate								
PERIOD	PA	NJ	NY	CT	DE	MD	OTHER NE*	OTHERS**	PERIOD TOTAL
7:30AM TO 9:30AM	671	2221	22	11	10	49	74	82	**3140**
	21%	71%	1%	0%	0%	2%	2%	3%	
12:00PM TO 2:00PM	1383	1062	45	12	15	29	60	185	**2791**
	50%	38%	2%	0%	1%	1%	2%	7%	
3:00PM TO 5:00PM	4920	1033	71	12	34	35	145	256	**6506**
	76%	16%	1%	0%	1%	1%	2%	4%	

**- New England States of MA, RI, VT, NH, ME*

***- All other States except PA, NJ, NY, CT, DE, MD, RI, NH, VT, MA, ME*

Counts of Vehicles Equipped with *E-ZPass*

A temporary *E-ZPass* reader was installed by the Commission at the Bridge for one week, from April 1st through April 7th 2014. This was done to determine how many vehicles currently crossing the Bridge in the southbound direction already are equipped with *E-ZPass*. Table 3 summarizes the counts of *E-ZPass* vehicles by tag agency. Along with this data collection effort, traffic counts were made during the same timeframe (see previous sections for details); these two data collection efforts helped us to determine the percentage of existing vehicles equipped with *E-ZPass.*

It was found that 49 percent of weekday vehicles and 46 percent of weekend vehicles crossing on the survey days had a readable *E-ZPass* transponder. Some 78 percent of those with *E-ZPass* have obtained it from the NJ Turnpike or the Pennsylvania Turnpike Commission. Only 5 percent have a DRJTBC-issued *E-ZPass* transponder. It is assumed that there were a small percentage of E-ZPass transponders that were not displayed and/or not read.

Table 3: Southbound Scudder Falls Bridge *E-ZPass* Counts (Raw Data)

	Southbound Transponder Reads			Avg Day
Agency	**Avg Weekday**	**Avg Weekend Day**	**Avg Day**	**Share by Agency**
NYSTA/NYSBA	509	336	460	3.2%
PANYNJ	990	795	934	6.5%
PTC	5,581	3,090	4,869	33.7%
MTAB&T	501	458	489	3.4%
DRPA	9	4	8	0.1%
VDOT	58	83	65	0.4%
Peace Br	4	2	4	0.0%
Illinois	57	37	51	0.4%
MdTA	121	160	132	0.9%
DelDOT	143	145	143	1.0%
MassPike	92	64	84	0.6%
NJTPKE	6,854	5,270	6,401	44.3%
WV	6	3	5	0.0%
DRBA	17	13	16	0.1%
NHDOT	12	10	11	0.1%
Maine	10	7	9	0.1%
DRJTBC	875	468	759	5.2%
Indiana	5	5	5	0.0%
Ohio	10	7	9	0.1%
RITBA	5	3	4	0.0%
NC	1	1	1	0.0%
Total E-ZPass Reads	**15,860**	**10,959**	**14,460**	**100.0%**
Total SB Traffic	**32,207**	**23,779**	**29,799**	
% E-Zpass	**49.2%**	**46.1%**	**48.5%**	

Travel Time Surveys

Travel time surveys were conducted in order to indicate time differences between trips taking the Scudder Falls Bridge and alternate routes. These results factor into our forecasts of who would remain on the Scudder Falls Bridge versus using another bridge in the area. The southbound origin-destination (O-D) study that was part of the surveys conducted by Jacobs during the Level II Scudder Falls Bridge T&R Study in 2008/2009, indicated two major clusters of origin points in New Jersey for Bridge customers. These were used as the starting locations for the travel time surveys:

- Ewing, NJ at Scotch Road and Parkway Avenue
- The I-95/Rte 1 interchange in Lawrence, NJ (which will include the majority of trips from the north and east)

Three major clusters of destination points were identified on the Pennsylvania side, and were used as the ending points for the travel time surveys:

- Newtown, PA at Lincoln Ave. and Washington Ave.
- Yardley, PA at Afton Ave. and Schuyler Dr.
- The I-95/Rte 1 interchange in Langhorne, PA (which will include the majority of the trips from the south and west)

The travel time surveys were conducted by Arora and Associates, PC, between each combination of O-D pairs during peak and off-peak periods. The surveys were conducted during the first week of April, from Tuesday through Thursday. Different routes were traveled between each O-D pair, using the Scudder Falls Bridge and using alternative bridges where they made sense as alternate routes (as an example, for a trip between Lawrence and Langhorne, the Washington Crossing Toll Supported Bridge is *not* a reasonable alternative because it is located well outside the area of travel and would add significant journey time, but the Route 1/Trenton-Morrisville Toll Bridge and the Lower Trenton Toll-Supported Bridge are). As shown in the following Table, the Scudder Falls Bridge is always the fastest route between these points, except between the two I-95/ Route 1 interchanges, where the travel time using the Trenton-Morrisville Toll Bridge is very similar to and sometimes shorter than the travel time using the Scudder Falls Bridge.

Table 4: Travel Times between O-D Pairs, Using Scudder Falls Bridge and Alternative Crossings (in minutes)

From	To	Scudder Falls Br.	Trenton-Morrisville Toll Br.	Lower Trenton Toll Supported Br.	Calhoun St. Toll Supported Br.	Washington Crossing Toll Supported Br.
AM Peak Period						
Ewing, NJ	Yardley, PA	12.4			18.3	
Ewing, NJ	I-95/Rte 1 Int., PA	11.5	18.0	17.8		
Ewing, NJ	Newtown, PA	13.0				23.0
I-95/Rte 1 Int., NJ	Yardley, PA	14.1		18.5		
I-95/Rte 1 Int., NJ	I-95/Rte 1 Int., PA	13.6	13.4	18.0		
I-95/Rte 1 Int., NJ	Newtown, PA	16.9	23.0	25.5		
Midday / Off-Peak Period						
From	To	Scudder Falls Br.	Trenton-Morrisville Toll Br.	Lower Trenton Toll Supported Br.	Calhoun St. Toll Supported Br.	Washington Crossing Toll Supported Br.
Ewing, NJ	Yardley, PA	10.8			18.4	
Ewing, NJ	I-95/Rte 1 Int., PA	13.0	17.5	18.3		
Ewing, NJ	Newtown, PA	14.0				21.5
I-95/Rte 1 Int., NJ	Yardley, PA	14.4		18.0		
I-95/Rte 1 Int., NJ	I-95/Rte 1 Int., PA	13.7	14.3	17.0		
I-95/Rte 1 Int., NJ	Newtown, PA	16.8	21.0	25.0		
PM Peak Period						
From	To	Scudder Falls Br.	Trenton-Morrisville Toll Br.	Lower Trenton Toll Supported Br.	Calhoun St. Toll Supported Br.	Washington Crossing Toll Supported Br.
Ewing, NJ	Yardley, PA	10.4			20.2	
Ewing, NJ	I-95/Rte 1 Int., PA	11.5	18.5	21.5		
Ewing, NJ	Newtown, PA	14.5				22.0
I-95/Rte 1 Int., NJ	Yardley, PA	14.2		24.0		
I-95/Rte 1 Int., NJ	I-95/Rte 1 Int., PA	13.7	13.9	17.9		
I-95/Rte 1 Int., NJ	Newtown, PA	17.5	23.5	32.0		

Online Customer Characteristic Surveys

The purpose of the online surveys was to obtain information on Scudder Falls Bridge current customer travel characteristics such as frequency of travel, state of residence, trip origin/destination, familiarity with electronic tolling, and stated preference (i.e., what a driver states they would do if the Scudder Falls Bridge were to be tolled). For the Level II Scudder Falls Bridge T&R Study in 2008/2009, Jacobs had conducted a survey advertised through roadside variable message signs (VMS). Our 2014 surveys contain almost all of the same questions as in the previous study, plus several new questions. The actual survey questions have been included at the end of this memorandum. Results of the surveys will be used in Jacobs' traffic and revenue forecasting model.

Two different methods were used to direct patrons to take the survey:

1. through e-Rewards, a service whereby e-Rewards members are e-mailed a survey link and earn e-Rewards points for completion of surveys, and
2. through variable message signs (VMS) displayed for several weeks near the Scudder Falls Bridge directing drivers to an internet link, "www.SURVEY-U.com".

eRewards Survey

The purpose of conducting an eRewards survey in addition to the roadside VMS survey was:

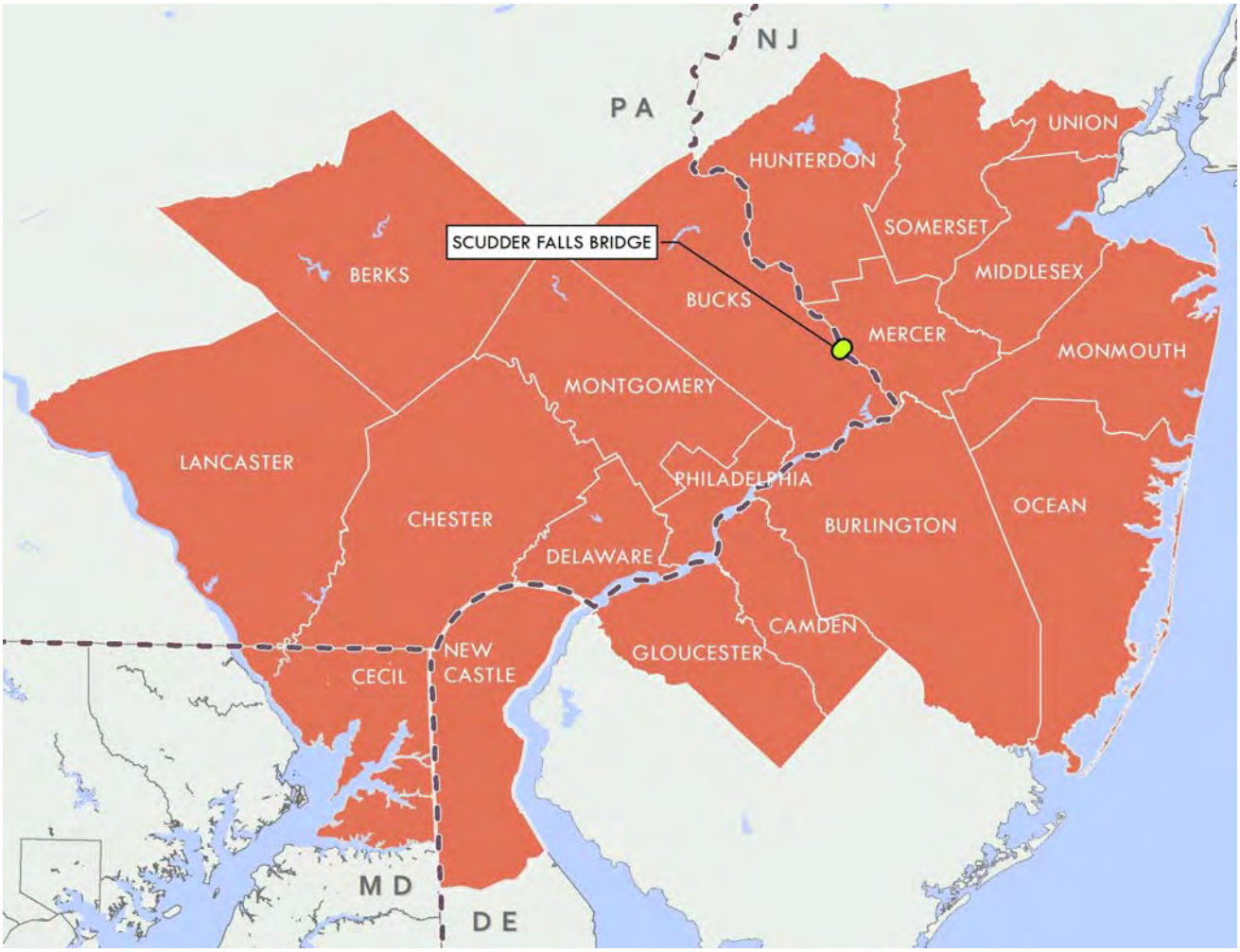
- to obtain responses from additional customers, and
- to include infrequent customers who may not have seen - or did not respond to - the VMS sign.

The e-Rewards survey, since it is sent to essentially a random sampling of people throughout the area, provides a far better indication of frequency of travel across the Bridge than the VMS survey, mainly because a person who sees the VMS sign advertising the survey over and over again (i.e., a frequent traveler) is much more likely to complete the survey than someone who sees it only once or not at all.

