Louis Berger

Rhode Island Department of Transportation Investment-Grade Tolling Study Final Report

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EXECUTIVE SUMMARY

Rhode Island ranks last in the nation in overall bridge condition based on a report produced by U.S. Department of Transportation (USDOT). To address this, Rhode Island Department of Transportation (RIDOT) developed RhodeWorks, a road improvement funding program that calls for the repair of the state's bridges. Under the program, a significant portion of the financing of the repairs is expected to be obtained from tolls assessed on tractors or truck tractors as defined in 23 C.F.R. 658.5, pulling a trailer or trailers (tractor trailers).

RIDOT engaged the Louis Berger Team to develop a level 3 investment-grade traffic and revenue study to further investigate the likely toll revenue that would accrue from the RhodeWorks Bridge Tolling Program. The Louis Berger Team constructed a level 3 study program consisting of the following broad elements:

- Data collection and analysis.
- Travel demand model development
- Toll traffic and revenue forecasting

Toll Locations and Tolling Structure

The level 3 study evaluated 14 toll locations across the state along six major highway corridors (I-95, I-195, I-295, US Route 6, RI Route 146, and RI Route 10) as shown in Figure ES-1.

Based on the legislation supporting the RhodeWorks program, tolls will be assessed only on vehicles that fall into the tractor trailer category. Tolls will be collected using all electronic tolling (AET) technology. The legislation also stipulates the following rules regarding toll assessment and collection from tractor trailers using radio frequency identification transponders (RFID):

- The program will limit the assessment of tolls upon the same individual tractor trailer to once per toll location, per 24 hours in each direction.
- The total amount of tolls assessed upon the same individual tractor trailer making border-to-border through trips on I-95 shall not exceed $20.00 per day.
- The maximum total amount of tolls collected from the same individual tractor trailer shall not exceed $40.00 per day.

FIGURE ES-1. TOLL LOCATION MAP

Existing Conditions and Future Growth Prospects

As part of the traffic and revenue forecast, the Louis Berger Team conducted a review of both socioeconomic and demographic conditions in the region that could affect future growth in truck trip generation. This evaluation reviewed data obtained from the regional statewide model used for this analysis as well as other independent sources of data.

Because the Rhode Island Statewide Model (RISM) was a critical tool employed in developing this traffic and revenue forecast, the Louis Berger Team evaluated the model's socioeconomic and demographic assumptions against other benchmarks. Independently generated data from Moody's Analytics provided a useful comparison for model base year conditions and future year growth assumptions. Table ES-1 provides a summary comparison of both the statewide model and Moody's assumptions for key socioeconomic and demographic variables driving trip generation. Overall, the statewide model assumptions are relatively conservative in comparison to the Moody's assumptions.

Table ES-1. Future Year Comparison for Key Socioeconomic/Demographic Variables (RI)

	Population		Households		Total Employment	
	Statewide Model	Moody's	Statewide Model	Moody's	Statewide Model	Moody's
2015	1,046,329	1,056,600	423,821	429,920	495,440	484,865
2040	1,070,104	1,097,853	477,334	488,918	523,863	570,541
CAGR	**0.09%**	**0.15%**	**0.48%**	**0.52%**	**0.22%**	**0.65%**

The Louis Berger Team also evaluated historical traffic patterns to determine recent trends in traffic growth. Total traffic volumes obtained from RIDOT appeared to indicate that total traffic has grown at an average annualized rate of approximately 0.45 percent between 2005 and 2015. A review of independent forecasts of truck traffic obtained from the Integrated Corridor Analysis Tool (ICAT) and the Federal Highway Administration (FHWA) Freight Analysis Framework (FAF) imply that future year growth in truck traffic may increase by 0.93 and 0.49 percent respectively.

Traffic Counts and Analysis

As part of this study's data collection efforts, the Louis Berger Team conducted traffic counts at all of the potential toll locations. Traffic data was collected primarily using video equipment over a seven-day period while a handful of less trafficked locations only recorded traffic data over a four-day period – automated traffic recorder (ATR) equipment was employed at some ramp locations.

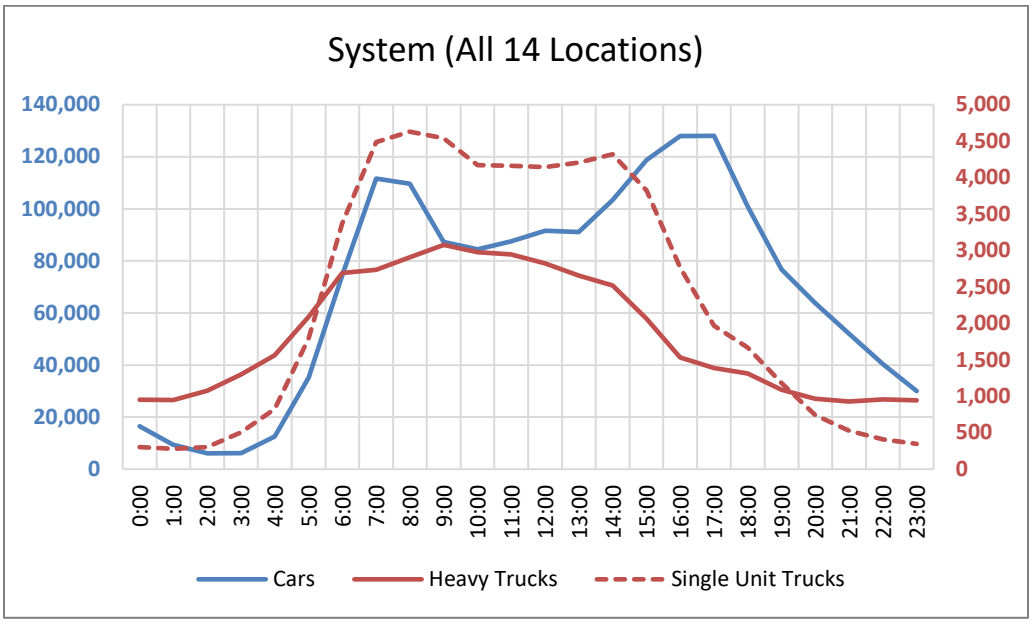
Traffic data was classified into four broad categories; cars, single unit trucks, single tractor trailers, and tandem tractor trailers – with single and tandem tractor trailers comprising the market for potential RhodeWorks toll revenue. Because the traffic data collection effort covered both weekday and weekend periods, the Louis Berger Team developed measures of average weekday and weekend traffic separately. As shown in Table Es-2, the difference between total weekday and weekend traffic volumes varies notably by vehicle class with tractor trailers recording significantly more volume on weekdays. This information was used to develop annualization factors to be applied in toll revenue calculations.

Because the traffic data was collected on an hourly basis, this allowed the Louis Berger Team to evaluate differences in time-of-day distributions by vehicle class as shown in Figure ES-2. This time of day distributions were used to inform travel demand modeling effort.

Table ES-2. Average Weekday Traffic by Vehicle Classification

Location	Cars	Single Unit Trucks	Tractor Trailers		Tractor Trailers	TOTAL
			Single	Tandem		
1	48,362	1,706	3,923	70	**3,993**	**54,061**
2	47,301	1,684	3,785	77	**3,861**	**52,847**
3	193,068	5,958	5,233	122	**5,356**	**204,382**
4	190,479	5,720	4,949	60	**5,009**	**201,208**
5	235,968	6,473	4,165	42	**4,206**	**246,648**
6	95,176	2,677	2,670	41	**2,711**	**100,564**
7	88,122	4,477	2,075	56	**2,131**	**94,729**
8	214,660	8,210	5,730	196	**5,926**	**228,796**
9	62,728	2,109	2,041	72	**2,114**	**66,950**
10	177,204	6,262	3,516	57	**3,572**	**187,038**
11	62,543	1,729	1,178	25	**1,202**	**65,475**
12	40,338	1,597	2,137	56	**2,193**	**44,128**
13	60,414	2,326	731	5	**736**	**63,476**
14	149,707	4,257	1,193	9	**1,202**	**155,166**
TOTAL (Weekday)	1,666,071	55,185	43,325	886	**44,211**	**1,765,467**
	94.4%	3.1%	2.5%	0.1%	**2.5%**	**100.0%**
TOTAL (Weekend)	1,480,869	18,232	11,931	424	**12,354**	**1,511,455**
	98.0%	1.2%	0.8%	0.0%	**0.8%**	**100.0%**

Figure ES-2. Total Toll Location Traffic Time-of-Day Distribution by Vehicle Class

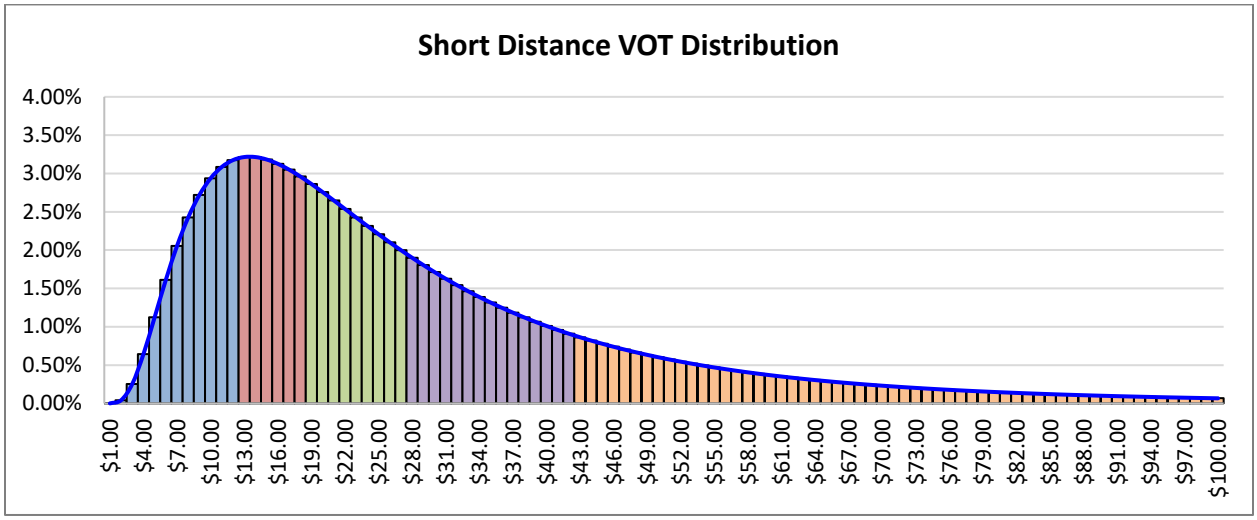


Stated Preference Survey

As part of the Level 3 investment-grade study, the Louis Berger Team conducted a stated preference (SP) survey to support the traffic and revenue forecast. Using discrete choice modeling techniques, the resulting SP data was then be used to understand tractor trailer drivers' value-of-time (VOT) or willingness-to-pay (WTP) for any potential travel time savings and other benefits of not diverting to a non-tolled roadway. The SP survey data was segmented into short and long distance trips and VOT distributions were generated to represent the variance in VOT by trip length Figure ES-3.

Both the short and long distance VOT distributions were further divided into equally sized quintiles as shown by the differently shaded areas in Figure ES-3, and an average VOT was estimated for each quintile. Table ES-3 presents the resulting upper threshold VOT values used to define each quintile in Figure 5-11, and the corresponding average VOTs that were calculated and used as inputs in the travel demand model.

FIGURE ES-3. VALUE OF TIME DISTRIBUTIONS



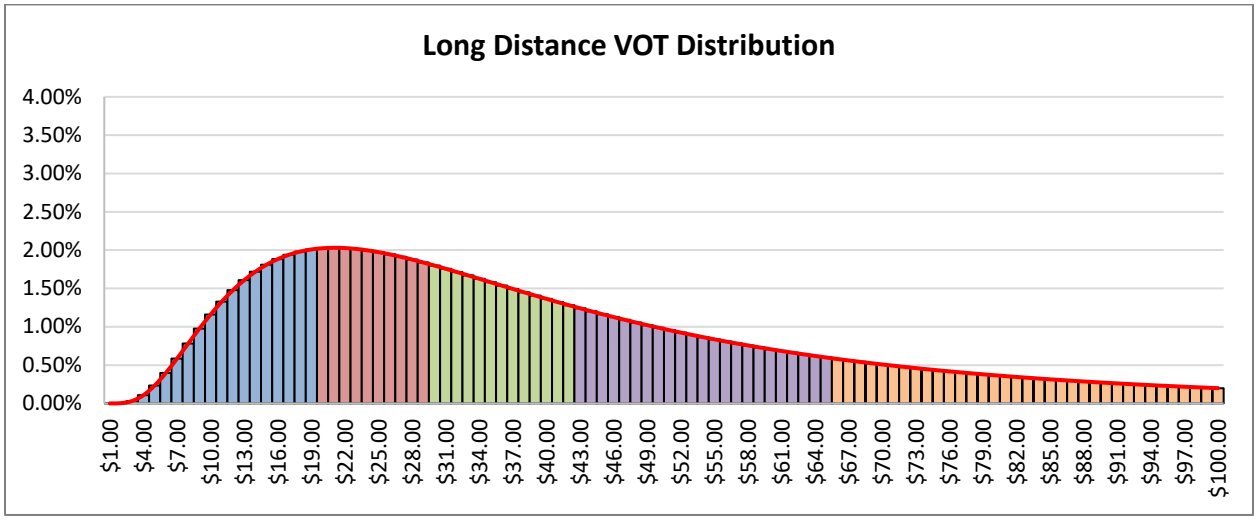


TABLE ES-3. AVERAGE VOT ESTIMATES BY DISTANCE AND QUINTILE

Quintile	Short Distance			Long Distance		
	Upper Threshold		Average VOT	Upper Threshold		Average VOT
	Percent	VOT		Percent	VOT	
0-20	20%	$12.00	**$8.89**	20%	$19.00	**$13.79**
20-40	40%	$18.00	**$15.45**	40%	$29.00	**$24.41**
40-60	60%	$27.00	**$22.70**	60%	$42.00	**$35.60**
60-80	80%	$41.00	**$33.65**	80%	$65.00	**$52.55**
80-100	100%	$212.00	**$65.48**	100%	$336.00	**$103.52**

Travel Demand Model Development

The traffic and revenue forecast was developed using a customized version of the Rhode Island Statewide Model (RISM). The RISM is a four-step travel demand model developed and maintained by the Rhode Island Statewide Planning Program that covers the State of Rhode Island plus bordering communities in Connecticut and Massachusetts. The model performs daily highway and transit assignments for three trip purposes: home-based work (HBW), home-based other (HBO) and non-home based (NHB). To ensure a more accurate representation of the travel demand affecting the tractor trailer tolling program, the Louis Berger Team made a number of modifications to the RISM.

- **Tractor Trailer Trip Table Development**. Because the RISM only includes three trip purposes that do not account for tractor trailer movements, the Louis Berger Team therefore generated the tractor trailer trip tables critical to this investment-grade study through a multi-step process that triangulated a number of different data sources. INRIX TRIPS data formed the basis of the origin-destination (O-D) matrix used for this study and was used as the seed matrix in the origin-destination matrix estimation (ODME) process used to develop the base year trip table that was expanded and calibrated to match the traffic counts described above.
- **Time-of-Day Segmentation**. The native RISM only performs daily assignments which do not account for variations in demand and corresponding capacity during an average day. The Louis Berger Team therefore modified the model to perform a separate assignment for each of the following five time periods:
    1. Midnight to 6 AM (Early AM)
    2. 6 AM to 9 AM (AM Peak)
    3. 9 AM to 3 PM (Midday)
    4. 3 PM to 6 PM (PM Peak)
    5. 6 PM to midnight (Night)
- **Toll Location Coding and Network Modifications**. To incorporate the tolls in the RISM, the Louis Berger Team coded the roadway network links to reflect the location of the proposed toll gantries. The Team also conducted a detailed diversion route analysis to ensure the network reflected the appropriate characterization of non-tolled alternative routes in the vicinity of the toll gantry locations. These modifications included the incorporation of turn penalties and representation of signalized intersections at key locations in the model's coverage area.

Traffic and Revenue Forecasting

The Louis Berger Team developed traffic and revenue forecasts for the RIDOT Bridge Tolling Program using the customized Rhode Island Statewide Model. In order to determine the base case toll rates for

each individual gantry location, the Louis Berger Team used the traffic assignment process in the modified statewide model to conduct a toll sensitivity analysis that tested a variety toll rate assumptions and calculated the resulting tractor trailer diversions away from the tolled highway facilities.

The Louis Berger Team identified a schedule of base case toll rates to be applied at each individual location based on a toll revenue and diversion optimization exercise that balanced toll revenue maximization against corresponding diversions and other factors. Table ES-4 presents the results of the base case forecast in the 2016 base year.

Table ES-4. 2016 Base Case Toll Rate & Corresponding Revenues

Toll Location	No Toll Tractor Trailer Traffic	Toll Revenue Tractor Trailer Traffic Estimate				Revenue	
		Toll Rate ($2016)	Diversion Rate	Toll Traffic		Daily	Annual (000's)
				Pre-Gantry Use Adj.	Multiple Gantry Adj.		
1	3,971	$3.75	10.1%	3,570	3,517	$13,190	$3,838
2	4,055	$4.50	9.7%	3,662	3,606	$16,226	$4,722
3	5,502	$7.00	16.1%	4,614	4,453	$31,169	$9,070
4	4,628	$2.50	14.5%	3,956	3,719	$9,297	$2,706
5	0	$0.00	0.0%	0	0	$0	$0
6	2,640	$2.25	2.4%	2,577	2,467	$5,552	$1,616
7	1,964	$6.50	34.7%	1,283	1,256	$8,167	$2,377
8	3,283	$8.50	34.0%	2,165	2,050	$17,429	$5,072
9	2,212	$7.50	31.8%	1,508	1,429	$10,718	$3,119
10	3,659	$10.00	13.9%	3,152	2,770	$27,701	$8,061
11	1,225	$4.00	26.0%	906	826	$3,303	$961
12	2,112	$6.75	24.0%	1,605	1,400	$9,448	$2,750
13	922	$2.00	29.6%	649	618	$1,236	$360
14	0	$0.00	0.0%	0	0	$0	$0
Total / (avg)	**36,173**	**$5.50**	**18.0%**	**29,649**	**28,112**	**$153,437**	**$44,651**

Starting with no toll tractor trailer traffic volume estimate in Table ES-4, the application of tolls results in varied levels of diversions away from the tolled facilities. The resulting estimate of toll traffic is also adjusted to account for estimates of multiple gantry use as previously described. The resulting adjusted traffic represents the billable transactions that generate an estimated $153,000 on an average weekday, which represents approximately 44.7 million dollars annually. The median toll paid under this base case scenario is $5.50.