Research Now (parent company of e-Rewards) conducted the survey through their e-Rewards program. e-Rewards participants who did not meet the survey requirements – such as people without a driver's license, and people who state that they have not crossed the Scudder Falls Bridge at all in the past year – were screened out of the survey and were not included in Jacobs' quota of 1,000 completed surveys.

Research Now e-mailed the survey link to all e-Rewards participants within an area specified by Jacobs. This area, chosen by Jacobs to cover the parts of the DVRPC model region that were proximate to the Scudder Falls Bridge and I-95 – and therefore likely to contain both frequent and infrequent Bridge customers – consisted of 19 counties, as shown in Figure 4. The e-mails were sent and the survey commenced on March 25th 2014; the 1,000 quota was reached and the survey concluded on March 28th.

Figure 4: Counties Included in eRewards Survey Area



VMS-Advertised SurveyMonkey Survey

The roadside VMS-advertised survey was administered through the internet survey site *SurveyMonkey*. Jacobs owns the web address "www.SURVEY-U.com," which was linked to the Scudder Falls survey. "WWW.SURVEY-U.COM" was publicized to patrons of the Scudder Falls Bridge via four strategically located roadside variable message signs.

The two phases for the VMS were as follows:

Phase 1 -
"TAKE TRAVEL SURVEY"

Phase 2 -
"WWW. SURVEY-U .COM"

The Commission placed the VMS signs and displayed the messages on the two Pennsylvania signs for about three and a half weeks, from March 5th through March 28th 2014. The two signs in New Jersey were displayed from March 5th through March 14th 2014. The survey was kept open to collect responses until March 31st. Locations for these variable message signs are shown in Figure 5.

Figure 5: Location of Variable Message Signs at Scudder Falls Bridge

Notes:
VMS 1 & 3 faced Northbound (NB) traffic. VMS 2 & 4 faced Southbound (SB) traffic.
VMS 3 & 4 were removed on March 14, the 10th day of the survey.

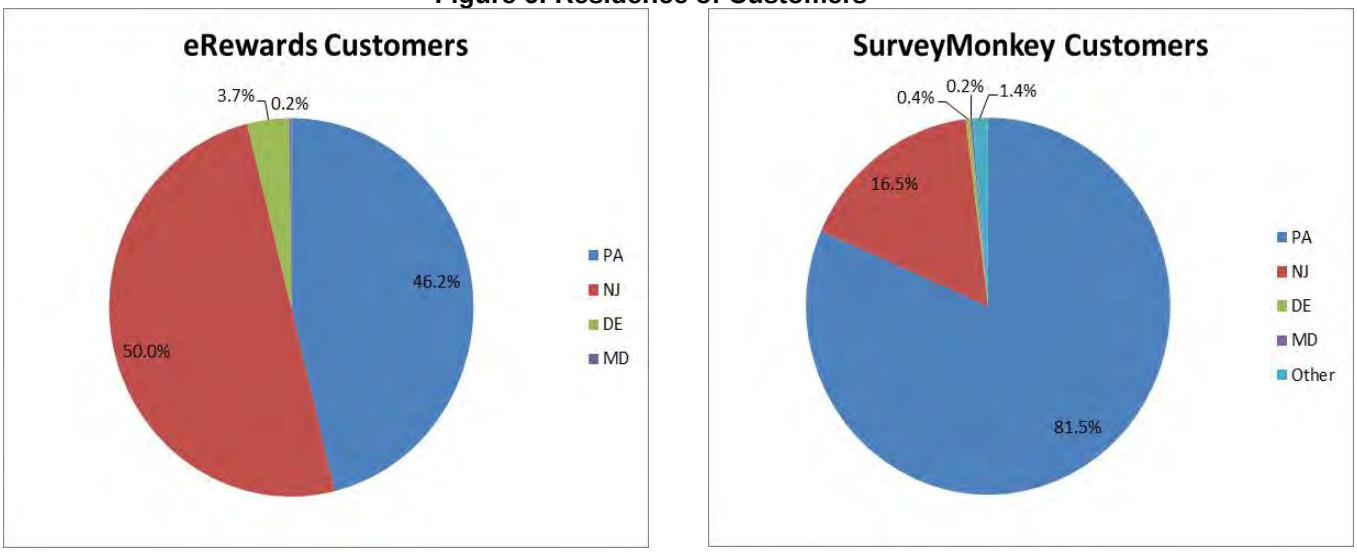
Online Customer Characteristic Survey Results: Customer Responses

We received 1,001 fully completed surveys from e-Rewards and 477 completed plus 32 partially-completed surveys from SurveyMonkey, the VMS-advertised survey. (This is in comparison to the 445 full and 27 partial surveys completed via the VMS surveys in the 2008-2009 Level II Traffic & Revenue study.) This section presents the customer responses for each survey. The results for several of the questions that were expanded to represent total trips are presented in the following section on page 28.

What is your city, state, and zip code of residence?

Customers were asked in which city and state they reside. As Figure 6 shows, eRewards survey respondents were almost evenly split between Pennsylvania and New Jersey residents, with a small number of Delaware residents. Meanwhile the VMS (SurveyMonkey) survey was mainly taken by people who live in Pennsylvania, as the work commute across the Scudder Falls Bridge is primarily made by Pennsylvania residents traveling to work in New Jersey, and these commuters (frequent travelers) were more likely to see the VMS than other travelers.

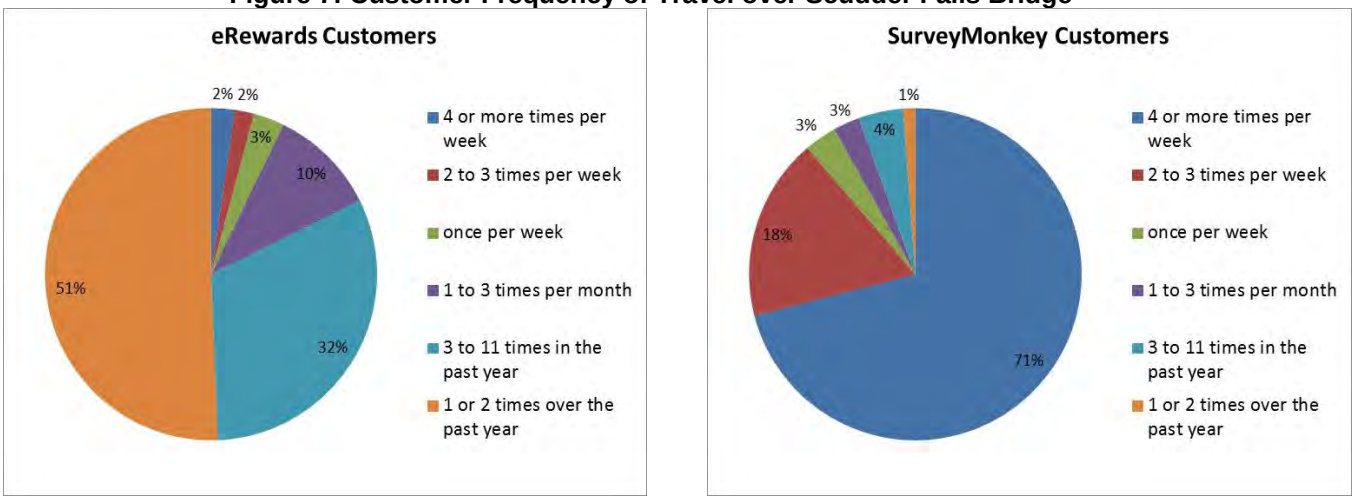
Figure 6: Residence of Customers



How often have you driven across the Scudder Falls Bridge over the past year?

Figure 7 shows how customers responded to the question on trip frequency. Anyone who stated that they had not used the Scudder Falls Bridge at all in the past year were screened out of the survey. As expected, there was a very large difference between the two surveys, as the eRewards survey was taken by a sampling of people throughout the central NJ and southeastern PA area, who are part of the eRewards program, and the SurveyMonkey survey was only taken by those who saw the roadside variable message sign, remembered the website name, and later went online to take the survey. Only 2 percent of the eRewards respondents cross the Bridge four or more times per week, while 71 percent of those responding to the VMS/SurveyMonkey survey do. The majority of eRewards customers – 51 percent – took the Bridge only once or twice in the past year, as compared to 1 percent of the SurveyMonkey respondents.

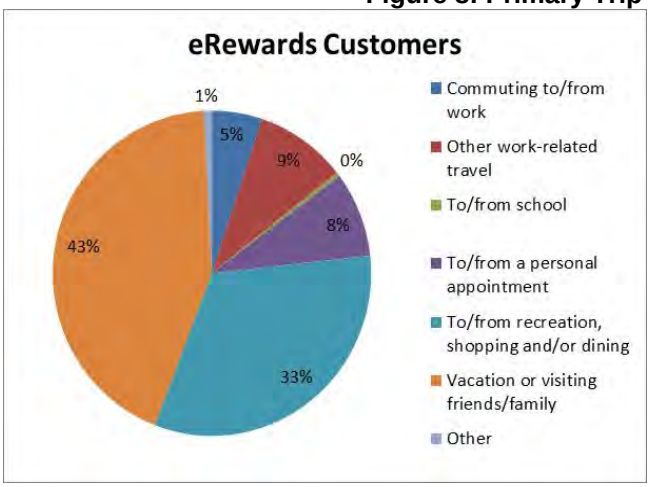
Figure 7: Customer Frequency of Travel over Scudder Falls Bridge

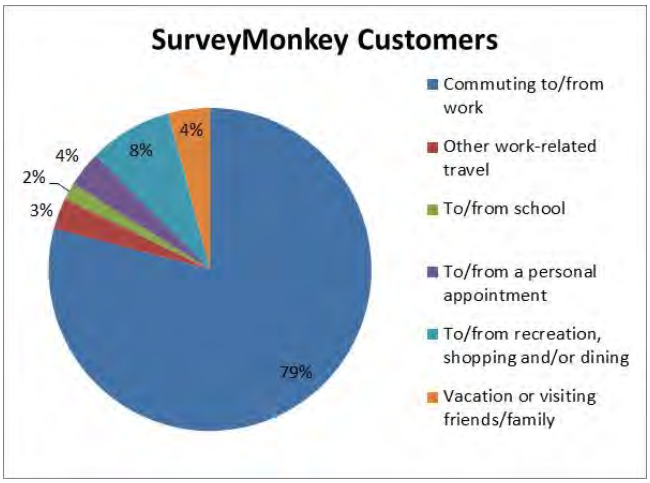


What was the primary purpose of your trip across the Scudder Falls Bridge?

Figure 8 compares the primary purpose of travel among Bridge customers for their most recent southbound crossing. Those taking the SurveyMonkey survey were primarily commuters while eRewards customers using the bridge used it for more discretionary trip purposes such as vacation travel, recreation and shopping.

Figure 8: Primary Trip Purpose of Customers

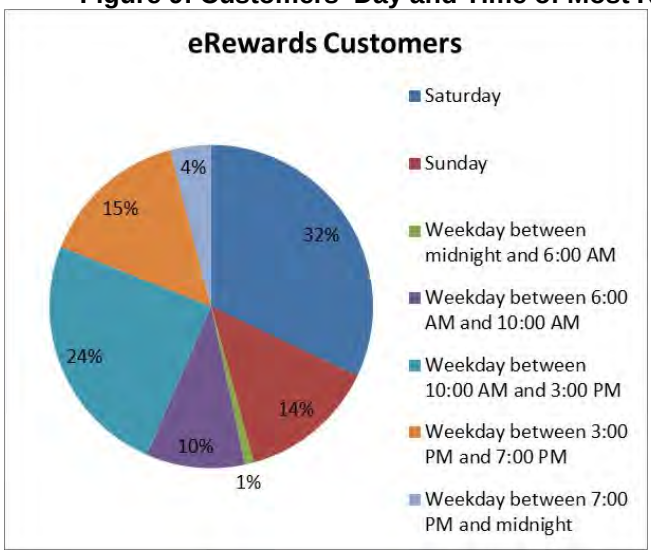


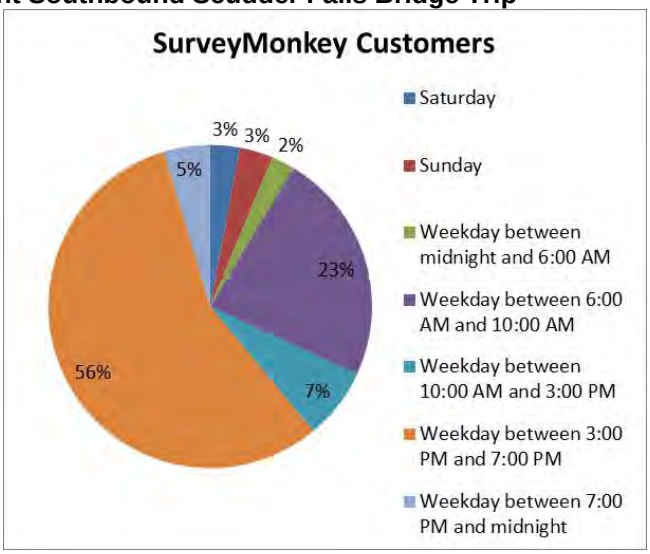


What day / time of day did you take this trip?

Customers' most recent time of crossing the Bridge in the southbound direction is shown in Figure 9. This follows the same pattern of the previous responses, with mainly infrequent, discretionary trips by eRewards customers and mainly commutation trips by SurveyMonkey respondents. Therefore, the eRewards' responses show more off-peak and weekend travel than those for the VMS surveys.

Figure 9: Customers' Day and Time of Most Recent Southbound Scudder Falls Bridge Trip

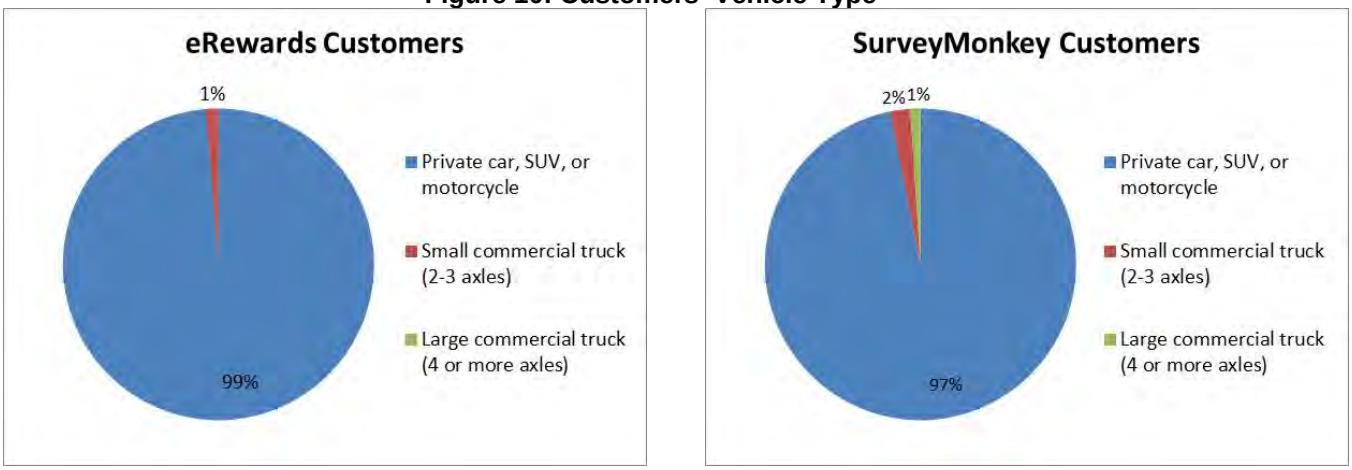




What type of vehicle were you driving for this trip?

The vast majority of respondents drove a car across the Bridge during their most recent southbound trip, as shown in Figure 10.

Figure 10: Customers' Vehicle Type



Where did this trip begin? Where did this trip end?

Customers were asked the origin and destination of their most recent southbound trip across the Bridge. A small number of patrons mistakenly gave their origin as Pennsylvania or south and their destination as New Jersey or north, corresponding to a northbound trip across the bridge; these origin-destination pairs were flipped to represent a southbound trip. Origins and destinations for the eRewards and SurveyMonkey respondents are shown in Figure 11 and Figure 12, respectively. Figure 13 shows the results of both surveys together, within about a 15-mile range of the Scudder Falls Bridge.

These results show, first of all, that there were differences between the two sets of customers. The respondents to the eRewards survey mainly took trips with origins and destinations outside the immediate area of the Scudder Falls Bridge, while those surveyed through SurveyMonkey were clustered in areas around the bridge, such as Newton, Langhorne, Yardley, the Trenton/Ewing area, and Princeton. This was expected because the eRewards survey link was emailed to people throughout the area including many who only use the bridge occasionally, while the SurveyMonkey respondents were more likely to be locals and commuters who took the survey because they saw the sign advertising it on multiple trips across the bridge.

The origins and destinations from the SurveyMonkey survey match well with those from the surveys conducted by Jacobs during the Level II Scudder Falls Bridge T&R Study in 2008/2009.

Figure 11: Origins and Destinations of Customers on Most Recent Southbound Trip, eRewards

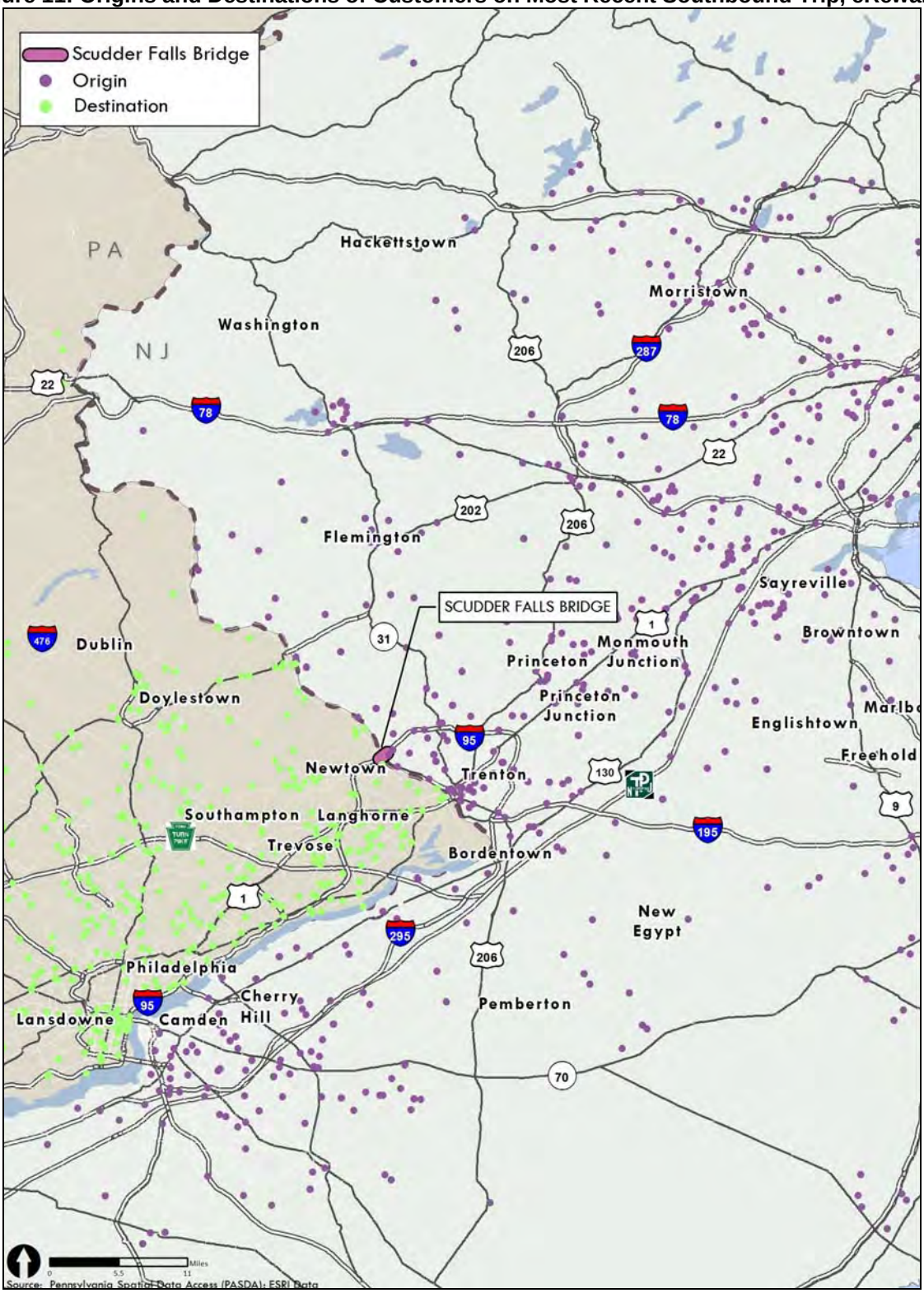


Figure 12: Origins and Destinations of Customers on Most Recent Southbound Trip, SurveyMonkey

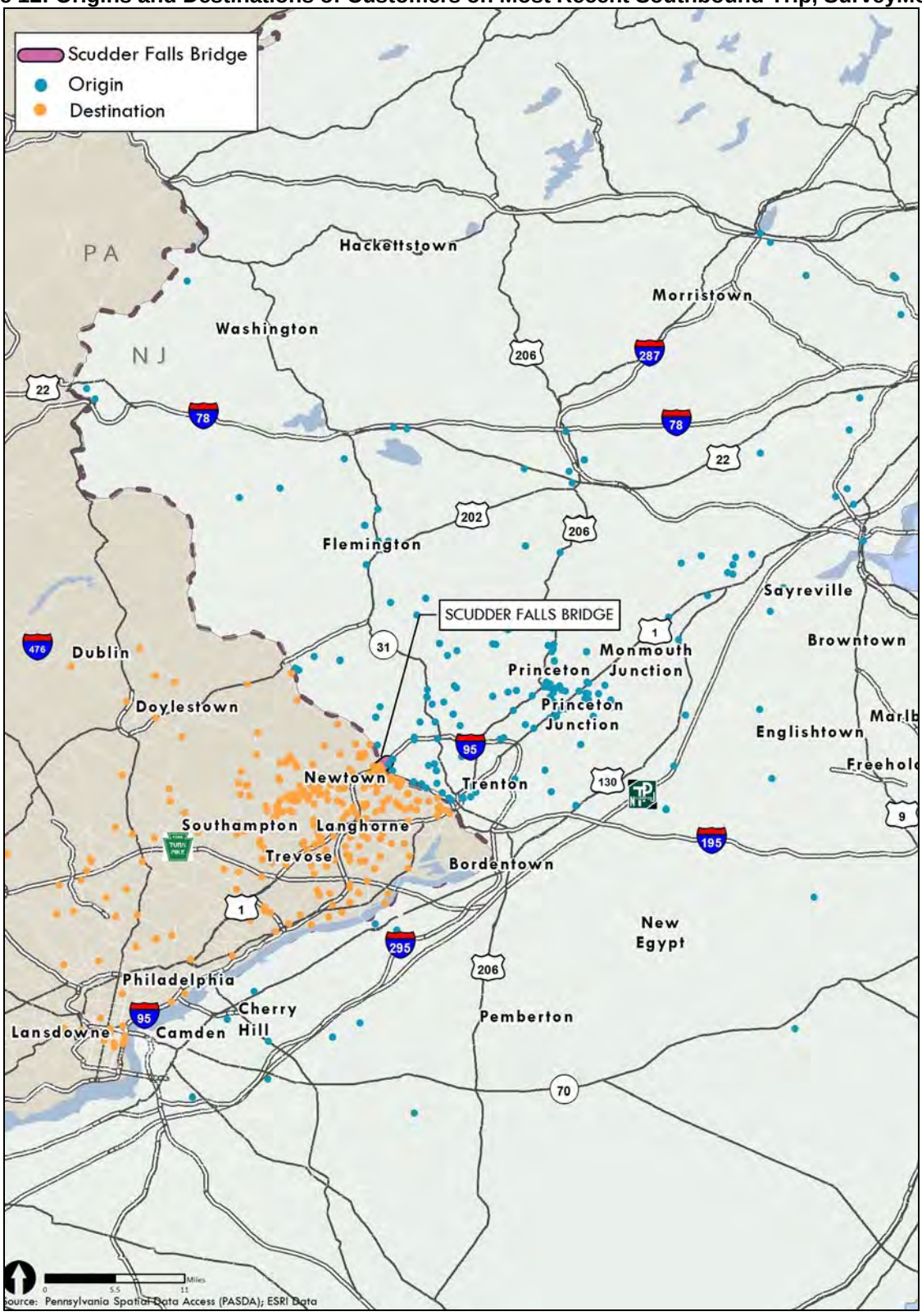
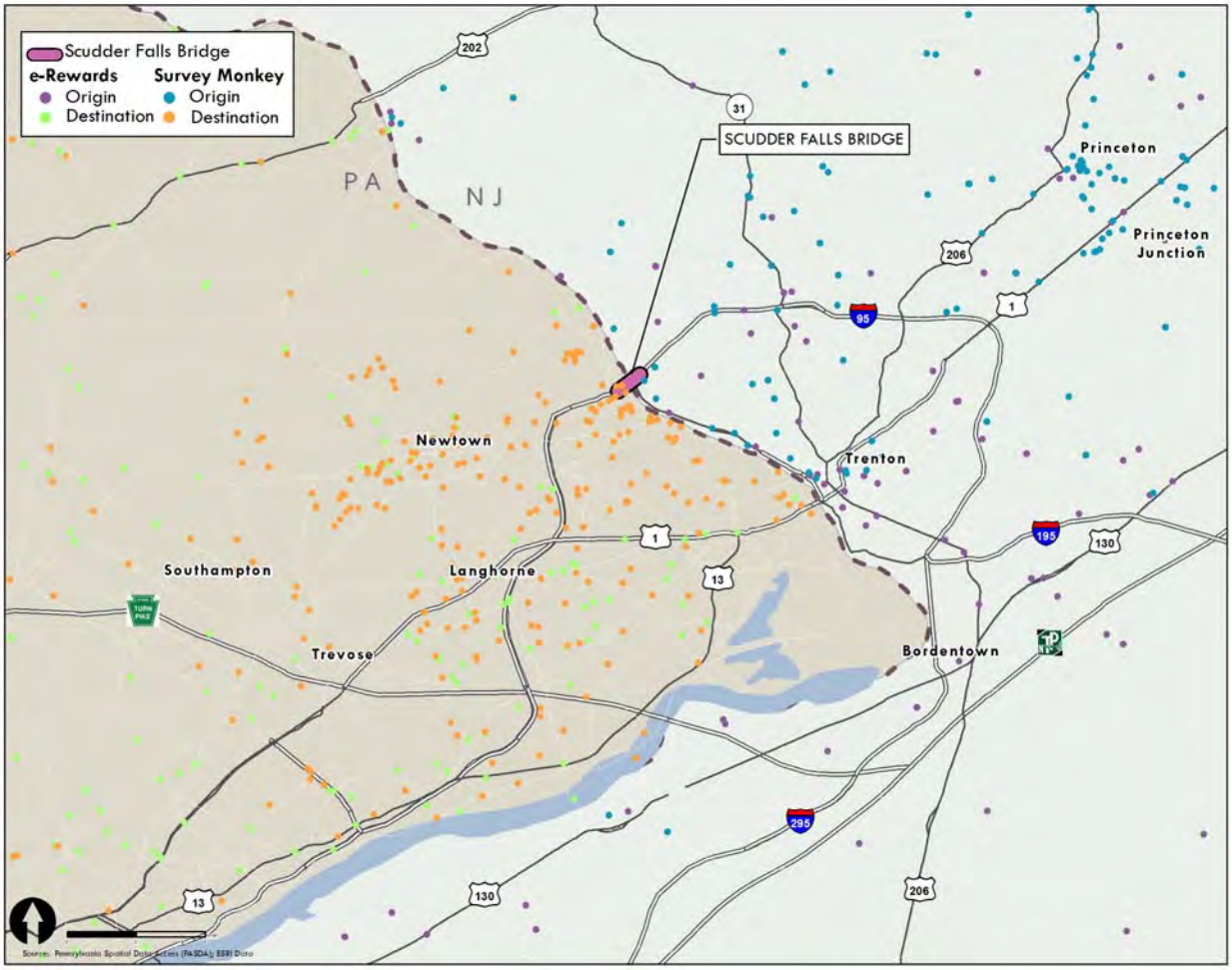