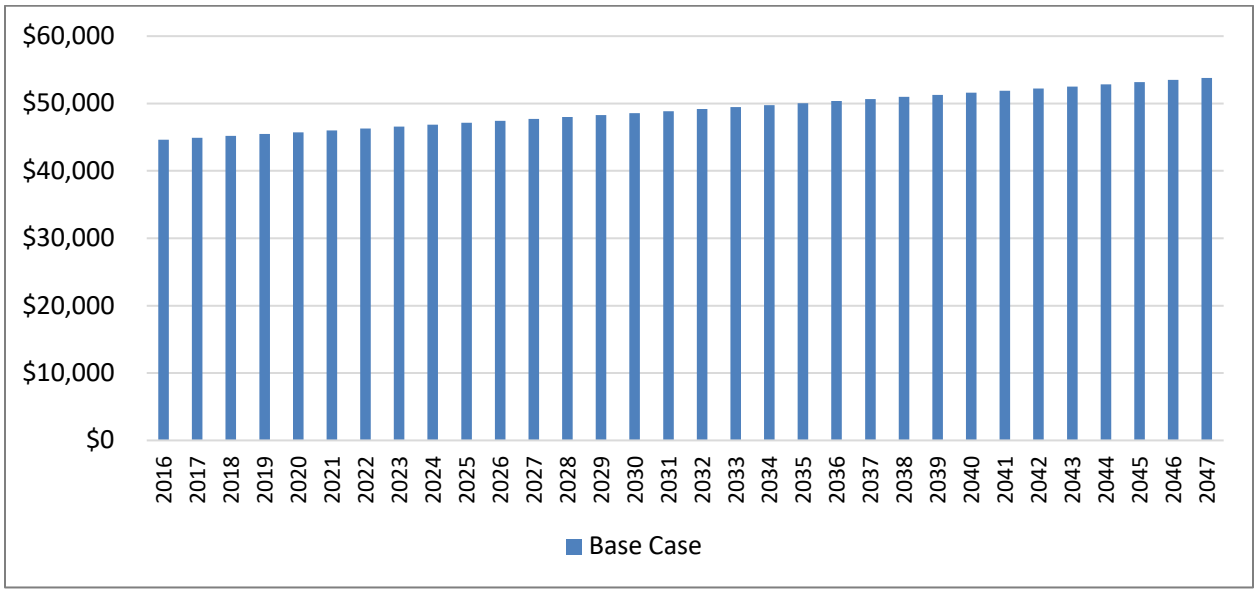
As can be seen from Table ES-4, the base case toll revenue forecast does not apply tolls to locations 5 or 14. Alternative scenarios were developed that applied tolls to both those locations, the results of these alternative scenarios are discussed in greater detail in Section 6.0 of this report.

Following the development of the 2016 base case forecast scenarios, the Louis Berger Team developed a future year forecast using the RISM 2040 horizon year and applying the base case toll rates. Table ES-5 presents the results of that analysis while Figure ES-4 displays the corresponding base case forecast stream of estimated revenues in nominal dollars starting in the year 2016.

Table ES-5. 2040 Base Case Toll Rate & Corresponding Revenues

Toll Location	No Toll Tractor Trailer Traffic	Toll Revenue Tractor Trailer Traffic Estimate				Revenue	
		Toll Rate ($2016)	Diversion Rate	Toll Traffic		Daily	Annual (000's)
				Pre-Gantry Use Adj.	Multiple Gantry Adj.		
1	4,048	$3.75	6.1%	3,803	3,746	$14,049	$4,088
2	4,288	$4.50	5.0%	4,073	4,010	$18,047	$5,252
3	5,798	$7.00	7.8%	5,348	5,161	$36,125	$10,513
4	4,861	$2.50	6.4%	4,548	4,276	$10,689	$3,111
5	0	$0.00	0.0%	0	0	$0	$0
6	2,730	$2.25	0.1%	2,726	2,609	$5,871	$1,709
7	2,110	$6.50	22.8%	1,628	1,594	$10,362	$3,015
8	3,633	$8.50	26.6%	2,666	2,525	$21,461	$6,245
9	2,217	$7.50	22.4%	1,722	1,631	$12,235	$3,560
10	3,958	$10.00	9.2%	3,593	3,157	$31,574	$9,188
11	1,266	$4.00	16.7%	1,054	961	$3,844	$1,119
12	2,305	$6.75	15.2%	1,955	1,704	$11,505	$3,348
13	1,039	$2.00	22.4%	807	768	$1,536	$447
14	0	$0.00	0.0%	0	0	$0	$0
Total / (avg)	38,254	$5.50	11.3%	33,921	32,144	$177,298	$51,595

Figure ES-4. Toll Revenue (Nominal Dollars)



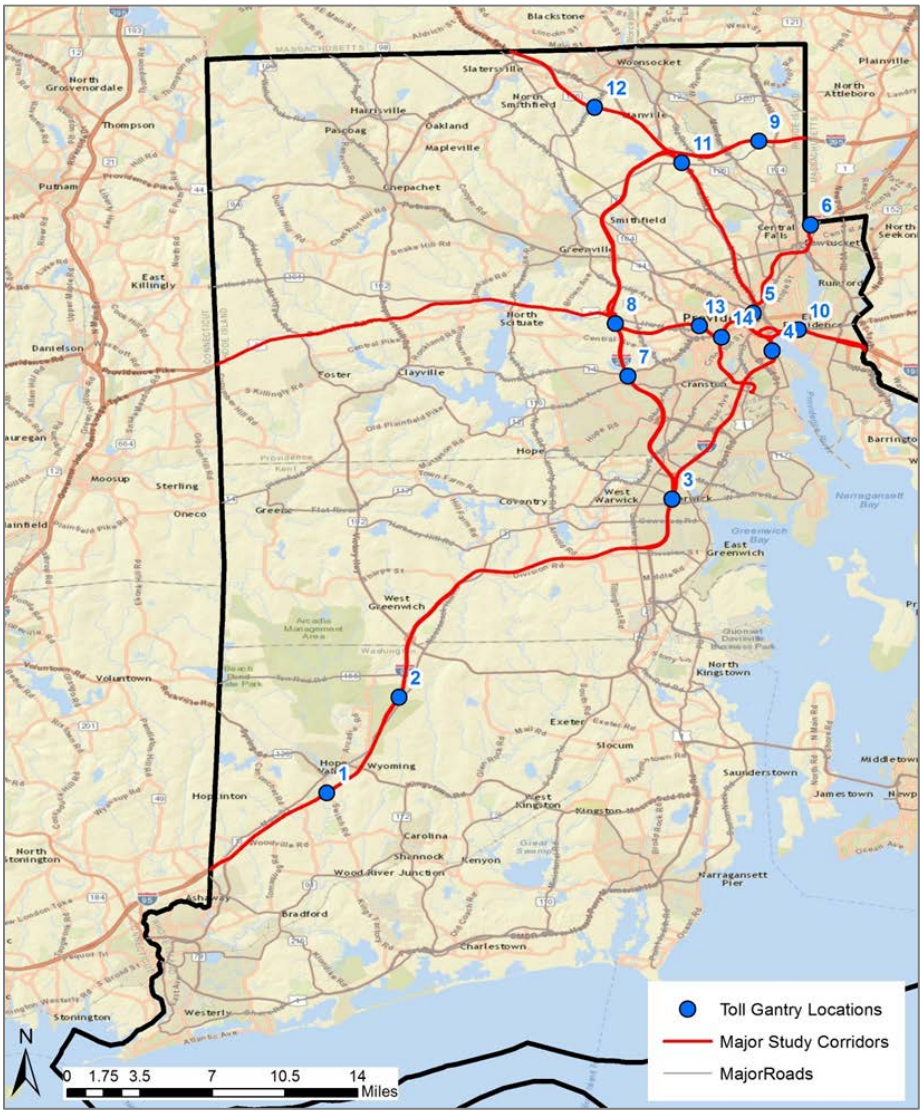
1.0 INTRODUCTION

Rhode Island ranks last in the nation in overall bridge condition based on a report produced by U.S. Department of Transportation (USDOT). To address this, Rhode Island Department of Transportation (RIDOT) developed RhodeWorks, a road improvement funding program that calls for the repair of the state's bridges. Under the program, a significant portion of the financing of the repairs is expected to be obtained from tolls assessed on tractors or truck tractors as defined in 23 C.F.R. 658.5, pulling a trailer or trailers (tractor trailers). The focus on tractor trailers stems from the facts that these vehicles are responsible for the vast majority of vehicle-caused damage to roads and bridges.

1.1 Tolling Locations

A Level 2 Traffic and Revenue (T&R) Study was completed by CDM Smith in early 2016 and this study was used to screen and finally identify 14 toll locations across the state, along six major highway corridors (I-95, I-195, I-295, US Route 6, RI Route 146, and RI Route 10) as shown in Figure 1-1.

FIGURE 1-1. TOLL LOCATION MAP



Several toll gantries will be placed at each of the 14 general toll locations identified in Figure 1-1 to capture various tractor trailer movements around each location. Table 1-1 provides a breakdown of the toll gantries associated with each of the 14 locations while Figures 1-2 through 1-5 provide a local map of each gantry location.

Table 1-1. Toll Location Gantry Descriptions

Toll Location	Gantries	Description
1	1	I-95 NB/SB North of Mechanic Street
2	2a, 2b	I-95 NB/SB North of Nooseneck Hill Road
3	3a, 3b	I-95 NB/SB North of Centerville Road
		I-95 NB/SB On/Off Ramps to/from Centerville Road
4	4	I-95 NB/SB North of Oxford Street
5	5a, 5b	I-95 NB/SB South of Smith Street
6	6a, 6b	I-95 NB/SB North of East Street
		I-95 NB/SB On/Off Ramp to/from East Street
7	7a, 7b	I-295 NB/SB North of Plainfield Pike
	7d	I-295 NB On Ramp from Route 14
	7c	I-295 NB Off Ramp to Route 14
8	8a	I-295 SB North of Route 6A
	8a	I-295 SB/Service Road North of Route 6A Off Ramp
	8b	Route 6 NB Off Ramp to I-295 NB
	8c	I-295 NB South of Route 6A
	8c	I-295 NB Service Rd South of Rte 6A On Ramp
	8d	I-295 SB South of Route 6
	8e, 8f	I-295 NB/SB South of Greenville Avenue
9	9	I-295 NB/SB South of Leigh Road
10	10a	I-195 EB West of Gano Street
	10b	I-195 WB East of Taunton Ave Ramps
	10c	Taunton Ave WB On Ramp to I-195 WB
11	11b	Rte 146 NB/SB North of Rte 116 SB On Ramp
	11a	Rte 146 SB On Ramp from Rte 116
12	12a, 12b	Route NB/SB 146 at Route 104 Crossing
13	13	Route WB/EB 6 at Woonasquatucket River Crossing
14	14a*	Route 10 SB North of Route 6
	14b*	Route 6 EB West of Route 10
	14c *	Route 10 NB South of Route 6
	14**	Route 10 NB/SB North of Dean Street Overpass

* Toll gantry locations removed and moved to new location
** New toll gantry location

Figure 1-2. Toll Locations 1-4

Figure 1-3. Toll Locations 5-8

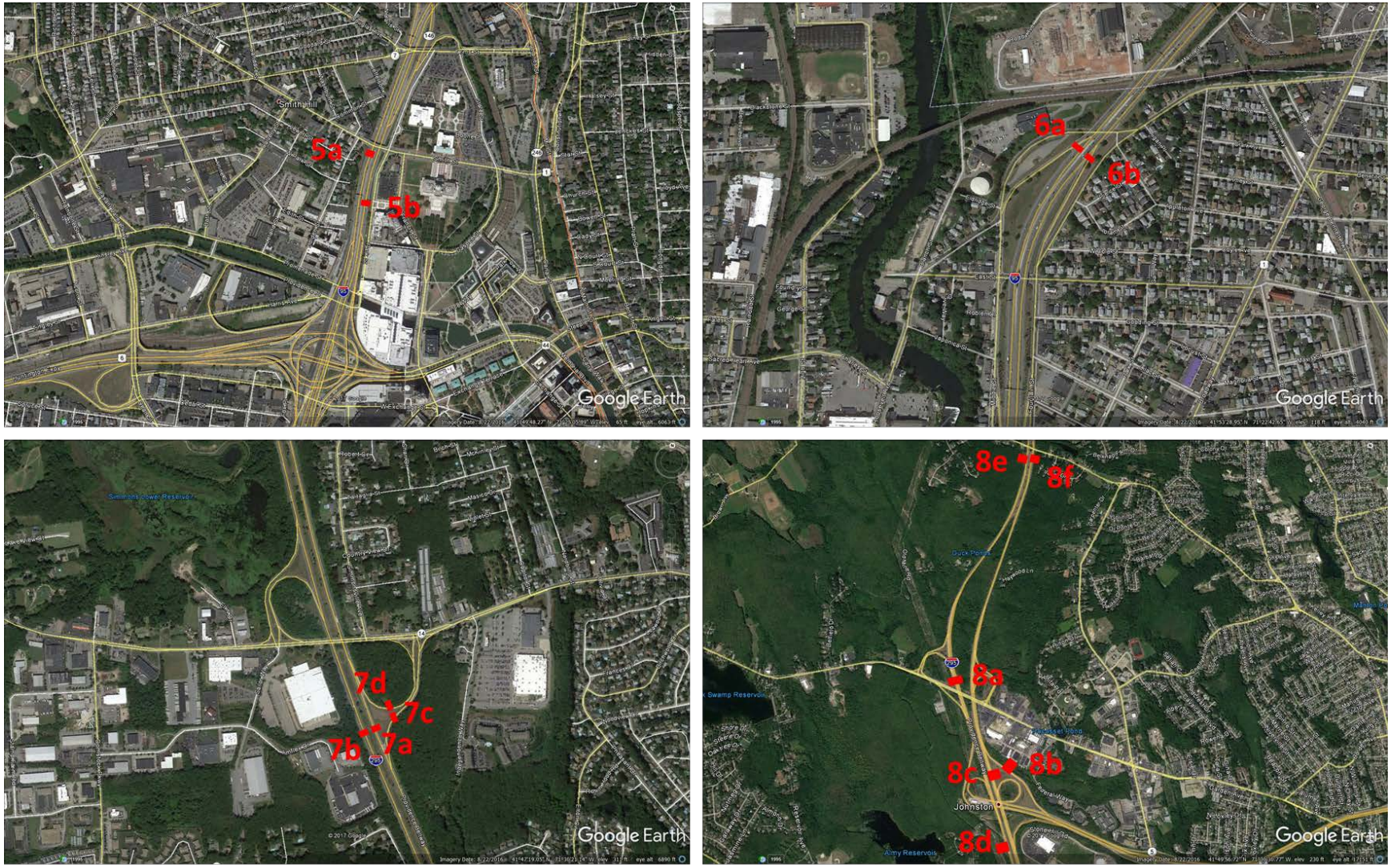
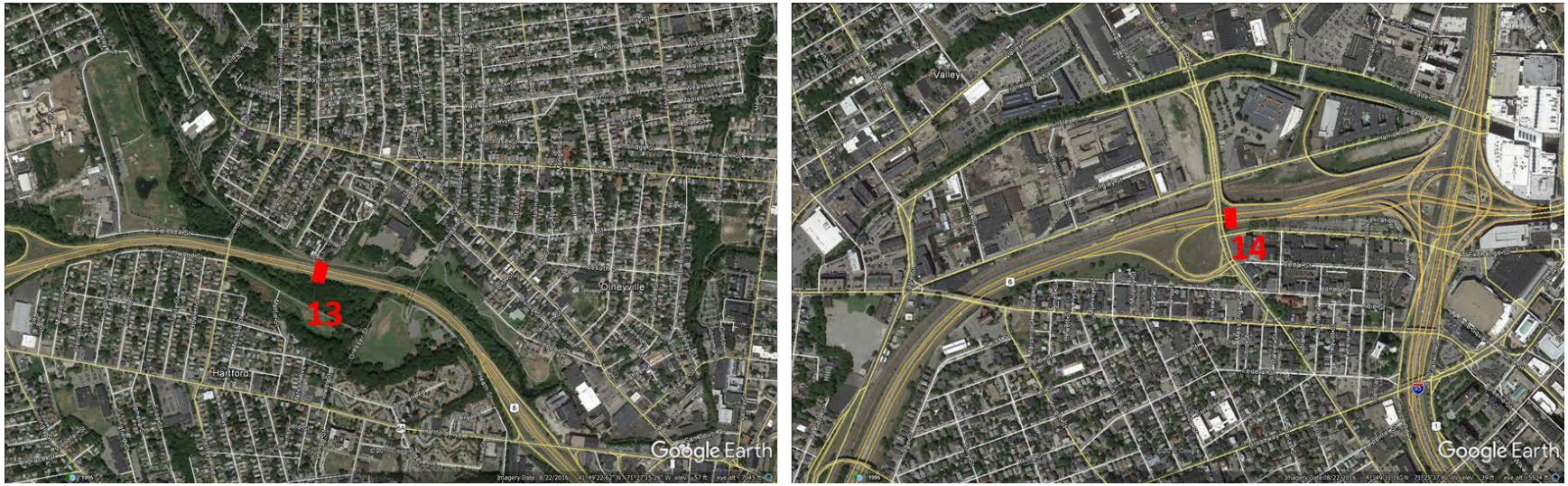


FIGURE 1-4. TOLL LOCATIONS 9-12

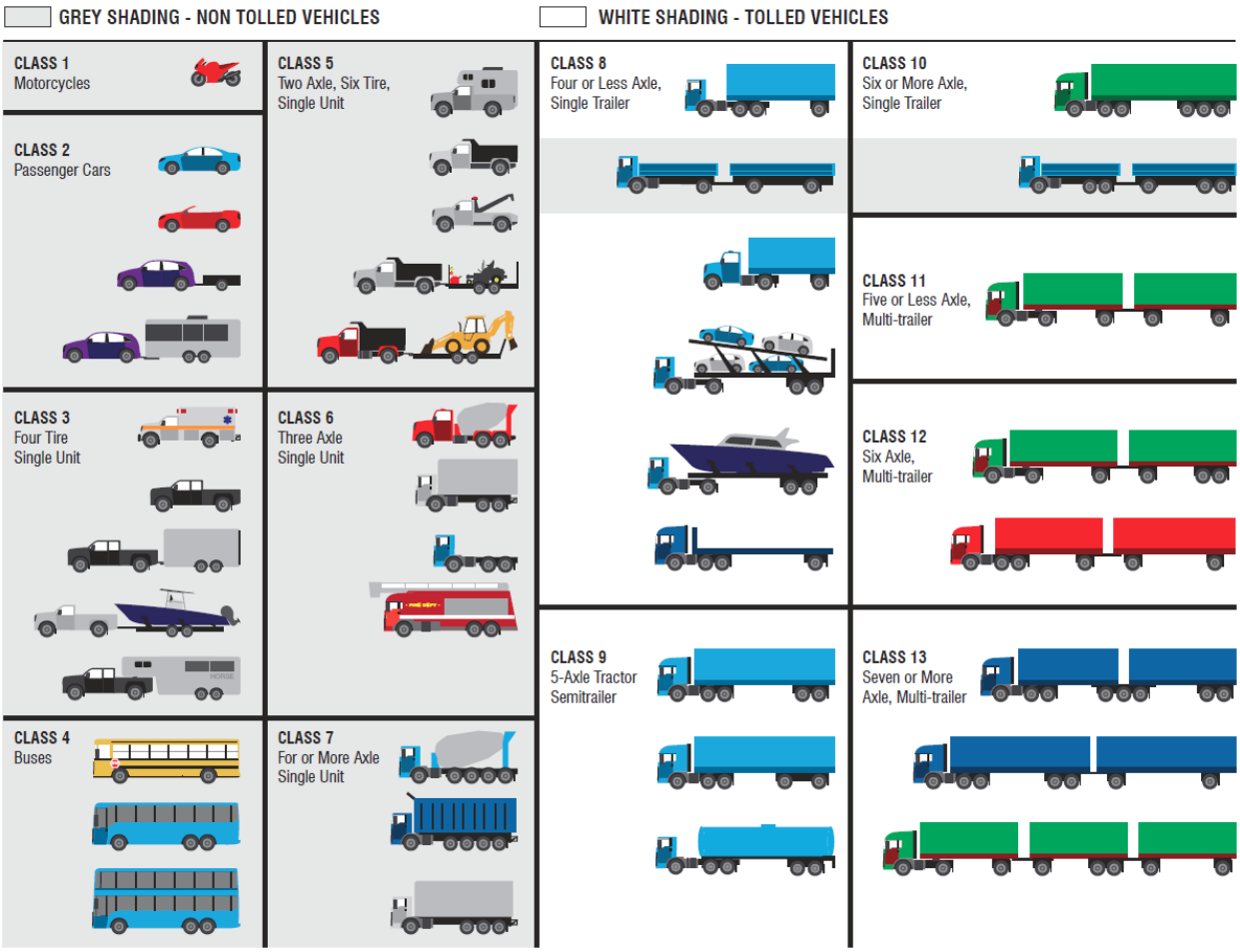
Figure 1-5. Toll Locations 13 & 14



1.2 Tolling Structure

Based on the legislation supporting the RhodeWorks program, tolls will be assessed only on vehicles that fall into the tractor trailer category (Figure 1-6). Tolls will be collected using all electronic tolling (AET) technology; vehicles equipped with E-ZPass transponders will be charged through electronic tolling while vehicles without these devices will be billed via pay-by-mail.

FIGURE 1-6. RHODEWORKS TOLLED VEHICLE CLASSIFICATIONS



Source: Rhode Island Department of Transportation

The legislation also stipulates the following rules regarding toll assessment and collection from tractor trailers using radio frequency identification transponders (RFID):

- The program will limit the assessment of tolls upon the same individual tractor trailer to once per general toll location, per 24 hours in each direction.
- The total amount of tolls assessed upon the same individual tractor trailer making border-to-border through trips on I-95 shall not exceed $20.00 per day.
- The maximum total amount of tolls collected from the same individual tractor trailer shall not exceed $40.00 per day.

1.3 Study Background

1.3.1 Level 2 Study Overview

The Level 2 study completed in early 2016 comprised of a detailed data collection effort that included traffic counts and vehicle classification efforts conducted over a two-day period in August of 2015. The study also involved license plate video survey that was used to estimate trip origin and destination patterns within Rhode Island. The trip patterns observed from the license plate survey were distributed into origin-destination (O-D) matrix distinguished by 27 freight districts. Ultimately, toll revenue traffic was estimated using a spreadsheet based model that separately analyzed diversions to non-tolled alternatives at each potential toll location. Base year toll revenue estimates were subsequently grown based on implied growth observed from independent studies of truck traffic in Rhode Island. This level of analytical effort and detail was sufficient for the Level 2 forecasts and provided a solid basis from which to proceed with more advanced and detailed analysis in a Level 3, investment-grade study.

1.3.2 Level 3 Study Overview

RIDOT engaged the Louis Berger Team to develop a Level 3 investment-grade traffic and revenue study to further investigate the likely toll revenue that would accrue from the RhodeWorks tolling program. As per the Louis Berger Team's experience with other investment-grade studies, the defining characteristics of a Level 3 study include:

- Thorough understanding of existing conditions
- Independent primary data collection efforts
- Critical analysis of economic growth potential
- Accepted modeling tools for tolling rate and diversion optimization analysis
- Benchmarking, validation and sensitivity testing
- Reasonable and well-supported input assumptions
- Conservative outlook
- Comprehensive documentation

As such, the Level 3 study will analyze the toll revenue potential in greater detail using state-of-the-practice techniques. The Level 3 study program consisting of the following broad elements:

- Data collection and analysis
    - Socioeconomic and demographic data analysis
    - Traffic counts and traffic analysis
    - Stated preference (SP) surveys
    - Time lapse aerial photography (TLAP) of tractor trailer movements
    - INRIX Trips database acquisition and analysis
- Travel demand model development
    - Regional statewide model acquisition
    - Regional model adjustment and customization

- Toll traffic and revenue forecasting
    - Toll sensitivity analysis and optimization
    - Base year base case toll forecast scenario development
    - Future year base case toll forecast
    - Sensitivity testing

1.3.2.1 Organization of Report

The rest of this report is organized as follows: Section 2.0 provides a brief description of existing socioeconomic and traffic conditions in Rhode Island and the wider Northeast region; Section 3.0 details the traffic count effort and benchmarking/comparisons to previous traffic counts; Section 4.0 details the stated preference survey effort and the discrete choice analysis of survey data; Section 5.0 describes the travel demand model development and customization effort; Section 6.0 presents the development of the base case toll revenue forecasts as well as the sensitivity scenarios developed around the base case forecast.

2.0 EXISTING CONDITIONS & FUTURE GROWTH PROSPECTS

As part of the traffic and revenue forecast, the Louis Berger Team conducted a review of both socioeconomic and demographic conditions in the region that could affect future growth in passenger car and tractor trailer trip generation. This evaluation reviewed data obtained from the regional statewide model used to generate the traffic and revenue forecast as well as other independent sources of data. The evaluation also included a review of recent traffic patterns and summaries of both analyses are provided in the following subsections of this report.

2.1 Summary of Socioeconomic and Demographic Conditions

Because the Rhode Island Statewide Model (RISM) was used in developing this traffic and revenue forecast, the Louis Berger Team evaluated the model's socioeconomic and demographic assumptions against other benchmarks where possible. Independent forecasts from Moody's Analytics (hereafter referred to as Moody's) provided a useful comparison for model base year conditions and future year growth assumptions. Data from the American Community Survey (ACS) was also referenced where applicable.

Although the three datasets referenced differ slightly, the State of Rhode Island in 2015 had a population of approximately 1 million residing in 400,000 households, while the total number of jobs in the state stood at approximately 480,000 (Table 2-1).

TABLE 2-1. 2015 POPULATION AND HOUSEHOLD DATA COMPARISON – RHODE ISLAND

Category	Statewide Model	Moody's	ACS Estimate[1]
Population	1,046,329	1,056,600	1,056,298
Households	423,821	429,920	407,484
Employment	488,479	484,865	N/A

2.1.1 Socioeconomic and Demographic Future Year Growth Outlook

Table 2-2 provides a summary comparison of both the statewide model and Moody's assumptions for key socioeconomic and demographic variables, while Figures 2-1 to 2-3 provide a graphical depiction of the same comparisons. Overall, the statewide model assumptions are relatively conservative in comparison to the Moody's forecasts of key socioeconomic variables driving trip generation. While the CAGRs for population and households are within approximately 0.05% for the two datasets in Table 2-2, Moody's forecasts that total employment will grow 0.43% faster on an annual basis.

In comparing the differences in population forecast trajectories across the two data sources, it should be noted that the statewide model employs a cohort-component method which operates by disaggregating and analyzing three key components of population change: births, deaths, and migration. As illustrated in Figure 2-1, the statewide model projects population to peak in 2035 before dropping between 2035 and 2040. According to the Rhode Island Statewide Planning Program, this fall in total population is due to high rates of overall mortality driven by the growing number of older residents[2].

[1] American Community Survey 1-Year Estimate (2015)
[2] http://www.planning.ri.gov/documents/census/tp162.pdf

Households are forecast in the statewide model using future assumptions about average household size that have shown declining trends over the last few decades. Both the statewide model and Moody's forecast a similar trajectory for this variable (Figure 2-2).

Employment in the statewide model is forecast by taking into account the expected size of the labor force, the amount of expected unemployment and net inflow of workers. The Statewide Planning Program accounted for the impact of the 2009 recession to project reasonable unemployment rates into the future. As such, employment is forecasted to rise steadily to a peak in 2030 before dipping in 2035 and 2040 (Figure 2-3). Moody's, however, forecasts strong growth through 2040, with slightly more aggressive growth occurring through 2025.

Table 2-2. Future Year Comparison for Key Demographic Variables - Rhode Island

	Population		Households		Total Employment	
	Statewide Model	Moody's	Statewide Model	Moody's	Statewide Model	Moody's
2010	1,052,566	1,053,083	413,600	414,450	488,479	458,000
2015	1,046,329	1,056,600	423,821	429,920	495,440	484,865
2020	1,049,179	1,066,298	432,910	441,217	514,705	508,067
2025	1,061,797	1,076,036	446,623	455,072	522,793	521,592
2030	1,070,677	1,084,387	459,195	468,406	526,178	534,334
2035	1,073,799	1,091,799	469,639	479,415	526,121	551,446
2040	1,070,104	1,097,853	477,334	488,918	523,863	570,541
2015-2040 CAGR	**0.09%**	**0.15%**	**0.48%**	**0.52%**	**0.22%**	**0.65%**

Figure 2-1. Rhode Island Population Projection Comparison

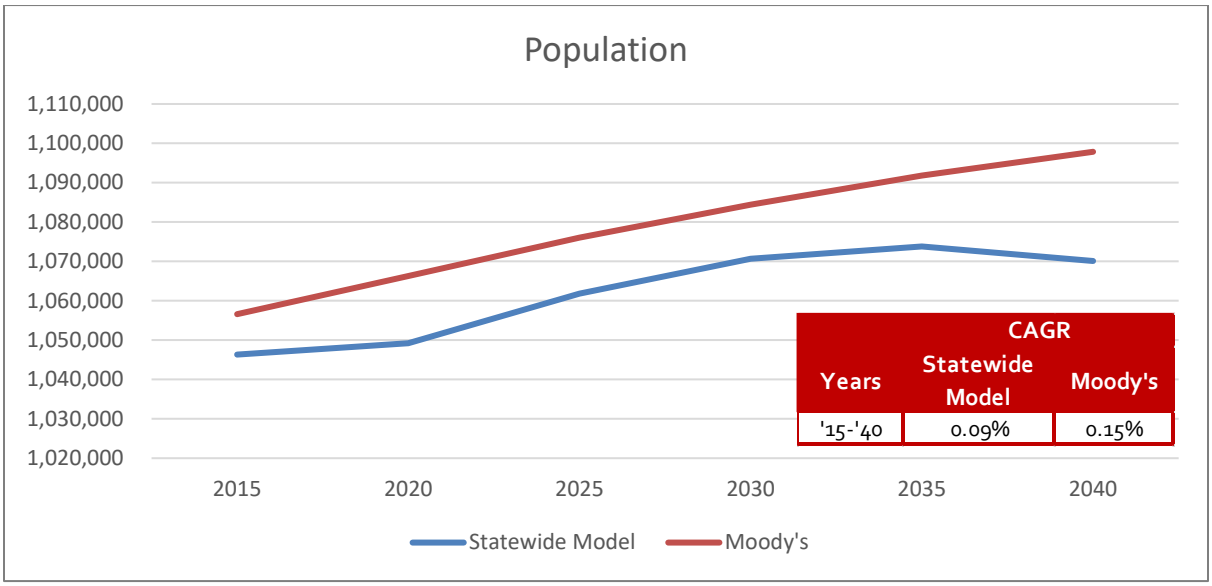


FIGURE 2-2. RHODE ISLAND HOUSEHOLDS PROJECTION COMPARISON

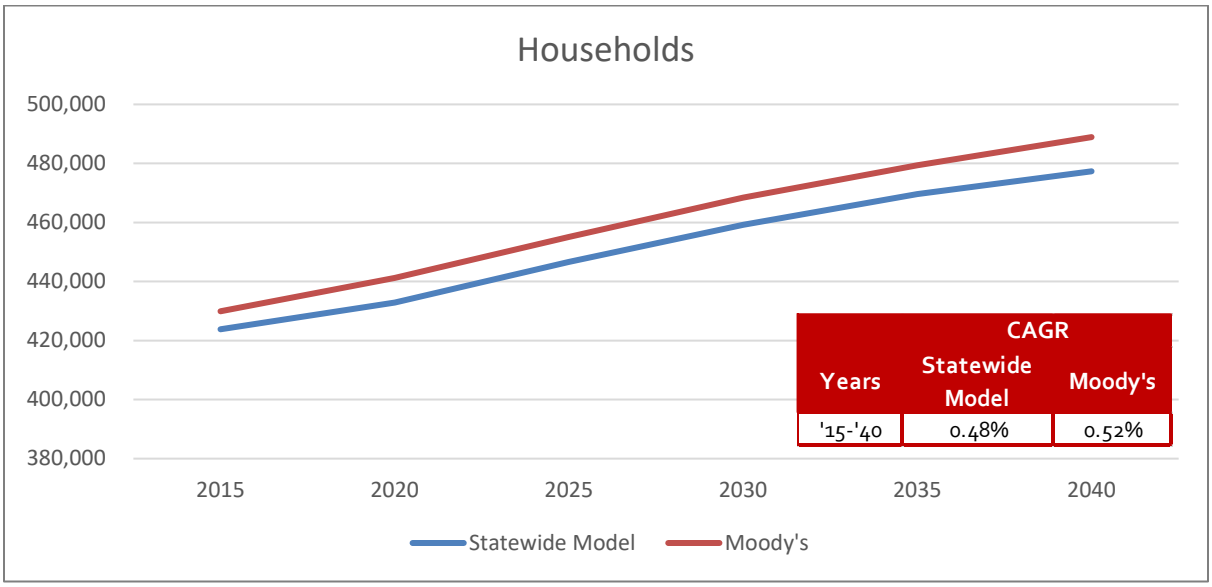
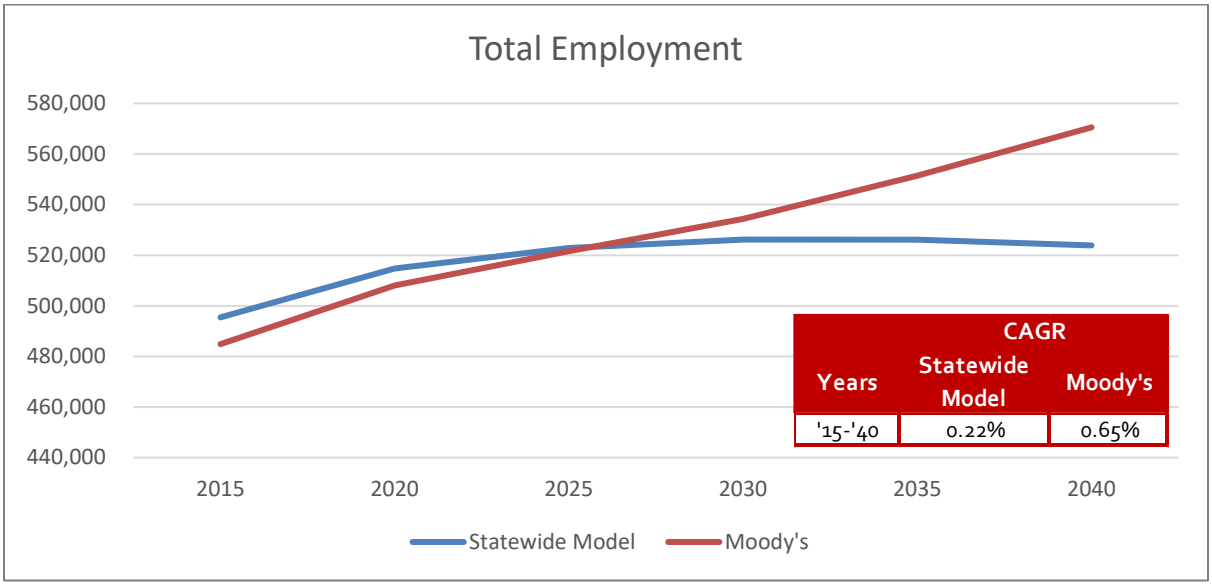