Figure 13: Origins and Destinations of Customers on Most Recent Southbound Trip, Vicinity of Scudder Falls Bridge



What was your total approximate travel distance? What was your total approximate travel time?

As shown in Figure 14 and
Figure 15, the majority of eRewards customers drove more than 50 miles the last time they crossed the Scudder Falls Bridge in the southbound direction, with a travel time of more than an hour. Most SurveyMonkey respondents drove 20 miles or less with a travel time of 15 to 45 minutes.

Figure 14: Customers' Travel Distance

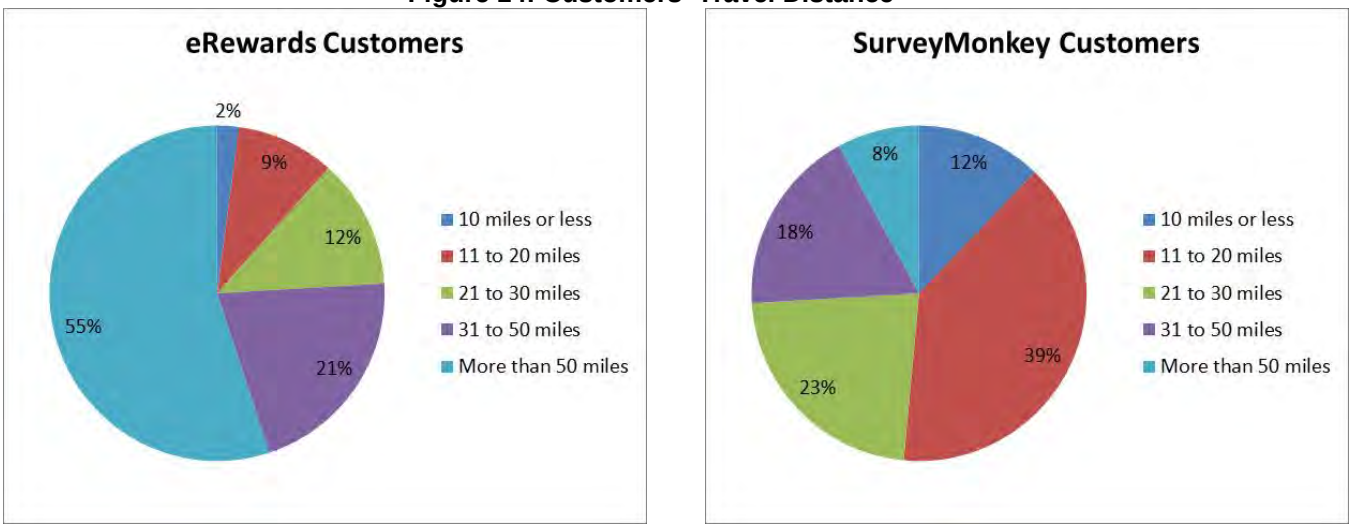
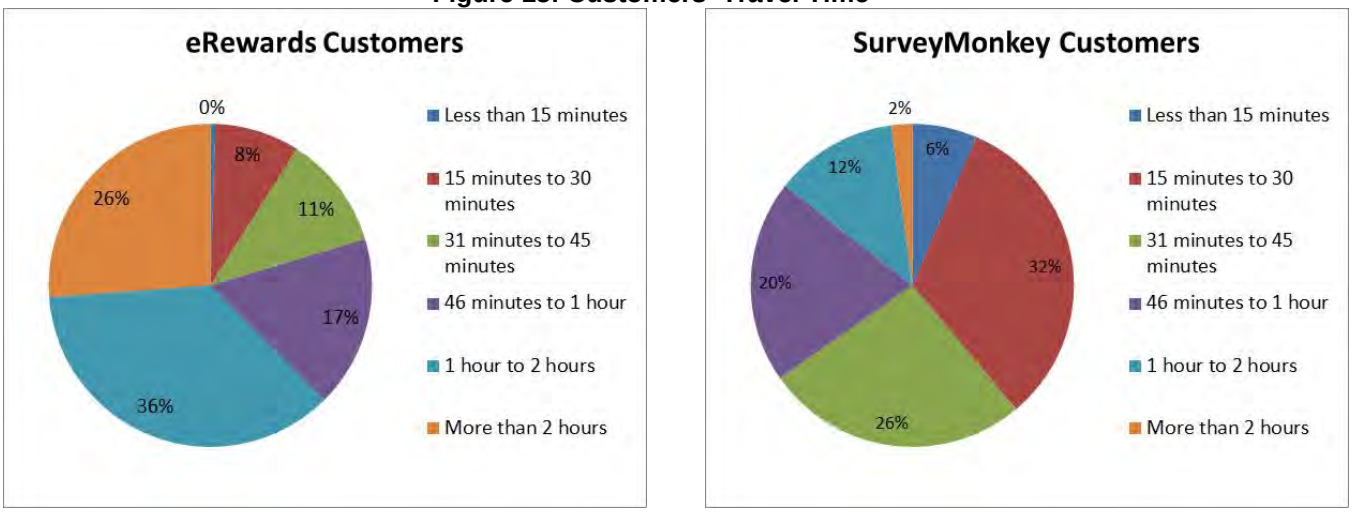


Figure 15: Customers' Travel Time



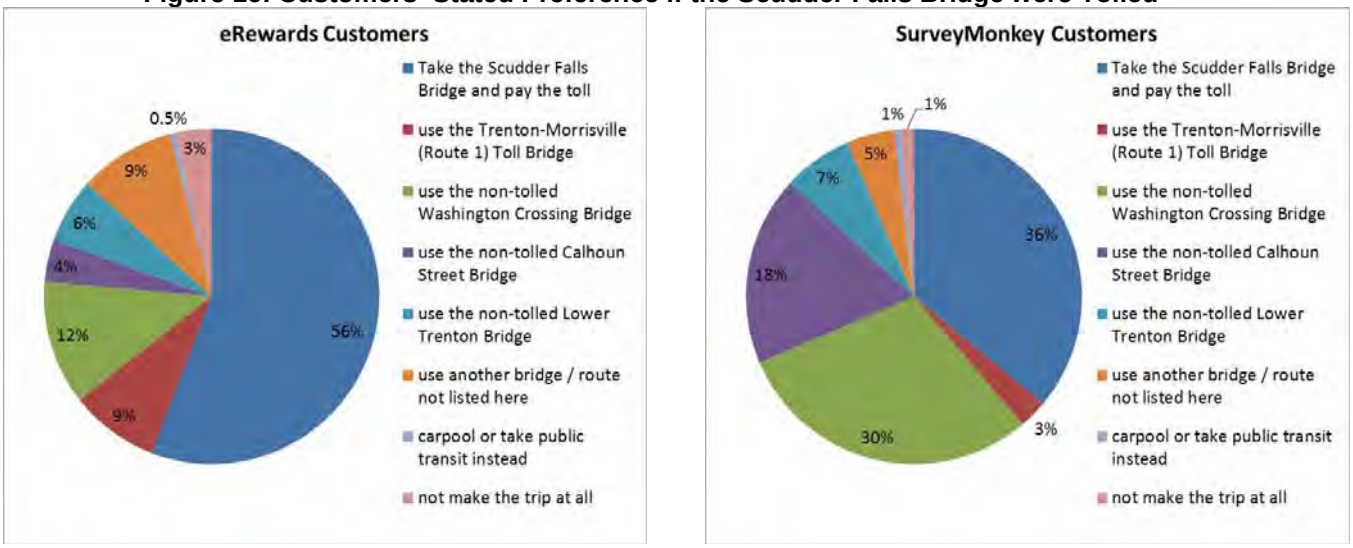
If the new Scudder Falls Bridge had the same Pennsylvania-bound toll as the Trenton-Morrisville Route 1 Toll Bridge, what would you do when you wanted to make this trip again across the Delaware River? {Stated Preference}

Customers were asked what they would do if they were to make the same trip but with a southbound toll on the Scudder Falls Bridge that is similar to the toll on the Trenton-Morrisville (Route 1) Bridge. A majority of the eRewards customers (56 percent) stated that they would stay on the Scudder Falls Bridge and pay the toll, while only 36 percent of SurveyMonkey respondents said they would; most of them stated that they would move to a non-tolled bridge.

It should be noted that stated preference surveys and their results rely on hypothetical questions to elicit preferences or values. Hypothetical bias arises in stated preference valuation studies when respondents report a willingness to do something in laboratory or field experiments that in fact they would not normally do in the real world, and hypothetical biases typically exceed the actual values. In this situation, many respondents were likely to state that they would take a free bridge as a protest against tolling on the Scudder Falls Bridge, or in the belief that the collective answers would be used to decide whether or not to toll the bridge. Therefore, the results of this particular question – and stated preference data in general - should be looked at with a note of caution, especially prior to the expansion of these customer results to 'total trips.'