FIGURE 2-3. RHODE ISLAND EMPLOYMENT PROJECTION COMPARISON



2.1.2 Additional Socioeconomic and Demographic Variables

Table 2-3 provides a summary comparison of trends in key variables for both the State of Rhode Island, and the larger Northeast Region[3] based on data obtained from Moody's. Across these key socioeconomic and demographic variables, Moody's Analytics forecasts Rhode Island to grow at a slightly stronger pace

[3] The Northeast Region is defined in this study as Rhode Island, Massachusetts, New York and Connecticut

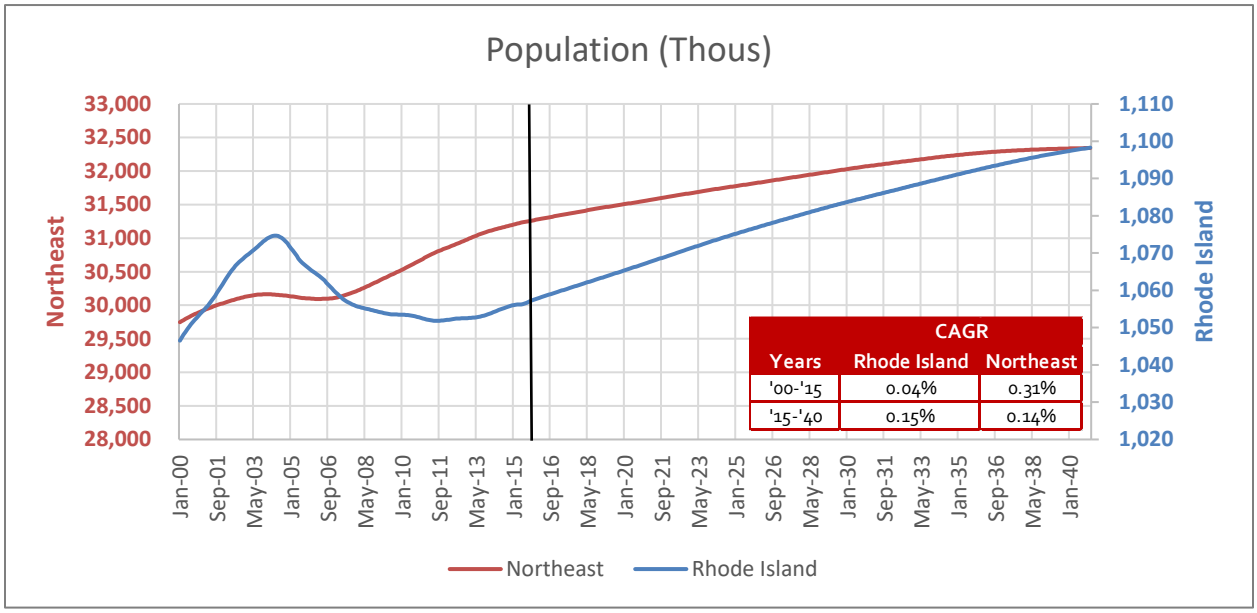
than the Northeast Region with some few exceptions. Figures 2-4 to 2-10 present the comparison of these key variables graphically.

TABLE 2-3. COMPARISON OF KEY VARIABLES (RHODE ISLAND V. NORTHEAST REGION)

Category	Variable	2015-2040 CAGR	
		Rhode Island	Northeast Region
Socioeconomic	Population	0.15%	0.14%
	Households	0.52%	0.51%
	Average HH Income	0.89%	1.02%
Employment	Total Employment (nonagricultural)	0.65%	0.61%
	Retail Trade	0.37%	0.24%
Economic	Gross State Product	1.44%	1.38%
	Retail Sales	2.17%	1.57%

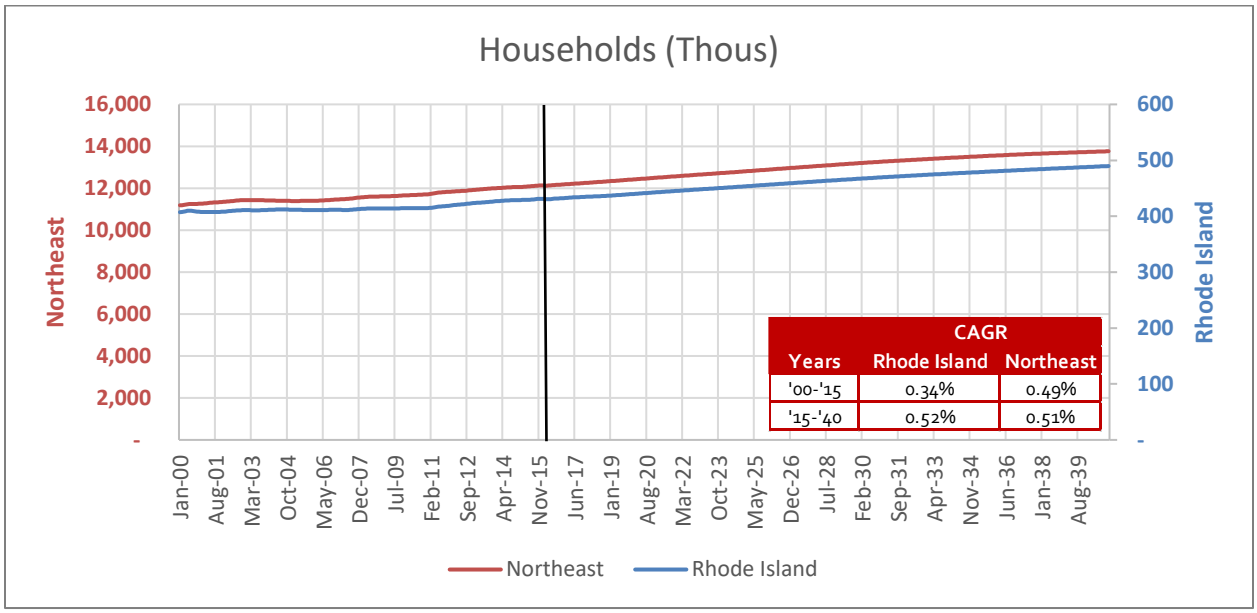
Source: Moody's Analytics

FIGURE 2-4. HISTORICAL AND FORECASTED POPULATION (MOODY'S)



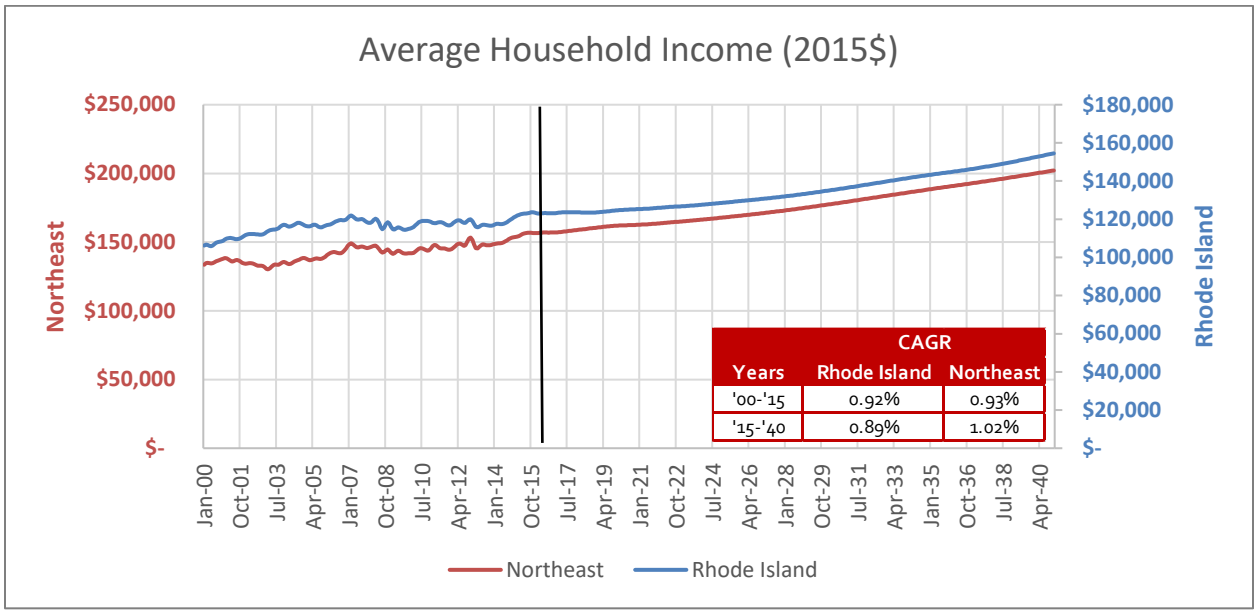
CAGR		
Years	Rhode Island	Northeast
'00-'15	0.04%	0.31%
'15-'40	0.15%	0.14%

Figure 2-5. Historical and Forecasted Households (Moody's)



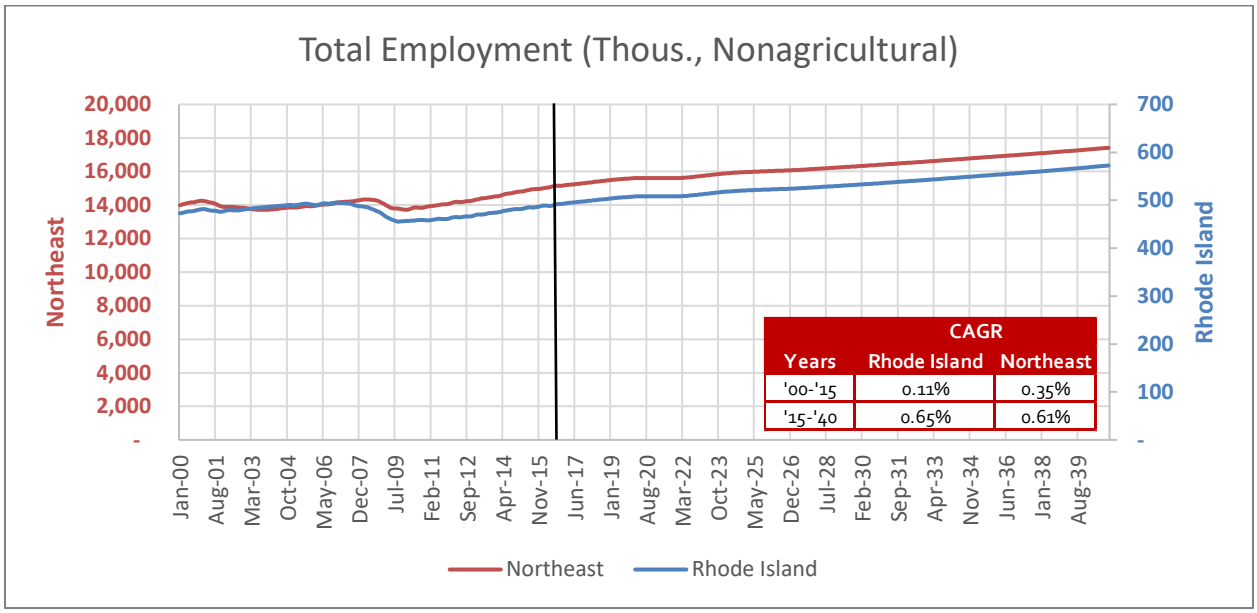
CAGR		
Years	Rhode Island	Northeast
'00-'15	0.34%	0.49%
'15-'40	0.52%	0.51%

Figure 2-6. Historical and Forecasted Average Household Income (Moody's)



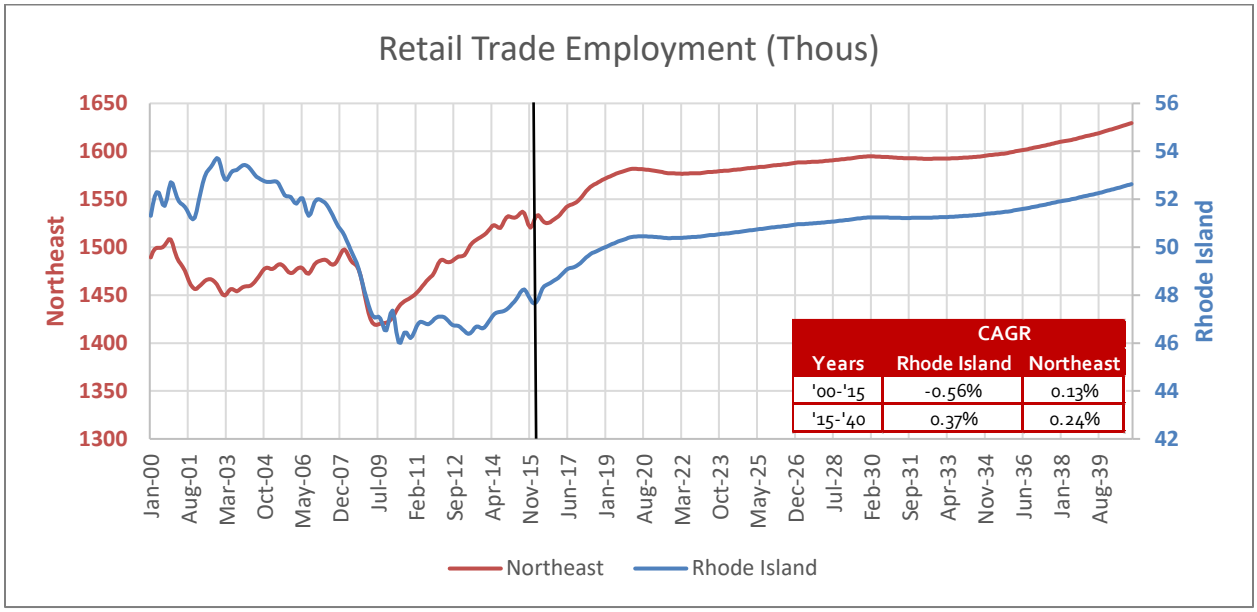
CAGR		
Years	Rhode Island	Northeast
'00-'15	0.92%	0.93%
'15-'40	0.89%	1.02%

Figure 2-7. Historical and Forecasted Total Employment (Moody's)



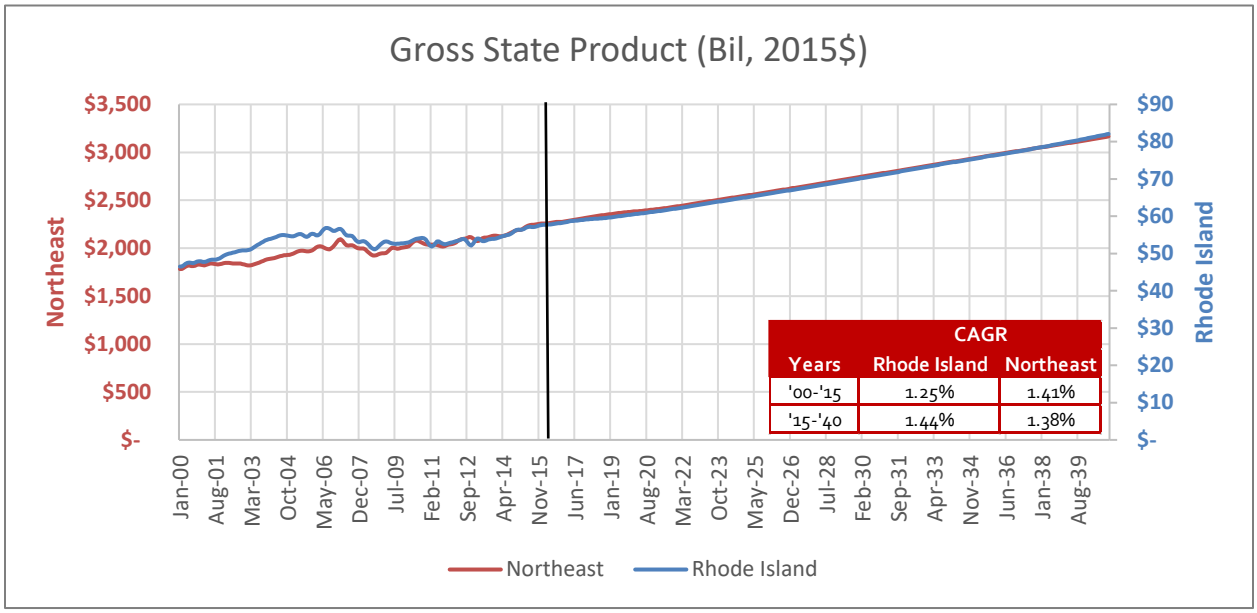
CAGR		
Years	Rhode Island	Northeast
'00-'15	0.11%	0.35%
'15-'40	0.65%	0.61%

Figure 2-8. Historical and Forecasted Retail Trade Employment (Moody's)



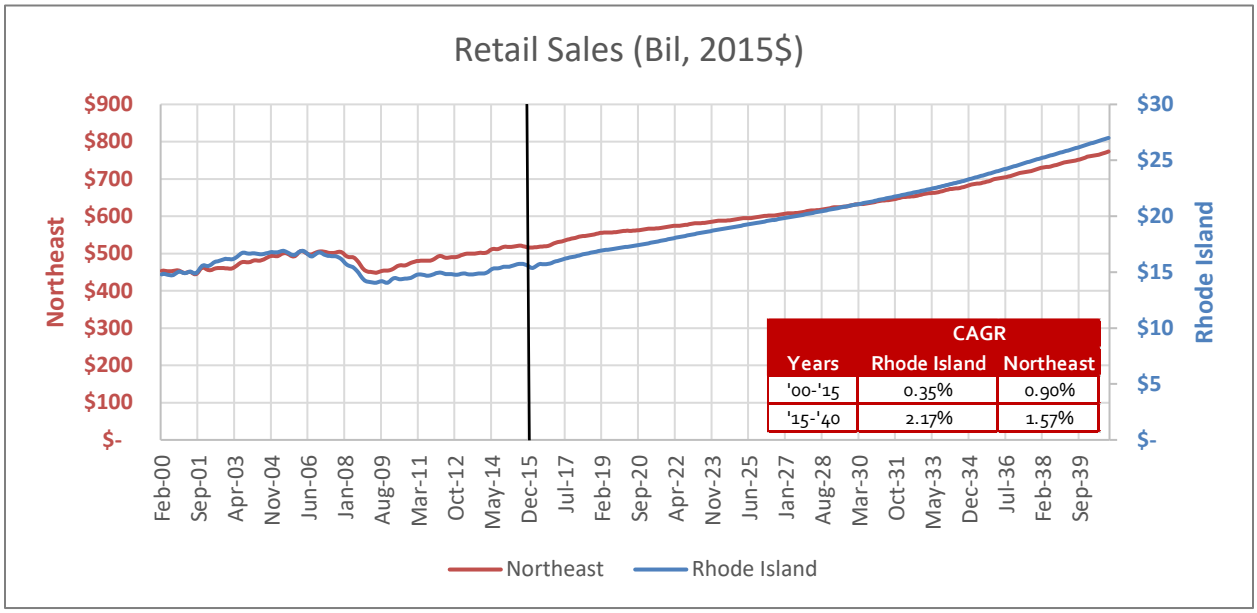
CAGR		
Years	Rhode Island	Northeast
'00-'15	-0.56%	0.13%
'15-'40	0.37%	0.24%

FIGURE 2-9. HISTORICAL AND FORECASTED GROSS STATE PRODUCT (MOODY'S)



CAGR		
Years	Rhode Island	Northeast
'00-'15	1.25%	1.41%
'15-'40	1.44%	1.38%

FIGURE 2-10. HISTORICAL AND FORECASTED RETAIL SALES (MOODY'S)



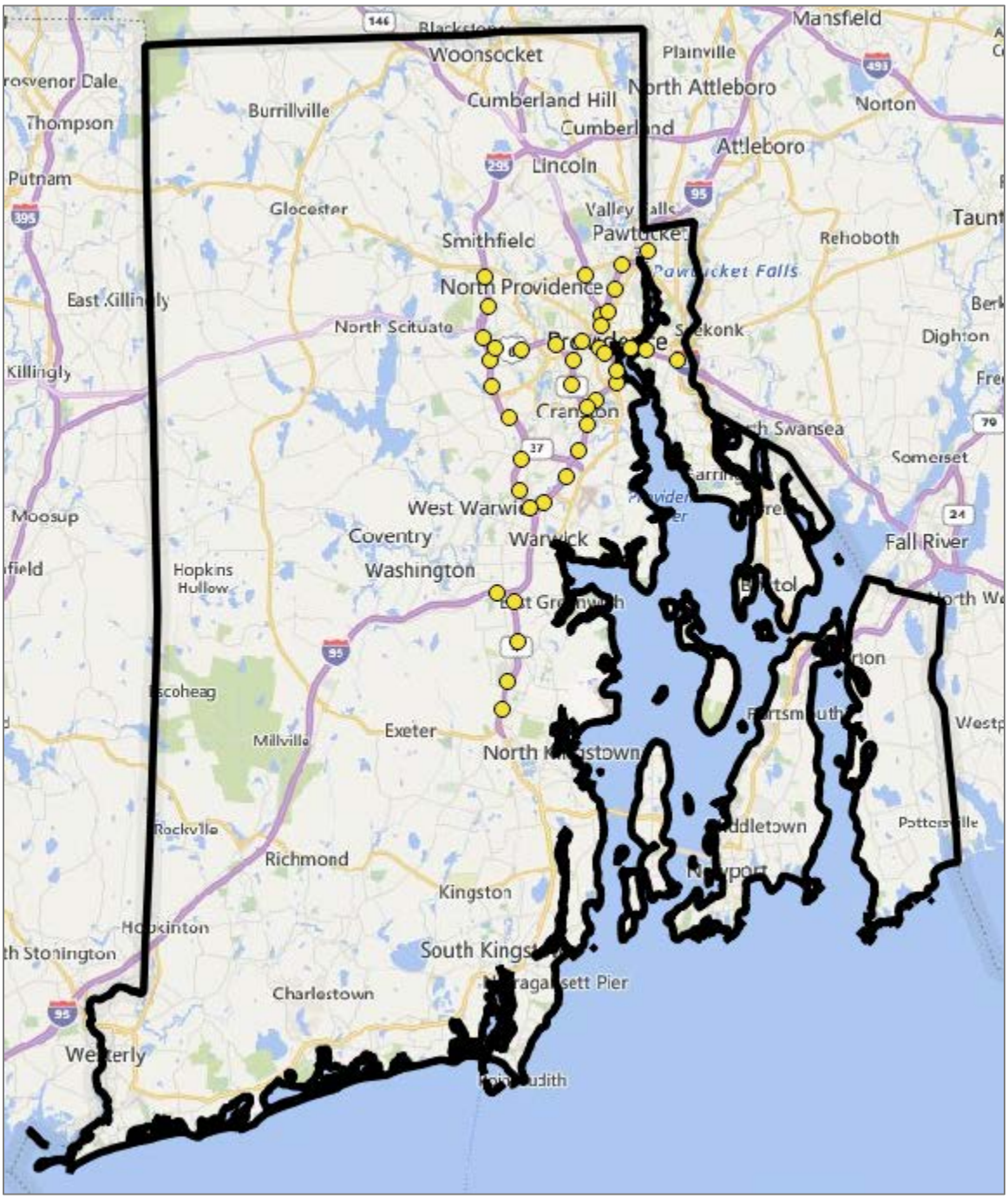
CAGR		
Years	Rhode Island	Northeast
'00-'15	0.35%	0.90%
'15-'40	2.17%	1.57%

2.2 Summary of Traffic Conditions

2.2.1 RIDOT Historical Data

RIDOT provided Louis Berger with monthly vehicle counts recorded from January 2005 through October 2016 at 40 locations on major routes within Rhode Island. The data was recorded by Radar Vehicle Detector (RVD) counters and a map of the 40 RVD locations is shown in Figure 2-11.

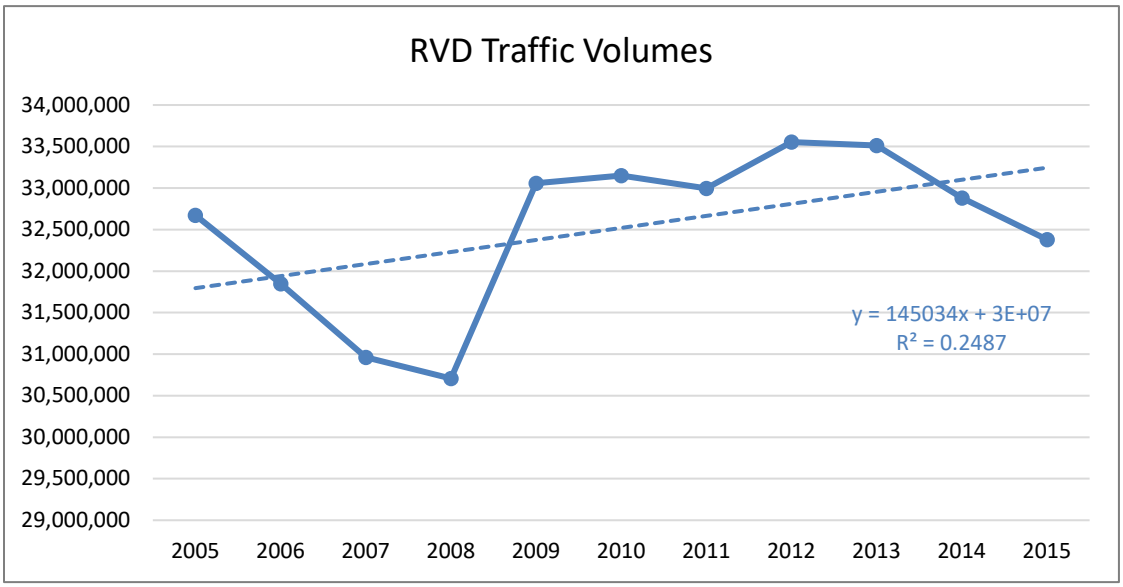
FIGURE 2-11. LOCATION OF RIDOT RADAR VEHICLE DETECTOR COUNTERS



Although some RVD locations had months with missing data, 29 of the locations had a full complement of data and the Louis Berger Team evaluated trends in traffic aggregated for those 29 locations. Figure 2-12 shows the resulting pattern of total traffic growth at this locations. The impact of the great recession on traffic volumes is noted by the sharp decline between 2005 and 2008, followed by a rapid recovery in 2009. To assess the rate of historical growth around these fluctuations, a trendline was fitted through the

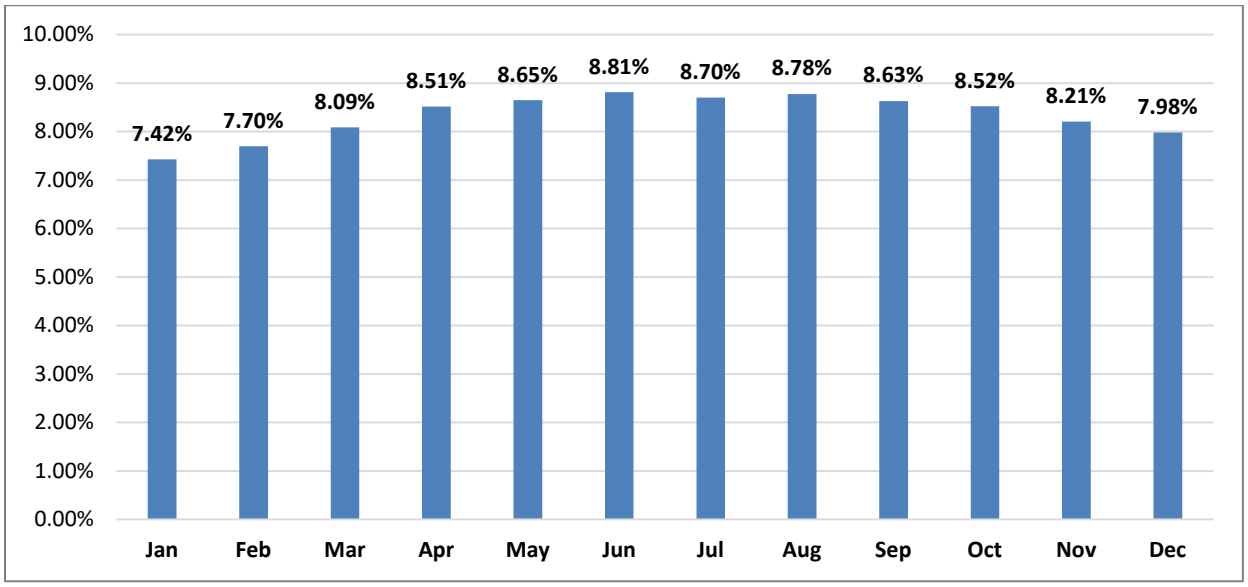
data points available. The resulting annualized rate of growth around this trendline was estimated to be 0.45 percent.

FIGURE 2-12. HISTORICAL TRAFFIC VOLUME TRENDS AT SELECT RIDOT RVD COUNTERS



The monthly series of RVD data was also used to evaluate patterns of traffic seasonality. Figure 2-13 presents the average distribution of annual traffic by month. As shown January is the month with lowest relative volume of traffic, while June, July and August represent the peak traffic volumes. Tractor trailers are not expected to display seasonal patterns driven by summer tourist traffic into and within the state, the overall pattern of seasonality displayed in Figure 2-13 was therefore not used in determining the tractor trailer annualization factor to be applied in the forecasting process.

FIGURE 2-13. HISTORICAL TRAFFIC VOLUME TRENDS AT SELECT RIDOT RVD COUNTERS



2.2.2 Traffic Growth Trends

Projections from two data sources were consulted as potential benchmarks for the future growth rate of tractor trailer volumes. The auto and overall truck trip tables extracted from the integrated corridor analysis tool (ICAT) were evaluated together with projected traffic volumes obtained from the FHWA Freight Analysis Framework (FAF). ICAT data in Table 2-4 shows that future total traffic is projected to increase at annualized rate of 0.71 percent between 2015 and 2030 with truck volumes growing at a slightly faster rate of 0.93 percent per year.

TABLE 2-4. ICAT PROJECTED TRAFFIC GROWTH RATES, 2015-2030

Rhode Island Trips	2015	2030	CAGR
Auto	3,498,613	3,873,582	**0.68%**
Truck	404,010	464,179	**0.93%**
TOTAL	**3,902,623**	**4,337,761**	**0.71%**

Table 2-5 shows auto and traffic data obtained from the FAF database. This data was collected from the mainline roadway links coinciding with the 14 toll locations described in Section 1.0 (Table 1-1). The Table shows that total traffic at the 14 locations is projected to grow at an annualized rate of 0.41 percent while overall truck traffic is projected to grow at a slightly faster rate of 0.49 percent. It should be noted that trucks in this definition include both single light (single unit) and tractor trailers.

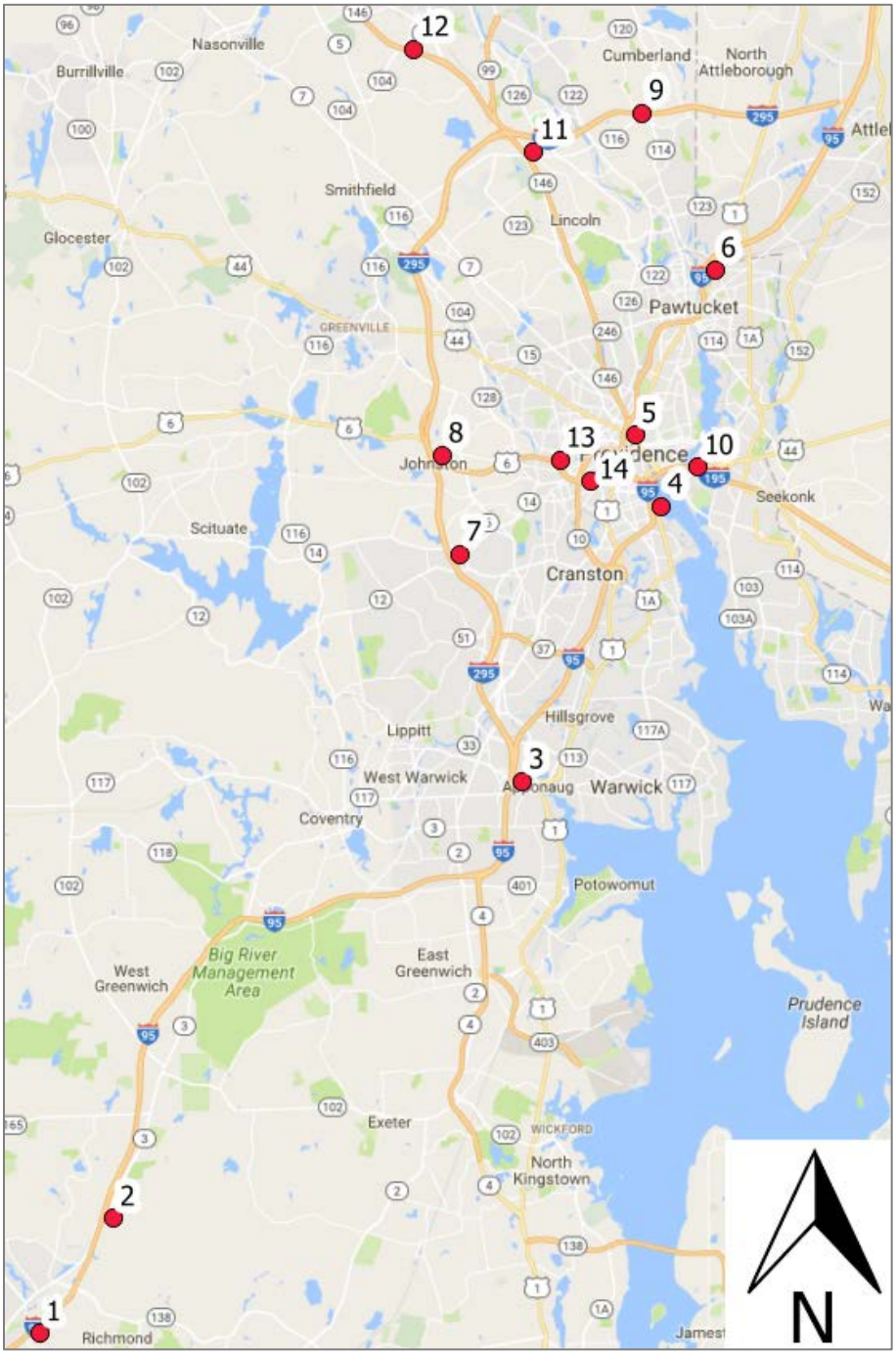
TABLE 2-5. FHWA FAF PROJECTED TRAFFIC GROWTH RATES, 2012-2045

Tolling Location	2012			2045		
	Auto	Trucks	Total	Auto	Trucks	Total
1	46,196	5,100	51,296	58,903	6,502	65,405
2	48,116	5,400	53,516	61,352	6,885	68,237
3	48,514	1,990	50,504	61,858	2,537	64,395
4	53,285	6,200	59,485	67,942	7,905	75,847
5	63,922	6,200	70,122	81,506	7,905	89,411
6	73,266	8,200	81,466	93,420	10,455	103,875
7	66,700	3,200	69,900	76,966	3,692	80,658
8	320,130	16,300	336,430	319,020	16,771	335,791
9	52,640	3,200	55,840	60,742	3,692	64,434
10	282,418	11,580	293,998	289,220	11,858	301,078
11	46,386	3,250	49,636	55,867	3,914	59,781
12	34,838	3,200	38,038	41,959	3,854	45,813
13	55,595	2,800	58,395	68,847	3,467	72,314
14	246,689	10,740	257,429	305,493	13,299	318,792
Total	**1,438,695**	**87,360**	**1,526,055**	**1,643,095**	**102,736**	**1,745,831**
2012-2045 CAGR				**0.40%**	**0.49%**	**0.41%**

3.0 TRAFFIC COUNTS & ANALYSIS

As part of this study's data collection efforts, Connecticut Counts LLC, a member of the Louis Berger Team conducted traffic counts at all of the potential toll locations; Figure 3-1 provides a map of the general traffic count locations. This section of the investment-grade report summarizes the traffic counting exercise approach and the resulting estimates of traffic volumes at each location.