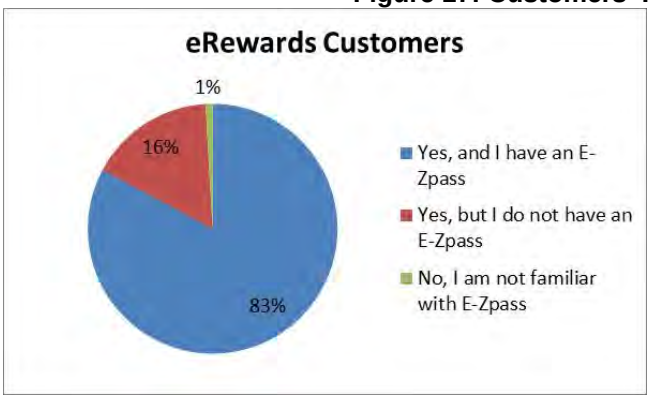
Note that this question was not asked in the survey conducted by Jacobs during the Level II Scudder Falls Bridge T&R Study in 2008/2009.

Figure 16: Customers' Stated Preference if the Scudder Falls Bridge were Tolled



Are you familiar with *E-ZPass*? If you do not have an *E-ZPass*, why not?
Customers were asked if they are familiar with *E-ZPass* and if they have *E-ZPass*. As Figure 17 shows, almost all customers are familiar with *E-ZPass,* and the vast majority stated that they have it. Those who do not have *E-ZPass* were asked to select all the reasons why not (see Figure 18). For both surveys, the majority of non-*E-ZPass* customers stated that they do not use toll facilities often enough to get *E-ZPass*. Other reasons chosen by many customers were that they have privacy concerns, don't like automatic credit card charges, and that they do not like the idea of prepaying for tolls. Other reasons customers specified were that they were afraid that *E-ZPass* would be error-prone, they wanted to keep toll collector jobs, or they do not own a vehicle.

Figure 17: Customers' Familiarity with *E-ZPass*



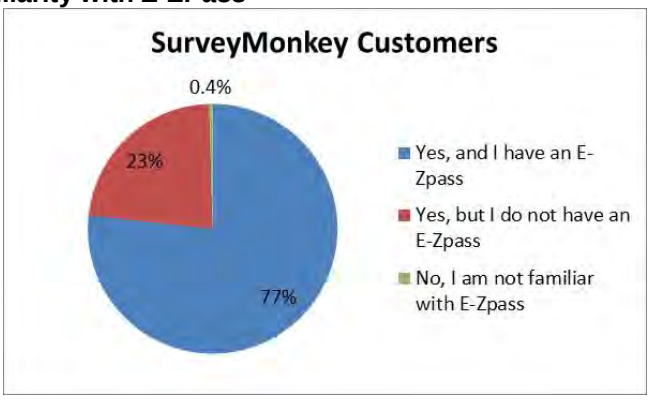
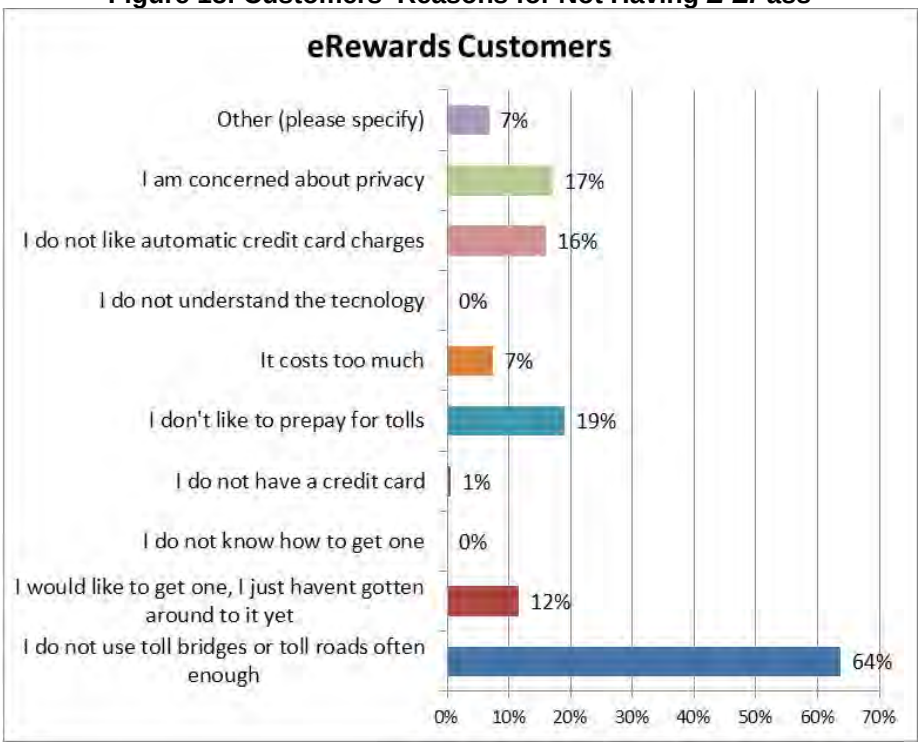
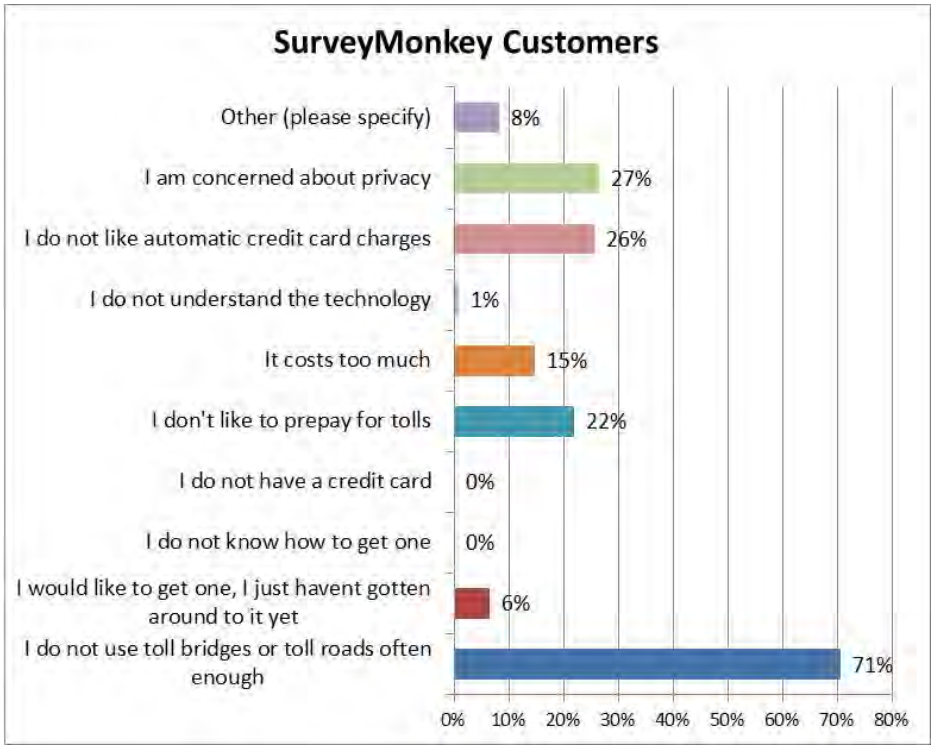


Figure 18: Customers' Reasons for Not Having *E-ZPass*

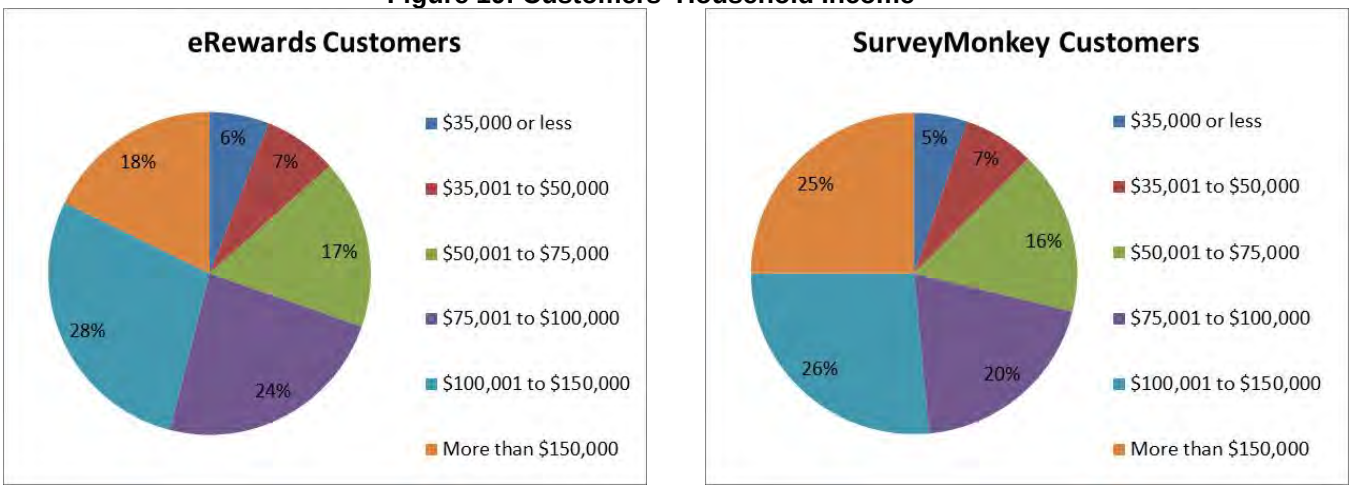




What is your annual household income?

Figure 19 graphs the household income of customers who took each survey. Those who preferred not to answer this question have been excluded from the resulting graphics.

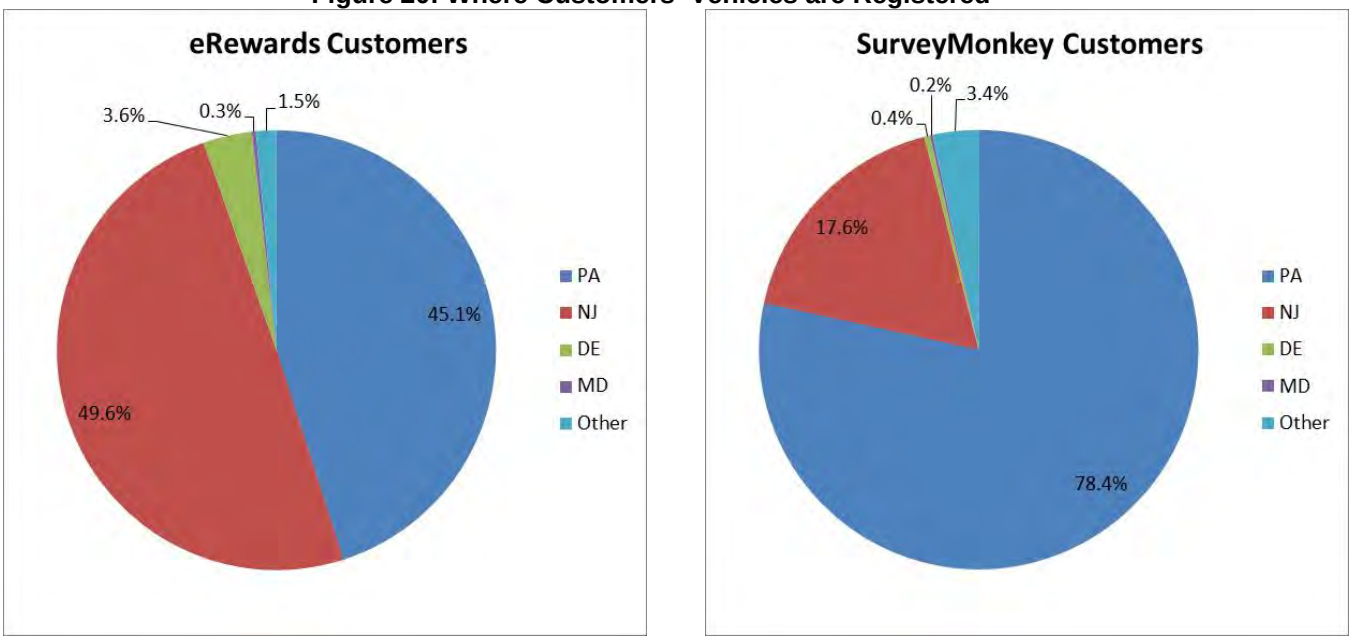
Figure 19: Customers' Household Income



In what state is your vehicle registered?

Figure 20 shows the state of registration of each customer's vehicle. There are some small differences between this and Figure 6 (residence of customers), signifying that a person's state of residence does not always match the state on their license plate. Also, there is a greater share of customers in the "Other" category for state of vehicle registration. Some of these are due to car rentals.