FIGURE 3-1. TRAFFIC COUNT LOCATION MAP



3.1 Data Collection Approach

Table 3-1 provides a description of the counters placed at each general location shown in Figure 3-1, as well as a brief description of the type of equipment used to record traffic movements. Traffic data was collected between August 16th and September 1st of 2016 with the vast majority of locations recording traffic movement data over a seven-day period while a handful of locations only recorded traffic data over a four-day period. The multiple days of data collection allowed for the identification and correction for any time period with anomalous traffic conditions.

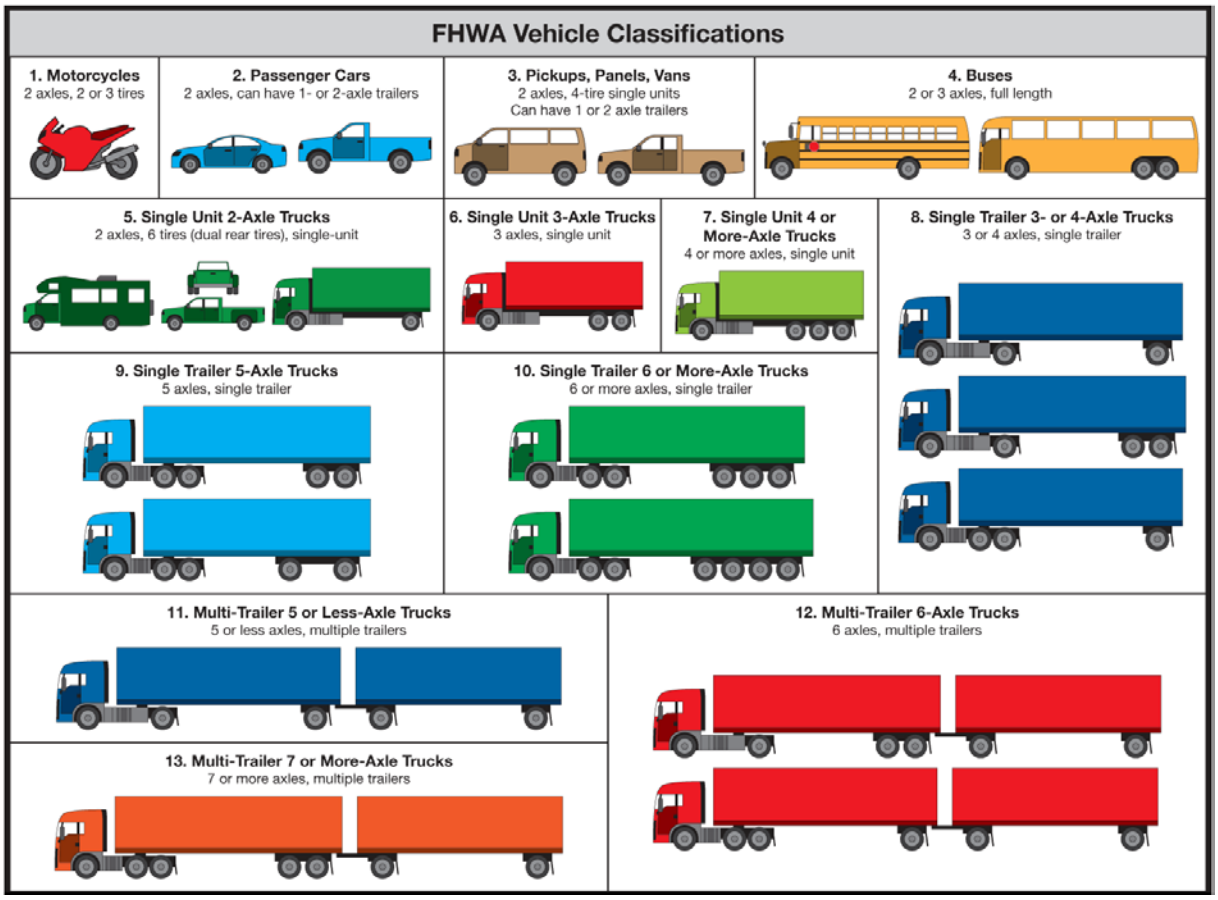
Table 3-1. Traffic Count Location Descriptions

Toll Location		Traffic Count Details						
ID	Gantries	Location	Station ID	Description	Equipment**	Duration		
						Start	End	Days
1	1	1	4034 / 4035	I-95 NB/SB North of Mechanic Street	Video	8/24	8/28	4
2	2a, 2b	2	4036 / 4037	I-95 NB/SB North of Nooseneck Hill Road	Video	8/16	8/23	7
3	3a, 3b	3	4038 / 4039	I-95 NB/SB North of Centerville Road	Video	8/16	8/23	7
		3-a	3993 / 3992	I-95 NB/SB On/Off Ramps to/from Centerville Road	ATR	8/16	9/1	16
4	4	4	4040 / 4041	I-95 NB/SB North of Oxford Street	Video	8/16	8/24	8
5	5a, 5b	5	4042 / 4043	I-95 NB/SB South of Smith Street	Video	8/16	8/23	7
6	6a, 6b	6	4044 / 4045	I-95 NB/SB North of East Street	Video	8/16	8/23	7
		6-a	3995 / 3994	I-95 NB/SB On/Off Ramp to/from East Street	ATR	8/16	8/24	8
7	7a, 7b	7	4046 / 4047	I-295 NB/SB North of Plainfield Pike	Video	8/24	8/28	4
	7d	7-a	3996	I-295 NB On Ramp from Route 14	ATR	8/24	9/1	8
	7c	7-b	3997	I-295 NB Off Ramp to Route 14	ATR	8/24	9/1	8
8	8e, 8f	8	4048 / 4049	I-295 NB/SB South of Greenville Avenue	Video	8/16	8/23	7
	8c	8-1	4067NB	I-295 NB South of Route 6A	Video	8/16	8/23	7
	8c	8-1a	4067SV	I-295 NB Service Rd South of Rte 6A On Ramp	Video	8/16	8/23	7
	8a	8-2	4066SB	I-295 SB North of Route 6A	Video	8/16	8/23	7
	8a	8-2a	4066SV	I-295 SB/Service Road North of Route 6A Off Ramp	Video	8/16	8/23	7
	8d	8-3	4068	I-295 SB South of Route 6	Video	8/24	8/31	7
	8b	8-a	4065	Route 6 NB Off Ramp to I-295 NB	Video	8/16	8/23	7
9	9	9	4053 / 4054	I-295 NB/SB South of Leigh Road	Video	8/24	8/31	7
10	10b	10-1	4056	I-195 WB East of Taunton Ave Ramps	Video	8/16	8/23	7
	10a	10-2	4055	I-195 EB West of Gano Street	Video	8/16	8/23	7
	10c	10-a	3998	Taunton Ave WB On Ramp to I-195 WB	ATR	8/16	8/24	8
11	11b	11	4057NB/SB	Rte 146 NB/SB North of Rte 116 SB On Ramp	Video	8/16	8/23	7
	11a	11-a	3999	Rte 146 SB On Ramp from Rte 116	ATR	8/16	8/24	8
12	12a, 12b	12	4058 / 4059	Route 146 NB/SB at Route 104 Crossing	Video	8/26	8/31	5
13	13	13	4060 / 4061	Route 6 WB/EB at Woonasquatucket River Crossing	Video	8/24	8/28	4
14	14a*	14-1	4064	Route 10 SB North of Route 6	Video	8/16	8/23	7
	14b*	14-2	4062	Route 6 EB West of Route 10	Video	8/16	8/23	7
	14c *	14-3	4063	Route 10 NB South of Route 6	Video	8/16	8/23	7

* Gantry location relocated after traffic data collection effort
** ATR = Automated Traffic Recorder

Traffic data was collected primarily using either Miovision video observation as indicated in Table 3-1, while traffic on a select number of ramp locations was monitored using Automated Traffic Recorder (ATR) equipment. Both approaches were used to classify observed traffic into broad groups as per Federal Highway Administration vehicle classification categories presented in Figure 3-2.

FIGURE 3-2. FEDERAL HIGHWAY ADMINISTRATION (FHWA) VEHICLE CLASSIFICATIONS



Source: Federal Highway Administration

The Rhode Works Program will apply tolls to tractor trailers. The traffic data vehicle classification process is therefore critical in determining the potential volume of traffic that would be subject to tolls at the various gantry locations.

Table 3-2 provides an indication of the manner in which the Miovision equipment classifies recorded traffic. The seven broad classifications in the table have been further consolidated into a group of four categories for summary purposes and also to facilitate comparisons with the four categories reported in the Level 2 report. Table 3-3 provides the 12 vehicle classifications recorded by the ATR counters that map directly to corresponding FHWA classifications.

Although the Miovision documentation suggests that the relevant FHWA classification for buses should be Classes 8-13, buses were instead grouped together with other single unit trucks (FHWA Classes 5-7) as they would not be subject to tolls; tolls would only apply to single and tandem tractor trailers.

Table 3-2. Video Recorder Vehicle Classifications

Native Classification	Description / FHWA Classification	Summary Grouping
Motorcycles	This classification includes motorcycles, scooters and other similar vehicles that are traveling on the road with traffic. Relevant FHWA Class: 1. Motorcycles	Cars
Cars	Includes cars and light trucks that are manufactured primarily for the purpose of carrying passengers. This includes pick-ups, vans, and SUVs. Relevant FHWA Classes: 2-3. Passenger Cars and Other Two-Axle, Four-Tire Passenger Vehicles	
Light Goods Vehicles	Includes cars and light trucks that are in operation primarily for the purpose of delivering goods or services. This includes pick-ups, vans, and SUVs. Relevant FHWA Class: 3. Pickups, Panels, Vans	
Buses	This classification includes buses of any size, including school buses, coach buses, transit buses, street cars and multi-unit buses. Relevant FHWA Classes: 8-13. Single Trailer and Multi-Trailer Trucks	Single Unit Trucks
Single Unit Trucks	This classification includes moving trucks, courier trucks, dump trucks, cement mixers, garbage trucks, transport trucks without trailers or with small rigid trailers, large flat bed trucks, or motor homes. Relevant FHWA Classes: 5-7. Single Unit Trucks with 2, 3, or 4+ Axles.	
Articulated Trucks	This classification includes tractor trailers with full length trailers or multiple trailers. Relevant FHWA Classes: 8-13. Single Trailer and Multi-Trailer Trucks	Single Tractor Trailers
Articulated Multi-Trailer		Tandem Tractor Trailers

Table 3-3. Video Recorder Vehicle Classifications

Native Classification	Description / FHWA Classification	Summary Grouping
Bikes	FHWA Class 1	Cars
Cars & Trailers	FHWA Class 2	
2 Axle Long	FHWA Class 3	
Buses	FHWA Class 4	Single Unit Trucks
2 Axle 6 Tire	FHWA Class 5	
3 Axle Single	FHWA Class 6	
4 Axle Single	FHWA Class 7	
<5 Axle Double	FHWA Class 8	Single Tractor Trailers
5 Axle Double	FHWA Class 9	
>6 Axle Double	FHWA Class 10	
<6 Axle Multi	FHWA Class 11	Tandem Tractor Trailers
6 Axle Multi	FHWA Class 12	

3.2 Average Traffic Count Estimates

Because the traffic data collection effort covered both weekday and weekend periods, the Louis Berger Team developed measures of average weekday and weekend traffic separately; Tables 3-4 and 3-5 provide the resulting distributions by vehicle class at each location. Detailed hourly breakdowns of traffic at each of the locations is provided in Appendix A of this report.

Table 3-4. Average Weekday Traffic Counts

ID	LOCATION	Cars	Single Unit Trucks	Tractor Trailers			TOTAL Traffic
				Single Trailer	Tandem Trailer	Subtotal	
1	I-95 NB/SB North of Mechanic Street	48,362	1,706	3,923	70	**3,993**	**54,061**
2	I-95 NB/SB North of Nooseneck Hill Road	47,301	1,684	3,785	77	**3,861**	**52,847**
3	I-95 NB/SB North of Centerville Road	175,403	5,414	5,161	122	**5,282**	**186,099**
3-a	I-95 NB/SB On/Off Ramps to/from Centerville Road	17,666	545	73	1	**73**	**18,283**
4	I-95 NB/SB North of Oxford Street	190,479	5,720	4,949	60	**5,009**	**201,208**
5	I-95 NB/SB South of Smith Street	235,968	6,473	4,165	42	**4,206**	**246,648**
6	I-95 NB/SB North of East Street	87,904	2,455	2,586	25	**2,611**	**92,970**
6-a	I-95 NB/SB On/Off Ramp to/from East Street	7,272	222	84	16	**100**	**7,595**
7	I-295 NB/SB North of Plainfield Pike	73,261	2,811	1,700	43	**1,742**	**77,815**
7-a	I-295 NB On Ramp from Route 14	9,292	872	253	6	**259**	**10,423**
7-b	I-295 NB Off Ramp to Route 14	5,569	794	122	7	**129**	**6,492**
8	I-295 NB/SB South of Greenville Avenue	84,943	3,079	2,279	78	**2,357**	**90,379**
8-1	I-295 NB South of Route 6A	25,977	977	776	42	**817**	**27,771**
8-1a	I-295 NB Service Rd South of Rte 6A On Ramp	5,160	182	82	1	**82**	**5,424**
8-2	I-295 SB North of Route 6A	28,047	1,075	913	41	**954**	**30,077**
8-2a	I-295 SB/Service Road North of Route 6A Off Ramp	12,953	424	140	1	**142**	**13,518**
8-3	I-295 SB South of Route 6	42,724	2,031	1,331	31	**1,362**	**46,117**
8-a	Route 6 NB Off Ramp to I-295 NB	14,857	443	209	2	**211**	**15,511**
9	I-295 NB/SB South of Leigh Road	62,728	2,109	2,041	72	**2,114**	**66,950**
10-1	I-195 WB East of Taunton Ave Ramps	67,154	2,267	1,568	21	**1,589**	**71,009**
10-2	I-195 EB West of Gano Street	88,147	2,769	1,682	15	**1,697**	**92,613**
10-a	Taunton Ave WB On Ramp to I-195 WB	21,903	1,225	266	21	**287**	**23,415**
11	Rte 146 NB/SB North of Rte 116 SB On Ramp	60,075	1,548	1,166	25	**1,191**	**62,814**
11-a	Rte 146 SB On Ramp from Rte 116	2,468	181	12	-	**12**	**2,661**
12	Route NB/SB 146 at Route 104 Crossing	40,338	1,597	2,137	56	**2,193**	**44,128**
13	Route WB/EB 6 at Woonasquatucket River Crossing	60,414	2,326	731	5	**736**	**63,476**
14-1	Route 10 SB North of Route 6	63,523	1,821	565	6	**571**	**65,914**
14-2	Route 6 EB West of Route 10	46,225	1,513	498	1	**499**	**48,236**
14-3	Route 10 NB South of Route 6	39,960	924	130	3	**133**	**41,016**
TOTAL		1,666,071	55,185	43,325	886	**44,211**	**1,765,467**
		94.4%	3.1%	2.5%	0.1%	**2.5%**	**100.0%**

Table 3-5. Average Weekend Traffic Counts

ID	LOCATION	Cars	Single Unit Trucks	Tractor Trailers			TOTAL Traffic
				Single Trailer	Tandem Trailer	Subtotal	
1	I-95 NB/SB North of Mechanic Street	59,554	826	1,318	48	**1,366**	**61,746**
2	I-95 NB/SB North of Nooseneck Hill Road	63,023	793	1,216	58	**1,274**	**65,089**
3	I-95 NB/SB North of Centerville Road	161,044	1,780	1,447	58	**1,504**	**164,328**
3-a	I-95 NB/SB On/Off Ramps to/from Centerville Road	12,550	272	29	-	**29**	**12,850**
4	I-95 NB/SB North of Oxford Street	176,524	1,945	1,537	22	**1,559**	**180,028**
5	I-95 NB/SB South of Smith Street	221,845	2,331	1,284	17	**1,301**	**225,477**
6	I-95 NB/SB North of East Street	88,782	921	789	14	**803**	**90,506**
6-a	I-95 NB/SB On/Off Ramp to/from East Street	5,446	90	27	12	**39**	**5,574**
7	I-295 NB/SB North of Plainfield Pike	55,072	660	358	30	**388**	**56,119**
7-a	I-295 NB On Ramp from Route 14	6,782	332	65	1	**66**	**7,179**
7-b	I-295 NB Off Ramp to Route 14	4,641	409	48	4	**52**	**5,101**
8	I-295 NB/SB South of Greenville Avenue	62,957	751	443	30	**473**	**64,180**
8-1	I-295 NB South of Route 6A	21,538	264	165	17	**182**	**21,983**
8-1a	I-295 NB Service Rd South of Rte 6A On Ramp	4,544	52	18	2	**20**	**4,615**
8-2	I-295 SB North of Route 6A	21,000	238	166	14	**180**	**21,417**
8-2a	I-295 SB/Service Road North of Route 6A Off Ramp	7,463	84	27	-	**27**	**7,574**
8-3	I-295 SB South of Route 6	31,844	470	220	12	**232**	**32,546**
8-a	Route 6 NB Off Ramp to I-295 NB	11,470	130	54	1	**55**	**11,655**
9	I-295 NB/SB South of Leigh Road	51,398	465	341	44	**385**	**52,248**
10-1	I-195 WB East of Taunton Ave Ramps	62,102	758	514	6	**520**	**63,380**
10-2	I-195 EB West of Gano Street	75,064	1,011	552	-	**552**	**76,627**
10-a	Taunton Ave WB On Ramp to I-195 WB	16,652	726	115	7	**122**	**17,500**
11	Rte 146 NB/SB North of Rte 116 SB On Ramp	51,266	454	343	7	**350**	**52,069**
11-a	Rte 146 SB On Ramp from Rte 116	1,169	58	5	-	**5**	**1,232**
12	Route NB/SB 146 at Route 104 Crossing	40,708	459	451	19	**469**	**41,636**
13	Route WB/EB 6 at Woonasquatucket River Crossing	44,204	658	180	2	**182**	**45,043**
14-1	Route 10 SB North of Route 6	52,627	561	100	1	**101**	**53,289**
14-2	Route 6 EB West of Route 10	37,285	429	97	1	**98**	**37,812**
14-3	Route 10 NB South of Route 6	32,323	312	26	2	**27**	**32,662**
TOTAL		1,480,869	18,232	11,931	424	**12,354**	**1,511,455**
		98.0%	1.2%	0.8%	0.0%	**0.8%**	**100.0%**

Overall traffic volumes in Table 3-5 are 85 percent lower on weekends as compared to weekdays. Whereas average weekend passenger car volumes are only approximately 90 percent the comparable weekday average, single unit truck volumes are approximately 35 percent the weekday average while tractor trailer volumes (single and tandem combined) are approximately 30 percent the weekday average. The differential between average weekday and weekend traffic has implications for the annualization factors that were applied to convert average weekday volumes to annual traffic volumes.

Table 3-6 presents the resulting estimate of average daily traffic that combines both weekday and weekend traffic, weighted by the number of each day type in a given week.

Table 3-6. Average Daily Traffic Counts

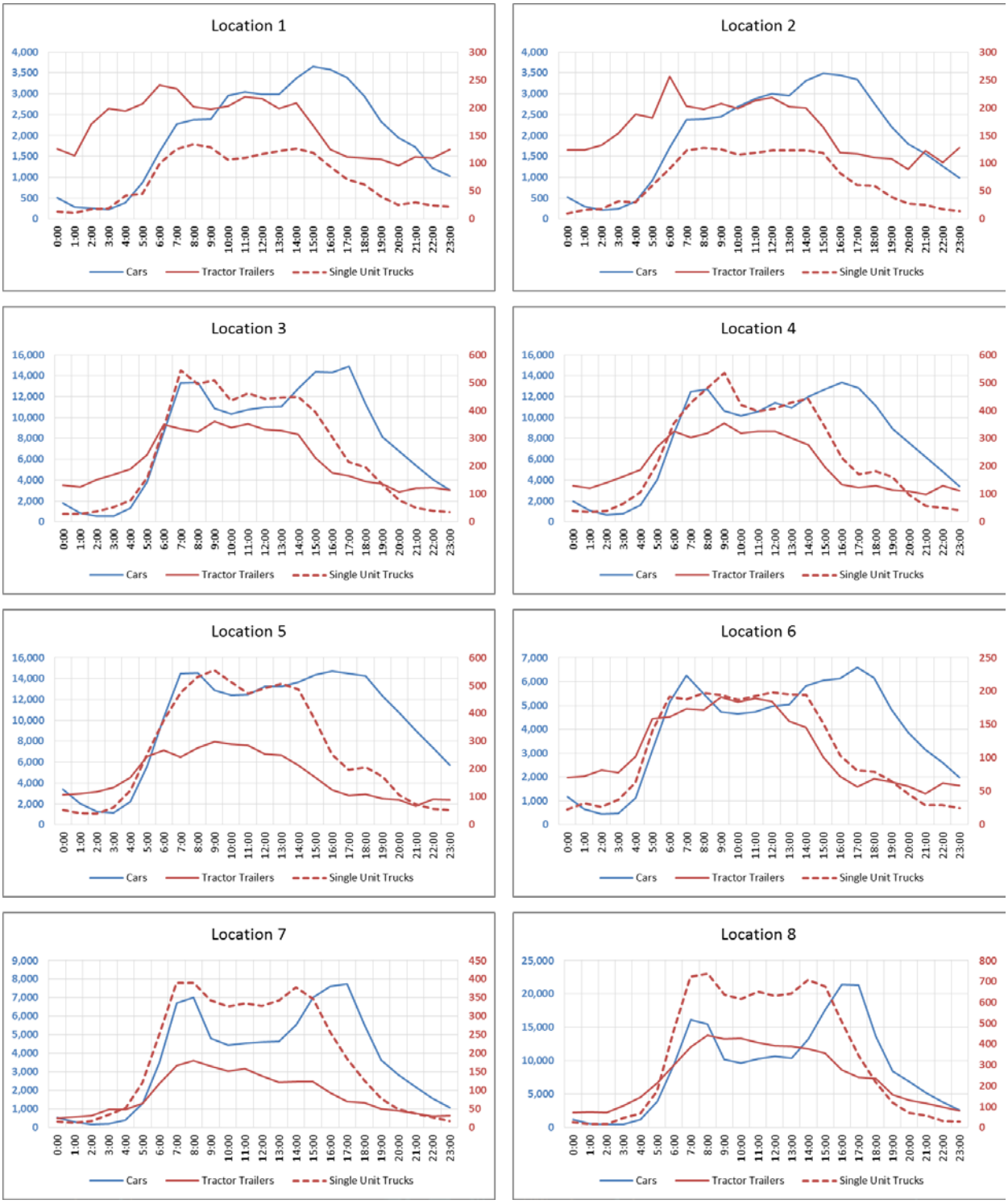
ID	LOCATION	Cars	Single Unit Trucks	Tractor Trailers			TOTAL Traffic
				Single Trailer	Tandem Trailer	Subtotal	
1	I-95 NB/SB North of Mechanic Street	51,560	1,455	3,179	63	**3,242**	**56,257**
2	I-95 NB/SB North of Nooseneck Hill Road	51,793	1,429	3,051	71	**3,122**	**56,344**
3	I-95 NB/SB North of Centerville Road	171,300	4,375	4,099	103	**4,203**	**179,878**
3-a	I-95 NB/SB On/Off Ramps to/from Centerville Road	16,204	467	60	0	**61**	**16,731**
4	I-95 NB/SB North of Oxford Street	186,492	4,641	3,974	49	**4,023**	**195,156**
5	I-95 NB/SB South of Smith Street	231,933	5,290	3,342	35	**3,376**	**240,599**
6	I-95 NB/SB North of East Street	88,155	2,017	2,072	22	**2,094**	**92,266**
6-a	I-95 NB/SB On/Off Ramp to/from East Street	6,750	184	68	15	**83**	**7,017**
7	I-295 NB/SB North of Plainfield Pike	68,064	2,196	1,316	39	**1,355**	**71,616**
7-a	I-295 NB On Ramp from Route 14	8,574	718	199	4	**204**	**9,496**
7-b	I-295 NB Off Ramp to Route 14	5,304	684	101	6	**107**	**6,095**
8	I-295 NB/SB South of Greenville Avenue	78,661	2,414	1,755	64	**1,819**	**82,893**
8-1	I-295 NB South of Route 6A	24,708	773	601	34	**636**	**26,117**
8-1a	I-295 NB Service Rd South of Rte 6A On Ramp	4,984	145	63	1	**64**	**5,193**
8-2	I-295 SB North of Route 6A	26,034	836	700	33	**733**	**27,602**
8-2a	I-295 SB/Service Road North of Route 6A Off Ramp	11,384	327	108	1	**109**	**11,820**
8-3	I-295 SB South of Route 6	39,616	1,585	1,014	26	**1,039**	**42,240**
8-a	Route 6 NB Off Ramp to I-295 NB	13,889	353	165	2	**167**	**14,409**
9	I-295 NB/SB South of Leigh Road	59,491	1,639	1,555	64	**1,620**	**62,749**
10-1	I-195 WB East of Taunton Ave Ramps	65,710	1,836	1,267	16	**1,283**	**68,829**
10-2	I-195 EB West of Gano Street	84,409	2,267	1,359	10	**1,370**	**88,045**
10-a	Taunton Ave WB On Ramp to I-195 WB	20,403	1,083	223	17	**239**	**21,725**
11	Rte 146 NB/SB North of Rte 116 SB On Ramp	57,558	1,236	931	20	**950**	**59,744**
11-a	Rte 146 SB On Ramp from Rte 116	2,097	145	10	-	**10**	**2,252**
12	Route NB/SB 146 at Route 104 Crossing	40,444	1,272	1,655	45	**1,700**	**43,416**
13	Route WB/EB 6 at Woonasquatucket River Crossing	55,782	1,850	574	4	**578**	**58,209**
14-1	Route 10 SB North of Route 6	60,410	1,461	432	4	**436**	**62,307**
14-2	Route 6 EB West of Route 10	43,670	1,203	383	1	**384**	**45,258**
14-3	Route 10 NB South of Route 6	37,778	749	100	2	**102**	**38,629**
TOTAL		1,613,156	44,627	34,355	754	**35,109**	**1,692,892**
		95.3%	2.6%	2.0%	0.0%	**2.1%**	**100.0%**

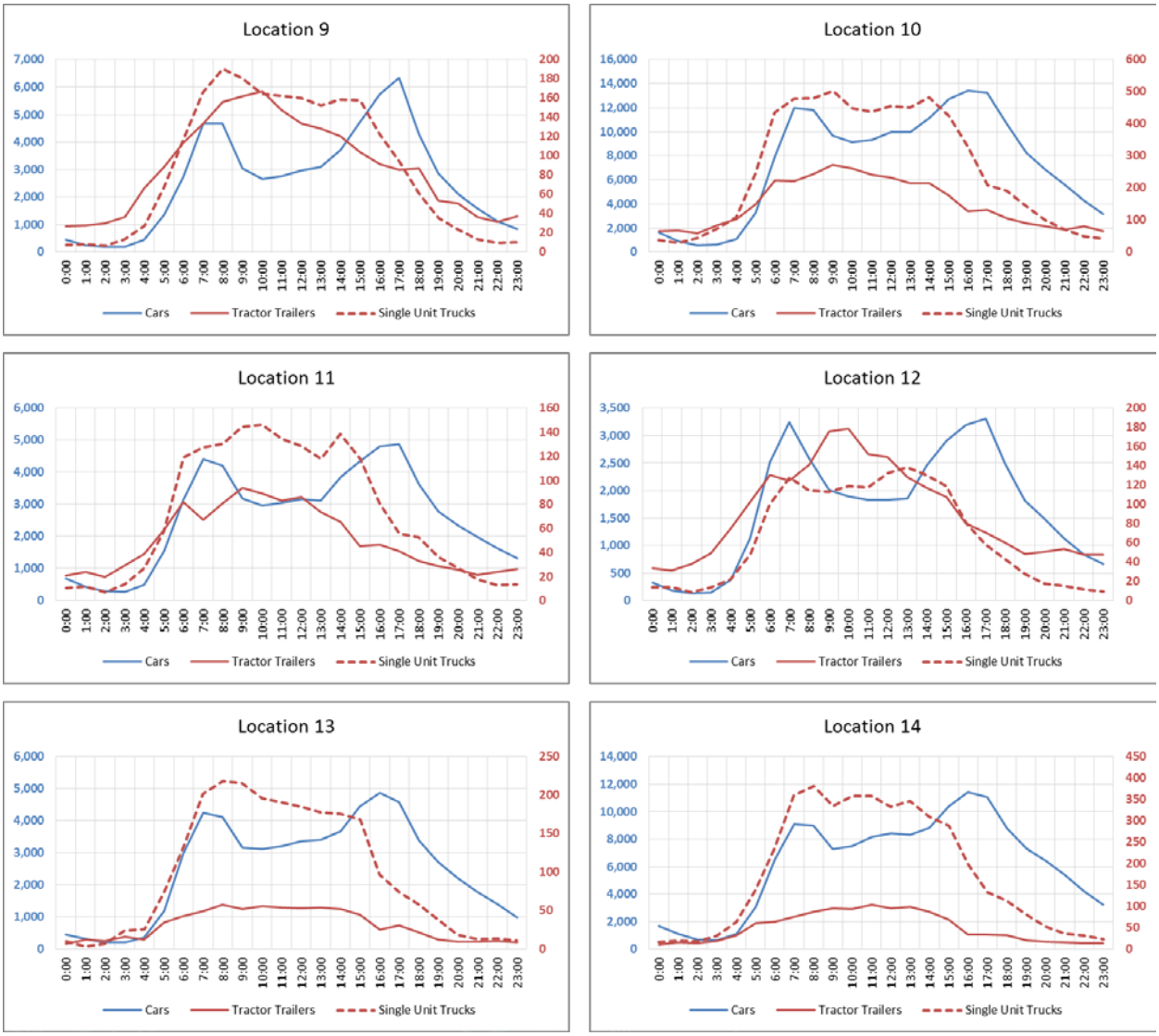
3.3 Hourly Traffic Analysis

Traffic counts by vehicle class were collected and tabulated in fifteen minute intervals and this level of detail allowed the Louis Berger Team to evaluate hourly volumes at each of the 14 toll locations. Figure 3-3 presents the hourly break down by the three major vehicle classifications by toll location. The scale

on the left hand side measures hourly traffic volumes of passenger vehicles while the right hand scale measures the hourly volume of both tractor trailers and single unit trucks.

FIGURE 3-3. HOURLY TRAFFIC COUNTS BY VEHICLE CLASSIFICATION AND TOLL LOCATION





The pattern of hourly traffic volumes in Figure 3-3 differs from location to location. Locations 1 and 2 on I-95 in the more rural southwest corner of the state show relatively low levels of passenger vehicle traffic in the morning hours while tractor trailer volumes at these locations appear to peak in the early morning and hold steady through the beginning of the evening peak period that starts at 3PM.

The traffic patterns at the remaining locations closer to the urban core in Providence show more traditional bimodal distributions for passenger car vehicles that coincide with morning and evening peak periods – with afternoon peak (3PM-6PM) displaying a slightly higher peak that extends a little longer in duration than the morning peak. Tractor trailer volumes at these other more urbanized locations typically show growing activity that generally coincides with the beginning of the morning peak and holds relatively steady before declining ahead of the start of the evening peak. As such, a large portion of tractor trailer traffic occurs at periods of relatively low congestion during the midday period as shown by the aggregate volumes summarized in Figure 3-4, as well as the corresponding table of relative time-of-day distributions presented in Table 3-7.

Figure 3-4. Hourly Traffic Counts by Vehicle Classification (All 14 Locations)

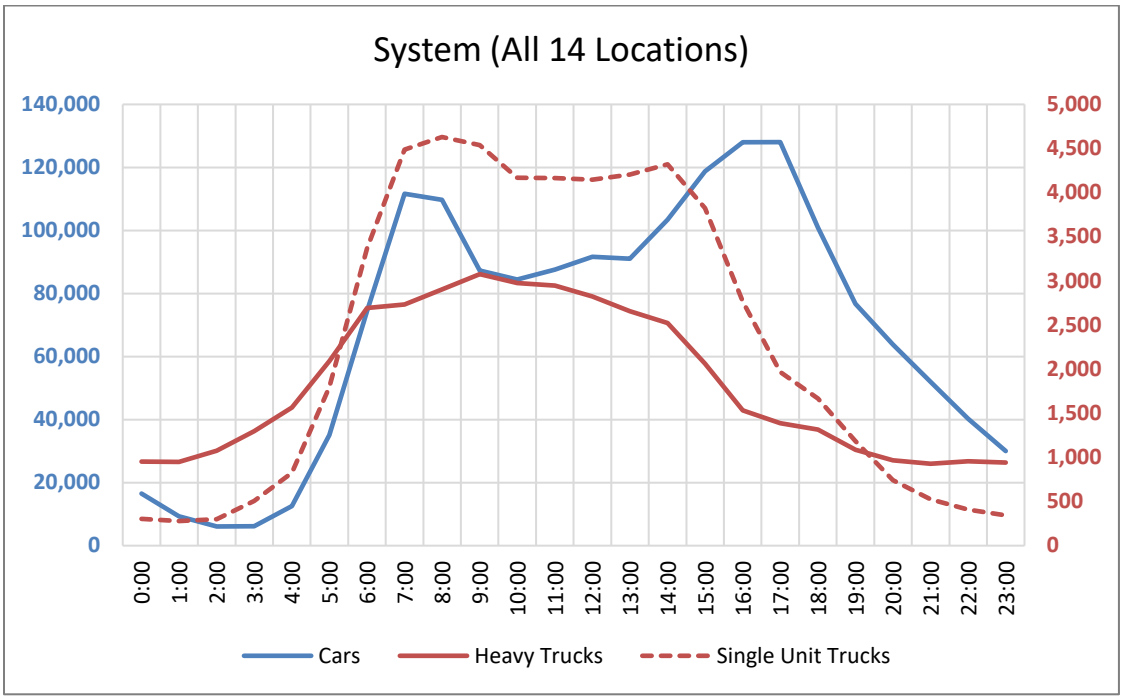


Table 3-7. Peak Hour Weekday Traffic

		Cars		Single Unit Trucks		Tractor Trailers	
		Volume	Percent	Volume	Percent	Volume	Percent
Early AM	00:00 to 06:00	85,851	5.2%	4,045	7.3%	7,883	17.8%
AM Peak	06:00 to 09:00	296,022	17.8%	12,380	22.4%	8,268	18.7%
Midday	09:00 to 15:00	545,555	32.7%	25,434	46.1%	16,912	38.3%
PM Peak	15:00 to 18:00	374,864	22.5%	8,479	15.4%	4,969	11.2%
Night	18:00 to 00:00	363,779	21.8%	4,847	8.8%	6,179	14.0%
TOTAL		1,666,071	100.0%	55,185	100.0%	44,211	100.0%

The Louis Berger Team reviewed the hourly traffic data to obtain estimates of peak hourly volumes by vehicle type. The estimation of peak hourly traffic at each of the potential gantry locations is an important component of the traffic data collection exercise as this provides critical detail to determining potential highway capacity constraints that will inform the travel demand modeling exercise, as well as providing vital information to be used in sizing the requirements of the system at each location. Tables 3-8 to 3-10 provide an estimate of the total peak hourly volume by vehicle class.