Figure 20: Where Customers' Vehicles are Registered



Online Customer Characteristic Survey Results – Expanded to Total Trips

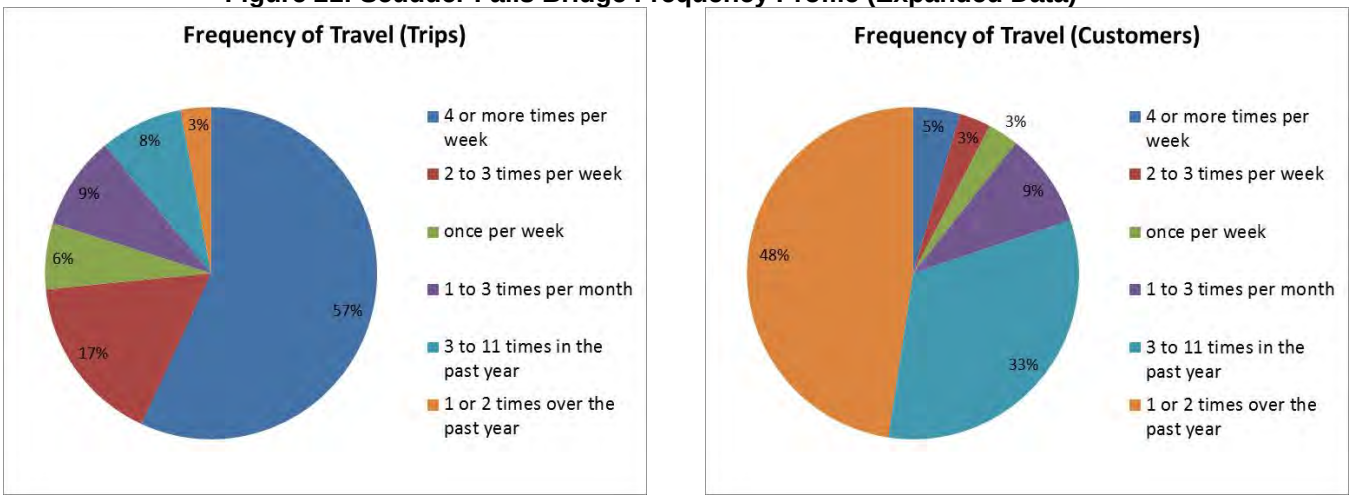
While the previous section presented the raw data from the surveys, some of the customer responses, in order to be effectively used in our traffic and revenue modeling, need to be expanded to represent total trips across the Bridge. This expansion was achieved using the customer trip frequency profile.

Trip Frequency
Jacobs developed the frequency profile by taking the following steps:

- Each SurveyMonkey response to the frequency question was assumed to represent one trip, as the survey captured travelers across the bridge for nearly one month.
- The eRewards survey, since it was not advertised to people crossing the bridge, represented customers. Factors were applied to turn each customer (survey response) into trips. This is detailed in the paragraph following Figure 21.
- Because the SurveyMonkey responses were biased towards frequent users who saw the survey advertisements multiple times, and the eRewards respondents tended to be more infrequent users, the frequency profiles between the two surveys differed somewhat. We felt that by combining the eRewards and SurveyMonkey frequency data with equal weight, we would remove most of this bias.

Figure 21 represents the overall adjusted frequencies of trips and customers. As seen from these results, 5 percent of customers who travel four or more times a week across the Scudder Falls Bridge make 57 percent of the trips. The 48 percent of customers who cross the bridge once or twice a year make only 3 percent of the trips.

Figure 21: Scudder Falls Bridge Frequency Profile (Expanded Data)



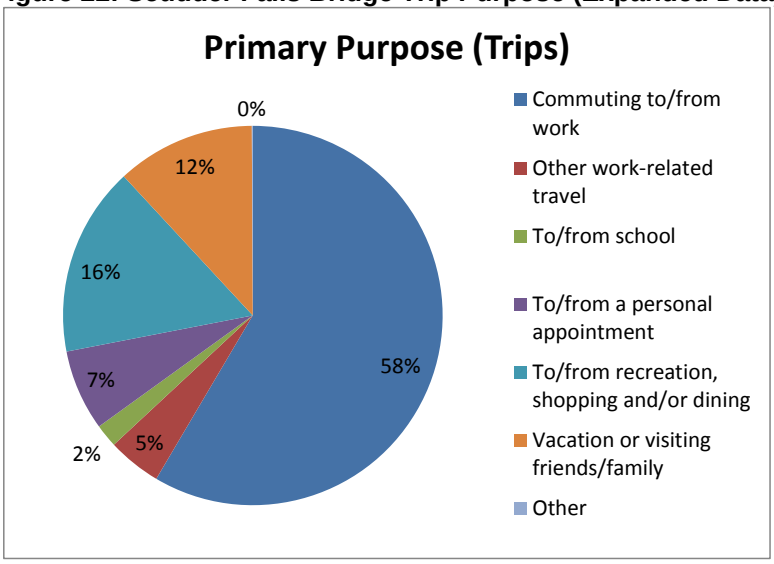
The remaining expanded data charts shown in this section apply the trip frequency of each customer in order to turn customers into trips. For example, if a customer takes one trip per week across the bridge, this represents 52 trips per year. A customer who takes 4 or more trips per week

makes about 300 trips per year. A customer who states they traveled over the bridge one or two times over the past year was assumed to make, on average, 1.5 trips per year. Therefore the survey results had to be expanded using the appropriate factors to represent trips. It is important to expand customer results to trips because a trip represents a potential *toll transaction*, and we would like to know if this *toll transaction* will be made by someone who has E-ZPass (rather than know the general population that has E-ZPass), or if a potential video toll transaction will be made by someone who travels frequently (and therefore receives one toll invoice with multiple transactions) or very infrequently (and receives one toll invoice with only one transaction on it). This is significant data that we incorporated into our forecasting models and estimates of video toll collection costs.

Trip Purpose

Figure 22 shows survey customer data expanded to represent southbound total trips across the Bridge in terms of trip purpose. The expanded data shows that almost two-thirds of the trips (58 percent plus 5 percent) on the Bridge are for commuting or work-related travel. Only 2 percent of the trips are made for school, and the remaining one-third of trips on the Bridge are for more discretionary travel, such as personal trips, shopping, or vacation.

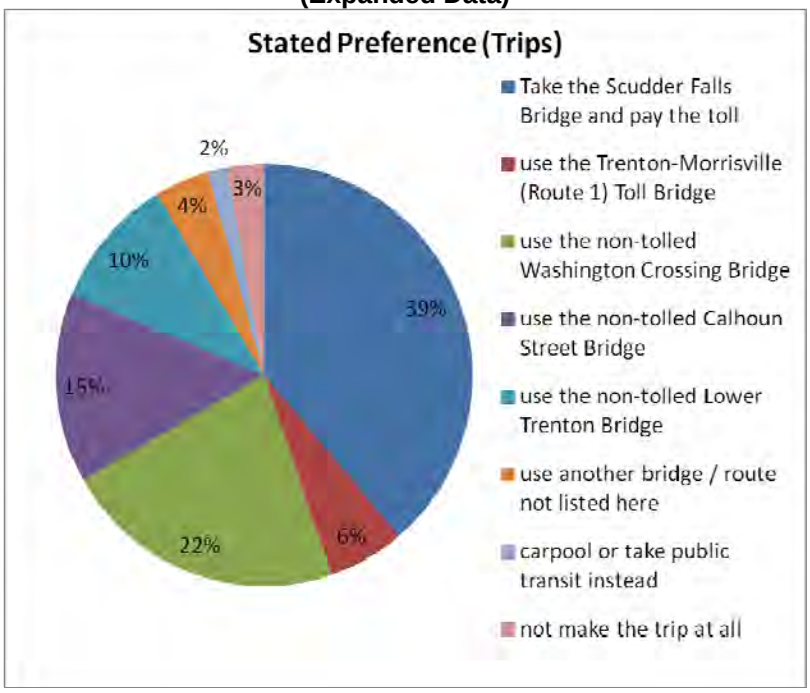
Figure 22: Scudder Falls Bridge Trip Purpose (Expanded Data)



Stated Preference Survey Question (What would you do if…?)
As mentioned previously, customers were asked what they would do if they were to make the same trip but with a southbound toll on the Scudder Falls Bridge that is similar to the toll on the Trenton-Morrisville (Route 1) Bridge. From a *customer* standpoint, a majority of the eRewards customers (56 percent) stated that they would stay on the Scudder Falls Bridge and pay the toll, while only 36 percent of SurveyMonkey respondents said they would; most of them stated that they would move to a non-tolled bridge. However, on a total trip (expanded data) basis, 39 percent of the trips would stay on the Bridge after implementation of tolling, with 6 percent using other tolled Trenton-Morrisville Bridge, 50 percent switching to non-tolled bridges, and 5 percent changing travel patterns.

As mentioned previously, the results of this particular question – and stated preference data in general - should be looked at with a note of caution as many users of a currently-free bridge would be biased against tolling it. The answers to this question were used only to inform Jacobs' analyses and have not been used directly.

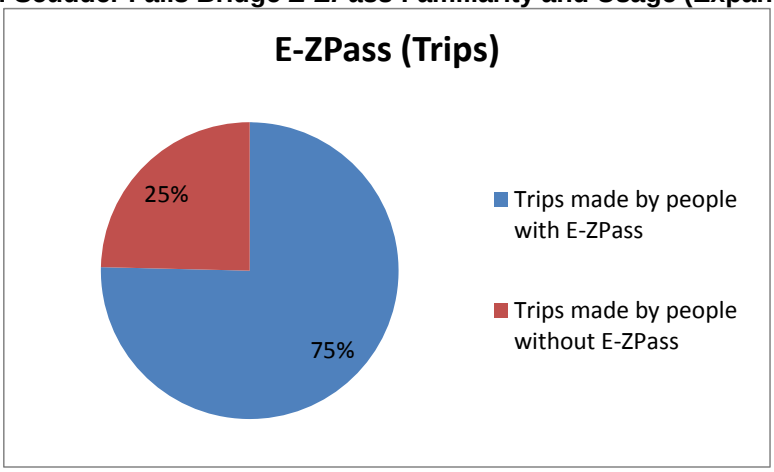
Figure 23: Stated Preference if the Scudder Falls Bridge were Tolled (Expanded Data)



E-ZPass Familiarity and Ownership

Figure 24 shows customer data expanded to percent *E-ZPass* trips. Customers for this online survey were asked if they are familiar with *E-ZPass* and if they have *E-ZPass*. As may be seen in the Figure, according to the data, three-quarters of the trips would be made by *E-ZPass* customers. However, it must be noted that as these surveys were administered and completed online, the results are somewhat skewed to the more tech-savvy person, who would in fact be more likely to have and use *E-ZPass* than would a non-tech-savvy person. As such, one should keep in mind while looking at these data that the answers noted herein would be on the high side of the range of *E-ZPass* usage.

Figure 24: Scudder Falls Bridge *E-ZPass* Familiarity and Usage (Expanded Data)



Scudder Falls Bridge Customer Characteristic Online Surveys

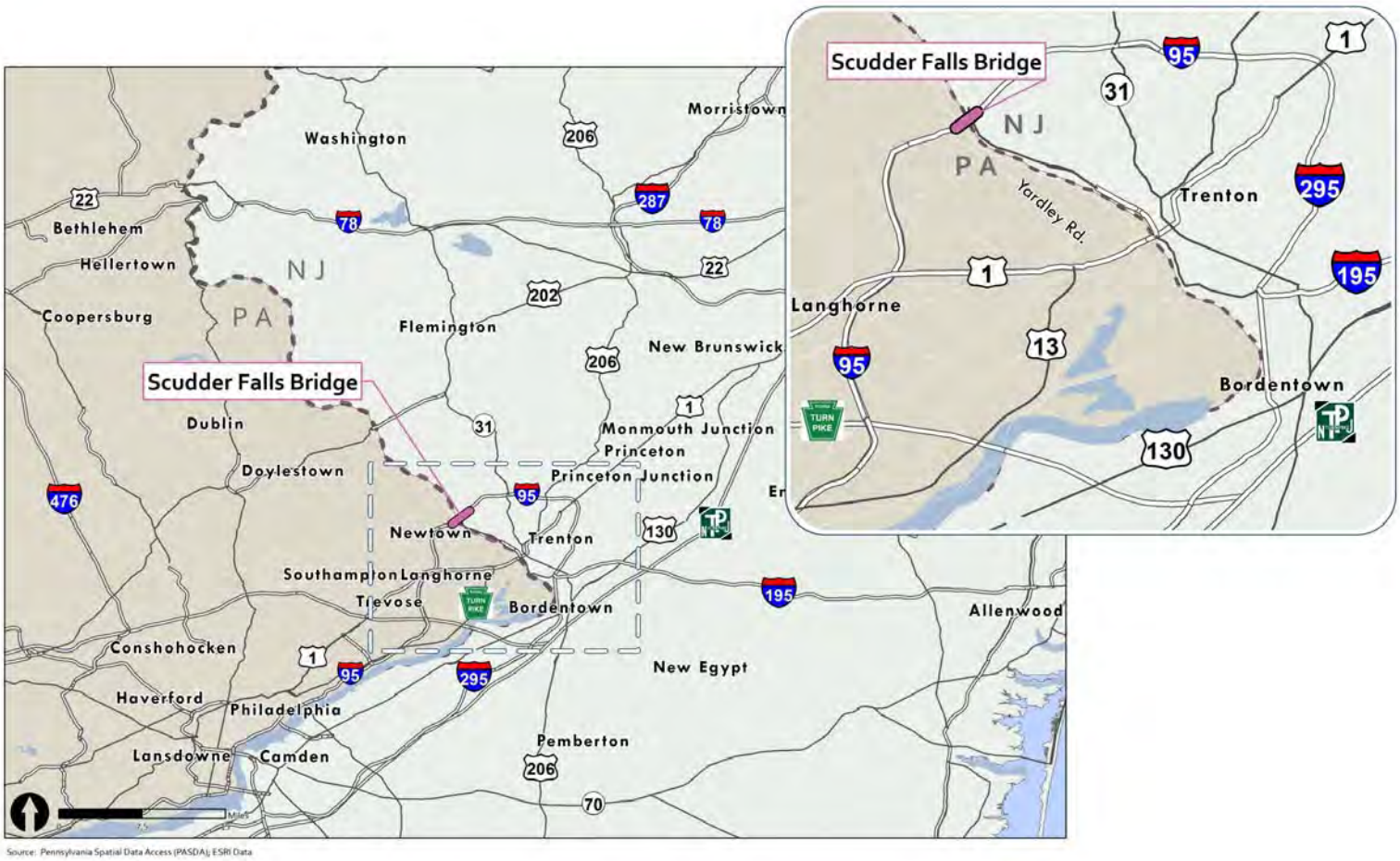
Scudder Falls Bridge Driver Survey

The Scudder Falls Bridge carries I-95 across the Delaware River between New Jersey and Pennsylvania. It is DRJTBC's most heavily used non-tolled bridge.

This survey seeks feedback/input from people who traveled across this bridge in the past year. Please take a few minutes to answer the following questions. Your responses will aid in future transportation planning.

Your participation is very much appreciated!

Below are a photo of the Scudder Falls Bridge and a map of its location northwest of Trenton.



1. Do you currently have a valid driver's license?

- *Yes*
- *No* *go to Disqualification page*

2. What is your city, state, and zip code of residence?

- ***City/Town:*** *Blank text box*
- ***State:*** *Drop Down*
- ***ZIP:*** *Blank text box*

3. How often have you driven across the Scudder Falls Bridge over the past year, in the <u>southbound</u> direction (traveling west from New Jersey to Pennsylvania)?

- *4 or more times per week*
- *2 to 3 times per week*
- *Once per week*
- *1 to 3 times per month*
- *3 to 11 times in the past year*
- *1 or 2 times over the past year*
- *I have not traveled southbound (Pennsylvania-bound) across this bridge in the past year* *go to Disqualification page*

For the next set of questions, we are going to ask you about your **most recent southbound (traveling west from New Jersey to Pennsylvania) trip** across the Scudder Falls Bridge.

4. What was the primary purpose of your most recent southbound trip across the Scudder Falls Bridge?

- *Commuting to/from work*
- *Other work-related travel*
- *To/from school*
- *To/from a personal appointment*
- *To/from recreation, shopping and/or dining*
- *Vacation or visiting friends/family*
- *Other (please specify)* *Blank text box*

5. What day / time of day did you take this trip?

- *On a Saturday*
- *On a Sunday*
- *On a weekday between midnight and 6:00 AM*
- *On a weekday between 6:00 AM and 10:00 AM*
- *On a weekday between 10:00 AM and 3:00 PM*
- *On a weekday between 3:00 PM and 7:00 PM*
- *On a weekday between 7:00 PM and midnight*

6. What type of vehicle were you driving for <u>this trip</u>?

- *Private car, SUV, or motorcycle*
- *Small commercial truck (2-3 axles)*
- *Large commercial truck (4 or more axles)*
- *Other (please specify)* *Blank text box*

7. Where did <u>this trip</u> begin? Please be as specific as possible.

- ***Street, intersection, or nearest landmark:*** *Blank text box, answer not required*
- ***City:*** *Blank text box*
- ***State:*** *Drop Down*
- ***Zip (if known):*** *Blank text box, answer not required*

8. Where did <u>this trip</u> end? Please be as specific as possible; answer should be different than the previous response.

- ***Street, intersection, or nearest landmark:*** **Blank text box, answer not required**
- ***City:*** *Blank text box*
- ***State:*** *Drop Down*
- ***Zip (if known):*** *Blank text box, answer not required*

9. What was your total approximate travel distance (in one direction) for <u>this trip</u>?

- *10 miles or less*
- *11 to 20 miles*
- *21 to 30 miles*
- *31 to 50 miles*
- *More than 50 miles*

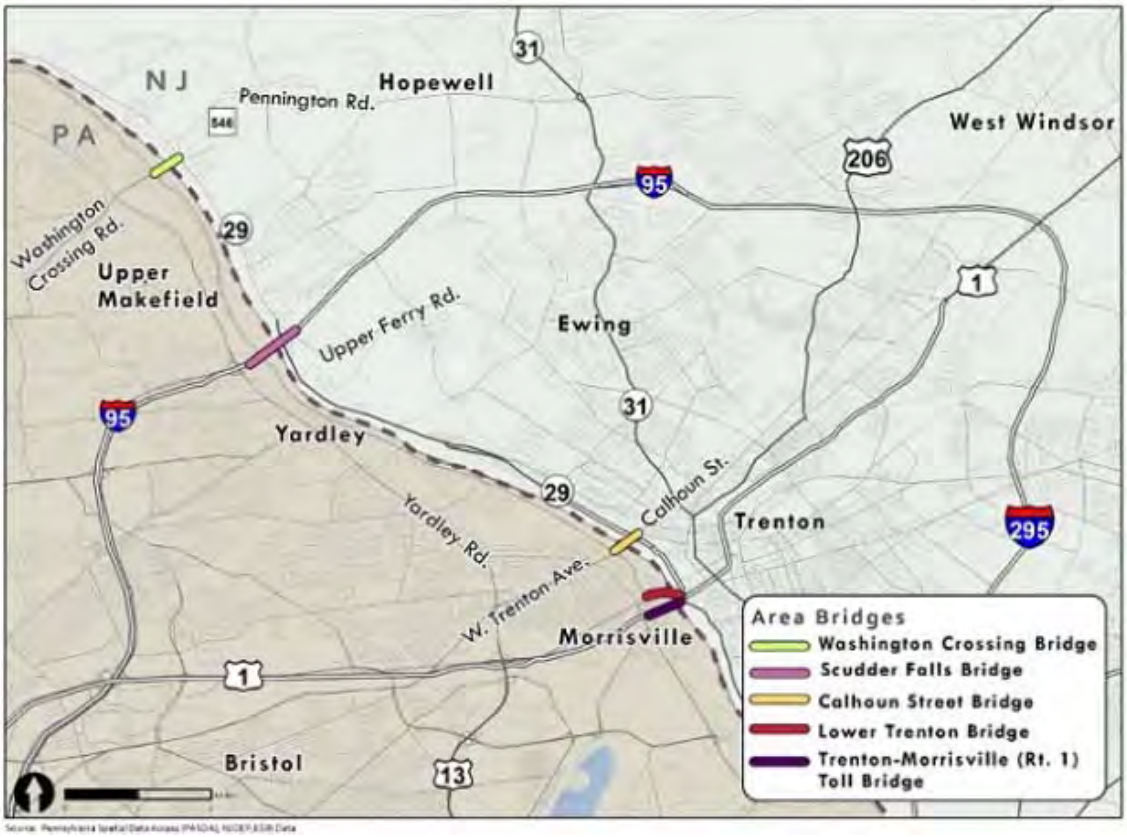
10. What was your total approximate travel time (in one direction) for <u>this trip</u>?

- *Less than 15 minutes*
- *15 minutes to 30 minutes*
- *31 minutes to 45 minutes*
- *46 minutes to 1 hour*
- *1 hour to 2 hours*
- *More than 2 hours*

The Scudder Falls Bridge is going to be replaced with a new crossing that will have an additional through lane in each direction. The project also will involve significant improvements along I-95 and at the adjoining interchanges in New Jersey and Pennsylvania.

11. If this new Scudder Falls Bridge had the same Pennsylvania-bound toll as the Trenton-Morrisville Route 1 Toll Bridge, what would you do when you wanted to make <u>this trip</u> again across the Delaware River? (Refer to the map below.)

- *I would still take the Scudder Falls Bridge and pay the toll*
- *I would use the Trenton-Morrisville (Route 1) Toll Bridge*
- *I would use the non-tolled Washington Crossing Bridge*
- *I would use the non-tolled Calhoun Street Bridge (aka "Trenton City Bridge")*
- *I would use the non-tolled Lower Trenton Bridge (aka "Trenton Makes Bridge")*
- *I would use another bridge / route not listed here*
- *I would carpool or take public transit instead*
- *I would not make the trip at all*



12. Are you familiar with E-ZPass?

- *Yes, and I have an E-ZPass* *Skip to Question 14*
- *Yes, but I do not have an E-ZPass* *Go to next question*
- *No, I am not familiar with E-ZPass* *Skip to Question 14*

13. Why do you not have an E-ZPass? (check all that apply)

- *I do not use toll bridges or toll roads often enough.*
- *I would like to get one, I just have not gotten around to it yet.*
- *I do not know how to get one.*
- *I do not have a credit card.*
- *I do not like to prepay for tolls.*
- *It costs too much.*
- *I do not understand the technology.*
- *I do not like automatic credit card charges.*
- *I am concerned about privacy.*
- *Other (please specify)* *Blank text box*

14. What is your annual household income?

- *$35,000 or less*
- *$35,001 to $50,000*
- *$50,001 to $75,000*
- *$75,001 to $100,000*
- *$100,001 to $150,000*
- *More than $150,000*
- *Prefer not to answer*

15. In what state is your vehicle registered?

Drop down list of states

Final Page for people who completed the survey:
The Delaware River Joint Toll Bridge Commission thanks you for your participation in this important travel survey. Your responses will aid in future transportation planning.

Disqualification Page:
Sorry, you do not meet the criteria for this travel survey. The Delaware River Joint Toll Bridge Commission thanks you for your interest.

Scudder Falls Bridge

Annual Traffic and Revenue Details

Scudders Falls Bridge
Revenue Build Up Detail
Approved Toll Scenario

Vehicle Type	Payment Type	Discount/Full Price	2019	2020	2021	2022	2023	2024	2025	2026
Annual SFB Transactions	**Total Vehicles**		**5,881,646**	**10,208,327**	**10,302,201**	**10,389,241**	**10,471,662**	**10,550,401**	**10,626,479**	**10,700,667**
Total Vehicles	Annual Growth Rate			73.56%	0.92%	0.84%	0.79%	0.75%	0.72%	0.70%
Annual Transactions	E-ZPass	Commuter	1,716,744	3,146,515	3,258,121	3,347,359	3,419,756	3,479,477	3,529,667	3,572,697
Passsenger Vehicles		Full Price	2,421,696	4,438,576	4,596,011	4,721,894	4,824,018	4,908,263	4,979,063	5,039,763
	Toll-by-Plate		1,359,225	1,954,356	1,769,676	1,632,063	1,529,963	1,454,657	1,399,574	1,359,753
	Total Passenger Vehicles		*5,497,665*	*9,539,447*	*9,623,808*	*9,701,317*	*9,773,737*	*9,842,398*	*9,908,304*	*9,972,212*
Annual Transactions	E-ZPass	Off Peak	11,655	21,550	22,488	23,284	23,987	24,611	25,175	25,696
2 Axle Commercial Vehs		Peak	88,808	164,206	171,352	177,415	182,772	187,524	191,825	195,792
	Toll-by-Plate		35,980	52,191	47,626	44,265	41,843	40,118	38,922	38,132
	Total 2 Axle Commercial Vehicles		*136,443*	*237,947*	*241,467*	*244,963*	*248,603*	*252,252*	*255,922*	*259,620*
Annual Transactions	E-ZPass	Off Peak	47,383	83,994	85,924	87,690	89,390	91,004	92,557	94,068
3+ Axle Commercial Vehs		Peak	154,474	273,827	280,120	285,878	291,420	296,681	301,744	306,673
	Toll-by-Plate		45,681	73,112	70,881	69,393	68,513	68,066	67,952	68,094
	Total 3+ Axle Commercial Vehicles		*247,538*	*430,933*	*436,926*	*442,961*	*449,322*	*455,751*	*462,253*	*468,835*
Annual SFB Toll Revenue	**Total Toll Revenue (Collected)**		**$10,059,044**	**$19,124,748**	**$19,308,400**	**$19,492,788**	**$19,683,647**	**$19,875,881**	**$20,069,669**	**$20,265,164**
Total Vehicle Rev	Growth Rate			90.12%	0.96%	0.95%	0.98%	0.98%	0.97%	0.97%
Annual Toll Revenue	E-ZPass	Commuter	$1,325,195	$2,414,002	$2,492,593	$2,555,711	$2,607,181	$2,649,887	$2,686,004	$2,717,174
Passsenger Vehicle Rev		Full Price	$3,115,605	$5,675,450	$5,860,220	$6,008,615	$6,129,624	$6,230,028	$6,314,941	$6,388,223
	Toll-by-Plate		$967,034	$2,433,281	$2,203,344	$2,032,008	$1,904,887	$1,811,128	$1,742,546	$1,692,967
	Total Passenger Vehicle Revenue		*$5,407,834*	*$10,522,732*	*$10,556,157*	*$10,596,335*	*$10,641,693*	*$10,691,043*	*$10,743,492*	*$10,798,365*
Annual Toll Revenue	E-ZPass	Off Peak	$75,113	$138,428	$144,226	$149,157	$153,532	$157,425	$160,961	$164,233
2 Axle Commercial Veh Rev		Peak	$635,926	$1,171,963	$1,221,047	$1,262,795	$1,299,830	$1,332,792	$1,362,726	$1,390,430
	Toll-by-Plate		$84,158	$213,630	$194,947	$181,186	$171,275	$164,211	$159,318	$156,084
	Total 2 Axle Commercial Vehicle Revenue		*$795,197*	*$1,524,021*	*$1,560,220*	*$1,593,138*	*$1,624,637*	*$1,654,428*	*$1,683,005*	*$1,710,747*
Annual Toll Revenue	E-ZPass	Off Peak	$778,930	$1,376,223	$1,405,640	$1,432,887	$1,459,427	$1,484,849	$1,509,492	$1,533,617
3+ Axle Commercial Veh Rev		Peak	$2,820,666	$4,983,586	$5,090,110	$5,188,777	$5,284,884	$5,376,942	$5,466,181	$5,553,540
	Toll-by-Plate		$256,416	$718,185	$696,273	$681,651	$673,007	$668,619	$667,499	$668,896
	Total 3+ Axle Commercial Vehicle Revenue		*$3,856,012*	*$7,077,995*	*$7,192,023*	*$7,303,315*	*$7,417,318*	*$7,530,410*	*$7,643,172*	*$7,756,053*
Annual SFB Net Revenue	Toll Revenue Collected		$10,059,044	$19,124,748	$19,308,400	$19,492,788	$19,683,647	$19,875,881	$20,069,669	$20,265,164
	Late Fee Revenue		$869,989	$2,198,634	$1,996,974	$1,846,967	$1,736,030	$1,654,525	$1,595,245	$1,552,752
	ETC Transaction Costs		-$504,439	-$913,964	-$942,026	-$965,031	-$984,352	-$1,000,824	-$1,015,161	-$1,027,903
	Toll-by-Plate Toll Collection Costs		-$1,911,735	-$2,802,747	-$2,545,393	-$2,353,942	-$2,212,333	-$2,108,274	-$2,032,569	-$1,978,278
	Net Revenue		**$8,512,858**	**$17,606,671**	**$17,817,956**	**$18,020,782**	**$18,222,992**	**$18,421,308**	**$18,617,184**	**$18,811,735**
Effects on T+R at Trenton-Morrisville Bridge										
Change in AADT at TMB due to toll increases and diversion from SFB			1,805	1,761	1,751	1,743	1,740	1,736	1,744	1,750
Additional TMB revenue due to toll increases and diversion from SFB			**$944,829**	**$1,613,707**	**$1,618,911**	**$1,627,376**	**$1,639,062**	**$1,652,725**	**$1,667,943**	**$1,684,399**

Notes: Tolling assumed to begin June 1, 2019. There is a 3-month lag in Toll-by-Plate toll collection in 2019.

SCUDDER FALLS BRIDGE TRAFFIC AND REVENUE DETAILS

Year	2019	2020	2021	2022	2023	2024	2025	2026
Toll Rates								
E-ZPass Car Toll Rate	$ 1.25	$ 1.25	$ 1.25	$ 1.25	$ 1.25	$ 1.25	$ 1.25	$ 1.25
E-ZPass Car Commuter Toll Rate	$ 0.75	$ 0.75	$ 0.75	$ 0.75	$ 0.75	$ 0.75	$ 0.75	$ 0.75
E-ZPass Light Truck Toll Rate (2-ax 6-tire)	$ 7.00	$ 7.00	$ 7.00	$ 7.00	$ 7.00	$ 7.00	$ 7.00	$ 7.00
E-ZPass Heavy Truck Toll Rate (per axle)	$ 4.25	$ 4.25	$ 4.25	$ 4.25	$ 4.25	$ 4.25	$ 4.25	$ 4.25
Toll-by-Plate Car Toll Rate	$ 2.60	$ 2.60	$ 2.60	$ 2.60	$ 2.60	$ 2.60	$ 2.60	$ 2.60
Toll-by-Plate Light Truck Toll Rate (2-ax 6-tire)	$ 8.35	$ 8.35	$ 8.35	$ 8.35	$ 8.35	$ 8.35	$ 8.35	$ 8.35
Toll-by-Plate Heavy Truck Toll Rate (per axle)	$ 4.75	$ 4.75	$ 4.75	$ 4.75	$ 4.75	$ 4.75	$ 4.75	$ 4.75
Scudder Falls Bridge Toll Transactions								
Annual Toll Transactions	10,082,821	10,208,327	10,302,201	10,389,241	10,471,662	10,550,401	10,626,479	10,700,667
Car AADT	25,821	26,064	26,367	26,579	26,777	26,892	27,146	27,321
Truck AADT	1,803	1,828	1,859	1,885	1,912	1,934	1,968	1,996
Toll Diversion								
Car	-16%	-15%	-15%	-15%	-15%	-15%	-15%	-15%
Truck	-34%	-34%	-34%	-34%	-34%	-34%	-34%	-34%
Total Diversion	-17%	-17%	-17%	-17%	-16%	-16%	-16%	-16%
Collectable Toll Revenue and Overall Toll Collection Costs								
E-ZPass Toll Revenue (Collected)	*$ 8,751,436*	*$ 15,759,652*	*$ 16,213,837*	*$ 16,597,943*	*$ 16,934,478*	*$ 17,231,923*	*$ 17,500,305*	*$ 17,747,218*
Toll-by-Plate Revenue (Collected)	*$ 1,307,608*	*$ 3,365,096*	*$ 3,094,563*	*$ 2,894,845*	*$ 2,749,169*	*$ 2,643,958*	*$ 2,569,363*	*$ 2,517,947*
Total Toll Revenue (Collected)	$ 10,059,044	$ 19,124,748	$ 19,308,400	$ 19,492,788	$ 19,683,647	$ 19,875,881	$ 20,069,669	$ 20,265,164
Late / Violation Fee Revenue (Collected)	$ 869,989	$ 2,198,634	$ 1,996,974	$ 1,846,967	$ 1,736,030	$ 1,654,525	$ 1,595,245	$ 1,552,752
E-ZPass Transaction Costs	$ (504,439)	$ (913,964)	$ (942,026)	$ (965,031)	$ (984,352)	$ (1,000,824)	$ (1,015,161)	$ (1,027,903)
Toll-by-Plate Toll Collection Costs	$ (1,911,735)	$ (2,802,747)	$ (2,545,393)	$ (2,353,942)	$ (2,212,333)	$ (2,108,274)	$ (2,032,569)	$ (1,978,278)
SFB Net Revenue (sum of Toll Rev, Fee Rev, and Toll Collection Costs)	$ 8,512,858	$ 17,606,671	$ 17,817,956	$ 18,020,782	$ 18,222,992	$ 18,421,308	$ 18,617,184	$ 18,811,735
Toll-by-Plate Toll Collection Costs								
Cost of Invoicing	$ (405,236)	$ (584,898)	$ (531,055)	$ (490,994)	$ (461,355)	$ (439,570)	$ (423,713)	$ (412,334)
Toll-by-Plate Account Costs	$ (1,066,931)	$ (1,539,957)	$ (1,398,195)	$ (1,292,721)	$ (1,214,687)	$ (1,157,328)	$ (1,115,579)	$ (1,085,621)
Non-EZ Trx Costs (excl Itoll)	$ (400,403)	$ (577,823)	$ (524,567)	$ (484,941)	$ (455,620)	$ (434,064)	$ (418,372)	$ (407,107)
Credit Card Fees (Toll-by-Plate Only)	$ (39,166)	$ (100,069)	$ (91,576)	$ (85,286)	$ (80,671)	$ (77,313)	$ (74,905)	$ (73,216)
Toll-by-Plate Toll Collection Costs	$ (1,911,735)	$ (2,802,747)	$ (2,545,393)	$ (2,353,942)	$ (2,212,333)	$ (2,108,274)	$ (2,032,569)	$ (1,978,278)
Cost per Toll-by-Plate Transaction	$ 1.33	$ 1.35	$ 1.35	$ 1.35	$ 1.35	$ 1.35	$ 1.35	$ 1.35
Cost per ETC Transaction	$ 0.08	$ 0.08	$ 0.08	$ 0.08	$ 0.08	$ 0.08	$ 0.08	$ 0.08
Incremental Cost of Toll-by-Plate per Transaction	$ 1.25	$ 1.27	$ 1.27	$ 1.27	$ 1.27	$ 1.27	$ 1.27	$ 1.27
Additional Cost to Collect Toll-by-Plate Tolls (deducting cost of traditional E-ZPass Transaction)	$ (1,803,092)	$ (2,645,940)	$ (2,403,024)	$ (2,222,315)	$ (2,088,653)	$ (1,990,436)	$ (1,918,982)	$ (1,867,743)
Uncollectable Toll-by-Plate Toll Revenue (due to bad images, E-ZPass - calculated using E-ZPass Toll Rate)								
Uncollectable Toll-by-Plate Toll Revenue	$ (1,052,536)	$ (1,554,197)	$ (1,434,218)	$ (1,346,253)	$ (1,282,800)	$ (1,237,549)	$ (1,206,067)	$ (1,185,015)
Uncollectable Toll-by-Plate Revenue considered in evaluation of Toll-by-Plate Premium?	No	No	No	No	No	No	No	No
% of Total Transactions that are Uncollectable	10%	8%	7%	7%	6%	6%	6%	6%
% of Car Image-Based Trans that are Uncollectable (incl iTolls)	41%	41%	41%	41%	41%	41%	41%	41%
% Truck Car Image-Based Trans that are Uncollectable (incl iTolls)	42%	42%	42%	42%	42%	42%	42%	42%
Potential Additional Revenue and traffic changes at Trenton Morrisville due to Toll Diversion from Scudder Falls								
Revenue Gain from Traffic switch to TM	$ 944,829	$ 1,613,707	$ 1,618,911	$ 1,627,376	$ 1,639,062	$ 1,652,725	$ 1,667,943	$ 1,684,399
AADT Switched from SF to TM - Total	1,805	1,761	1,751	1,743	1,740	1,736	1,744	1,750
AADT Switched from SF to TM - Cars	1,567	1,520	1,507	1,496	1,489	1,482	1,487	1,489
AADT Switched from SF to TM - Trucks	238	241	244	247	251	253	257	261
Total Revenue Gain at TM	$ 944,829	$ 1,613,707	$ 1,618,911	$ 1,627,376	$ 1,639,062	$ 1,652,725	$ 1,667,943	$ 1,684,399
Total AADT Change at TM	1,805	1,761	1,751	1,743	1,740	1,736	1,744	1,750