Table 3-8. Peak Hour Weekday Traffic

ID	LOCATION	Cars	Single Unit Trucks	Tractor Trailers			TOTAL Traffic
				Single Trailer	Tandem Trailer	Subtotal	
1	I-95 NB/SB North of Mechanic Street	3,645	135	230	11	**241**	**3,933**
2	I-95 NB/SB North of Nooseneck Hill Road	3,483	128	243	17	**256**	**3,766**
3	I-95 NB/SB North of Centerville Road	13,613	494	354	12	**356**	**13,968**
3-a	I-95 NB/SB On/Off Ramps to/from Centerville Road	1,431	51	8	0	**8**	**1,467**
4	I-95 NB/SB North of Oxford Street	13,343	536	353	7	**354**	**13,706**
5	I-95 NB/SB South of Smith Street	14,731	555	296	5	**299**	**15,378**
6	I-95 NB/SB North of East Street	6,080	185	185	2	**185**	**6,204**
6-a	I-95 NB/SB On/Off Ramp to/from East Street	630	22	6	2	**8**	**654**
7	I-295 NB/SB North of Plainfield Pike	6,725	273	147	7	**150**	**6,887**
7-a	I-295 NB On Ramp from Route 14	957	74	30	1	**31**	**1,051**
7-b	I-295 NB Off Ramp to Route 14	444	71	12	3	**12**	**527**
8	I-295 NB/SB South of Greenville Avenue	8,719	272	175	16	**180**	**8,958**
8-1	I-295 NB South of Route 6A	2,715	90	63	5	**66**	**2,817**
8-1a	I-295 NB Service Rd South of Rte 6A On Ramp	532	18	8	0	**8**	**550**
8-2	I-295 SB North of Route 6A	2,841	107	73	7	**75**	**2,941**
8-2a	I-295 SB/Service Road North of Route 6A Off Ramp	1,536	46	13	1	**13**	**1,573**
8-3	I-295 SB South of Route 6	4,062	193	109	7	**109**	**4,199**
8-a	Route 6 NB Off Ramp to I-295 NB	1,582	39	22	1	**22**	**1,612**
9	I-295 NB/SB South of Leigh Road	6,341	190	165	8	**167**	**6,521**
10-1	I-195 WB East of Taunton Ave Ramps	5,127	192	125	4	**125**	**5,355**
10-2	I-195 EB West of Gano Street	7,544	251	128	2	**128**	**7,733**
10-a	Taunton Ave WB On Ramp to I-195 WB	1,863	120	31	4	**35**	**1,986**
11	Rte 146 NB/SB North of Rte 116 SB On Ramp	4,564	134	93	5	**93**	**4,673**
11-a	Rte 146 SB On Ramp from Rte 116	316	17	1	-	**1**	**323**
12	Route NB/SB 146 at Route 104 Crossing	3,315	139	178	10	**179**	**3,498**
13	Route WB/EB 6 at Woonasquatucket River Crossing	4,873	219	58	1	**58**	**4,995**
14-1	Route 10 SB North of Route 6	5,714	160	49	1	**49**	**5,830**
14-2	Route 6 EB West of Route 10	3,658	153	43	0	**43**	**3,844**
14-3	Route 10 NB South of Route 6	2,755	84	12	1	**12**	**2,795**
TOTAL		133,137	4,946	3,209	140	**3,263**	**137,743**
		96.7%	3.6%	2.3%	0.1%	**2.4%**	**100.0%**

Table 3-9. Peak Hour Weekend Traffic

ID	LOCATION	Cars	Single Unit Trucks	Tractor Trailers			TOTAL Traffic
				Single Trailer	Tandem Trailer	Subtotal	
1	I-95 NB/SB North of Mechanic Street	4,689	67	73	6	**74**	**4,802**
2	I-95 NB/SB North of Nooseneck Hill Road	4,788	71	69	16	**74**	**4,876**
3	I-95 NB/SB North of Centerville Road	11,918	140	90	9	**92**	**12,059**
3-a	I-95 NB/SB On/Off Ramps to/from Centerville Road	976	22	4	-	**4**	**994**
4	I-95 NB/SB North of Oxford Street	12,416	167	93	3	**94**	**12,606**
5	I-95 NB/SB South of Smith Street	14,565	174	89	3	**90**	**14,742**
6	I-95 NB/SB North of East Street	6,143	68	53	2	**53**	**6,208**
6-a	I-95 NB/SB On/Off Ramp to/from East Street	375	8	3	6	**7**	**383**
7	I-295 NB/SB North of Plainfield Pike	4,518	62	28	4	**32**	**4,584**
7-a	I-295 NB On Ramp from Route 14	540	29	9	1	**9**	**573**
7-b	I-295 NB Off Ramp to Route 14	367	36	5	2	**5**	**388**
8	I-295 NB/SB South of Greenville Avenue	5,008	70	30	3	**31**	**5,094**
8-1	I-295 NB South of Route 6A	1,748	27	12	3	**14**	**1,767**
8-1a	I-295 NB Service Rd South of Rte 6A On Ramp	363	7	2	1	**2**	**366**
8-2	I-295 SB North of Route 6A	1,813	26	16	4	**16**	**1,846**
8-2a	I-295 SB/Service Road North of Route 6A Off Ramp	636	10	4	-	**4**	**649**
8-3	I-295 SB South of Route 6	2,790	51	17	2	**19**	**2,842**
8-a	Route 6 NB Off Ramp to I-295 NB	914	14	5	1	**5**	**924**
9	I-295 NB/SB South of Leigh Road	4,365	40	25	6	**27**	**4,419**
10-1	I-195 WB East of Taunton Ave Ramps	4,472	71	33	2	**34**	**4,534**
10-2	I-195 EB West of Gano Street	5,431	80	37	-	**37**	**5,505**
10-a	Taunton Ave WB On Ramp to I-195 WB	1,189	51	13	1	**13**	**1,246**
11	Rte 146 NB/SB North of Rte 116 SB On Ramp	3,409	40	24	3	**24**	**3,453**
11-a	Rte 146 SB On Ramp from Rte 116	92	7	2	-	**2**	**97**
12	Route NB/SB 146 at Route 104 Crossing	2,941	38	29	3	**30**	**2,998**
13	Route WB/EB 6 at Woonasquatucket River Crossing	3,300	64	20	1	**20**	**3,362**
14-1	Route 10 SB North of Route 6	3,495	51	8	1	**8**	**3,553**
14-2	Route 6 EB West of Route 10	2,626	50	11	1	**11**	**2,658**
14-3	Route 10 NB South of Route 6	2,101	29	4	1	**4**	**2,119**
TOTAL		107,980	1,562	800	78	**826**	**109,641**
		98.5%	1.4%	0.7%	0.1%	**0.8%**	**100.0%**

Table 3-10. Peak Hour Average Day Traffic

ID	LOCATION	Cars	Single Unit Trucks	Tractor Trailers			TOTAL Traffic
				Single Trailer	Tandem Trailer	Subtotal	
1	I-95 NB/SB North of Mechanic Street	3,823	115	180	10	**188**	**4,055**
2	I-95 NB/SB North of Nooseneck Hill Road	3,856	110	190	13	**201**	**4,083**
3	I-95 NB/SB North of Centerville Road	12,750	384	276	10	**279**	**13,188**
3-a	I-95 NB/SB On/Off Ramps to/from Centerville Road	1,274	40	6	0	**6**	**1,305**
4	I-95 NB/SB North of Oxford Street	12,889	426	279	5	**280**	**13,189**
5	I-95 NB/SB South of Smith Street	14,566	446	237	3	**239**	**14,877**
6	I-95 NB/SB North of East Street	6,007	149	146	2	**147**	**6,114**
6-a	I-95 NB/SB On/Off Ramp to/from East Street	504	17	5	2	**7**	**523**
7	I-295 NB/SB North of Plainfield Pike	5,868	212	113	5	**116**	**6,013**
7-a	I-295 NB On Ramp from Route 14	781	60	23	1	**24**	**856**
7-b	I-295 NB Off Ramp to Route 14	421	57	9	2	**10**	**487**
8	I-295 NB/SB South of Greenville Avenue	7,470	211	133	11	**137**	**7,655**
8-1	I-295 NB South of Route 6A	2,438	69	49	4	**51**	**2,517**
8-1a	I-295 NB Service Rd South of Rte 6A On Ramp	478	14	6	0	**6**	**494**
8-2	I-295 SB North of Route 6A	2,431	83	56	6	**58**	**2,507**
8-2a	I-295 SB/Service Road North of Route 6A Off Ramp	1,240	34	10	0	**10**	**1,268**
8-3	I-295 SB South of Route 6	3,457	152	82	5	**82**	**3,591**
8-a	Route 6 NB Off Ramp to I-295 NB	1,358	31	16	1	**16**	**1,382**
9	I-295 NB/SB South of Leigh Road	5,544	144	123	7	**125**	**5,684**
10-1	I-195 WB East of Taunton Ave Ramps	4,391	147	99	3	**99**	**4,583**
10-2	I-195 EB West of Gano Street	6,860	200	99	2	**100**	**7,017**
10-a	Taunton Ave WB On Ramp to I-195 WB	1,520	97	24	3	**27**	**1,624**
11	Rte 146 NB/SB North of Rte 116 SB On Ramp	4,207	106	72	3	**72**	**4,292**
11-a	Rte 146 SB On Ramp from Rte 116	247	13	1	-	**1**	**253**
12	Route NB/SB 146 at Route 104 Crossing	3,161	109	135	7	**135**	**3,265**
13	Route WB/EB 6 at Woonasquatucket River Crossing	4,340	174	45	1	**45**	**4,438**
14-1	Route 10 SB North of Route 6	5,036	129	37	1	**37**	**5,127**
14-2	Route 6 EB West of Route 10	2,942	120	32	0	**32**	**3,080**
14-3	Route 10 NB South of Route 6	2,546	66	9	1	**9**	**2,582**
TOTAL		122,404	3,914	2,492	109	**2,539**	**126,050**
		97.1%	3.1%	2.0%	0.1%	**2.0%**	**100.0%**

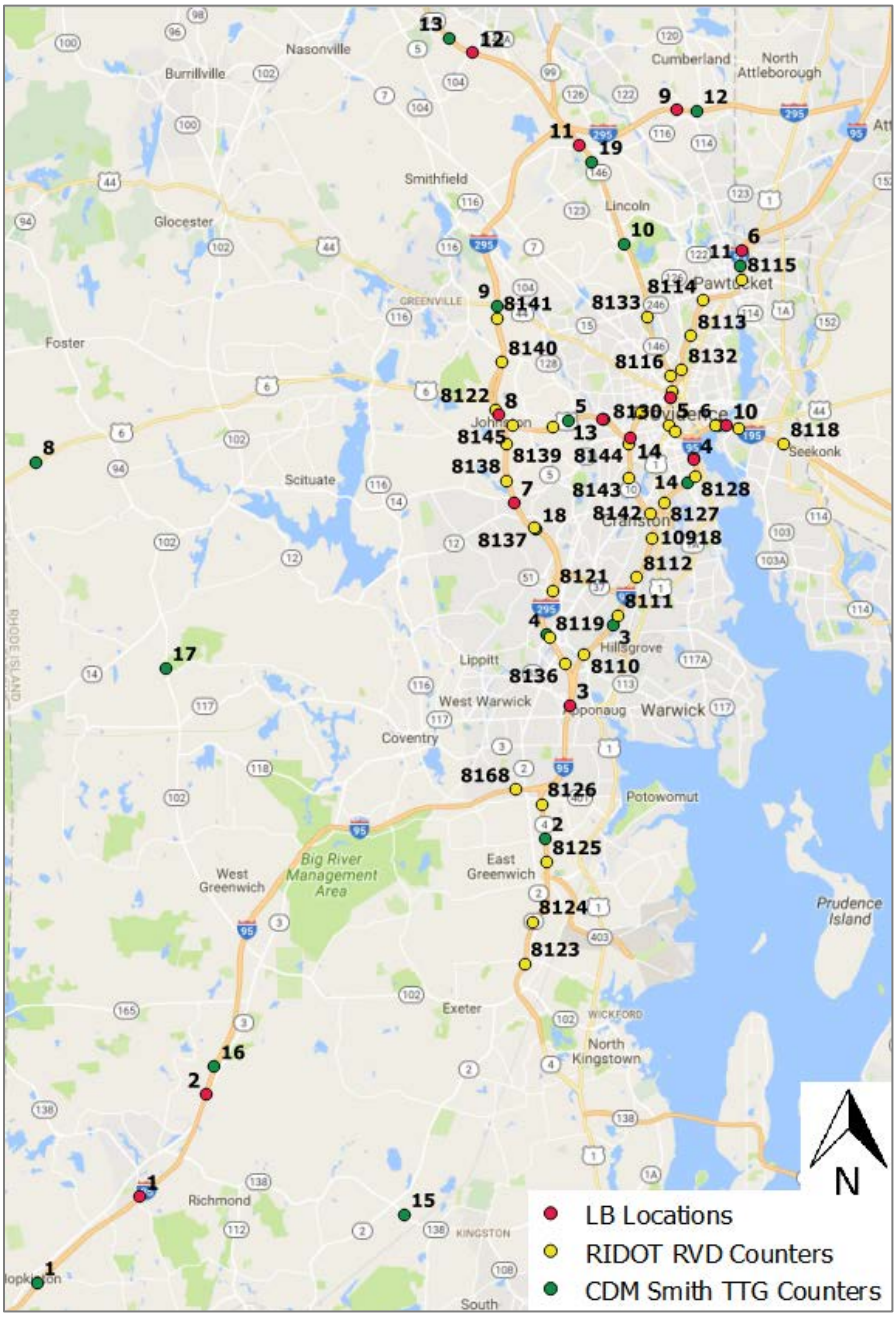
3.4 Level 2 Study Comparison and Benchmarking

The traffic counts from this investment-grade study were compared to those collected from the previous estimates that supported the Level 2 study.

3.4.1 RIDOT Traffic Counts

As indicated previously, RIDOT maintains 40 radar vehicle detector (RVD) counters along major routes across the State of Rhode Island as shown by the map in Figure 3-5. The Level 2 Study documents indicate that these RVD locations are primarily intended to collect vehicle speed information, but as a by-product they also provide vehicle classifications that approximate FHWA vehicle categories based on vehicle length. The Louis Berger Team received adjusted RIDOT RVD vehicle counts and classifications from 2014 that were used to support the Level 2 Study.

FIGURE 3-5. LEVEL 2 STUDY TRAFFIC COUNT LOCATIONS



3.4.2 CDM Smith Level 2 Study Traffic Counts

Figure 3-5 also shows the 19 potential tolling locations along major corridors that CDM Smith – through its subconsultant The Traffic Group (TTG) – collected traffic data using advanced radar detection units and traditional automated traffic recorders (ATRs). As indicated in the Level 2 Study Report, this data was collected over a 48-hour period between the evening of August 17, 2015 and August 19, 2015. Table 3-11 provides the resulting estimate of traffic volumes and corresponding vehicle classifications at each of the 19 locations.

TABLE 3-11. CDM SMITH/TTG AVERAGE DAY TRAFFIC (AUGUST 2015)

ID	LOCATION	Cars	Single Unit Trucks	Tractor Trailers			TOTAL Traffic
				Single Trailer	Tandem Trailer	Subtotal	
1	I-95 Between Exit 1 and Exit 2	37,100	2,718	3,266	1,594	**4,860**	**44,678**
2	SR 4 Between Exit 7A and Exit 8A	96,785	3,436	1,456	487	**1,943**	**102,163**
3	I-95 Between Exit 13 and Exit 15	155,494	6,104	3,526	1,522	**5,047**	**166,645**
4	I-295 Between Exit 2 and Exit 3	52,492	2,859	1,680	531	**2,210**	**57,560**
5	US 6 Between US 6A and SR 128	50,896	2,404	837	58	**895**	**54,194**
6	I-195 Between Exit 2 and Gano Street	156,274	9,349	3,928	672	**4,599**	**170,221**
7	I-95 between Exit 22A and Exit 23	213,098	12,445	6,517	3,711	**10,228**	**235,771**
8	US 6 East of Connecticut State Line	8,594	359	731	11	**741**	**9,694**
9	I-295 at I-44 Interchange	72,628	3,545	2,487	599	**3,086**	**79,258**
10	SR 146 at Twin River Road Interchange	65,595	2,087	1,134	281	**1,414**	**69,096**
11	I-95 Between Exit 29 and Exit 30	95,630	3,753	2,392	923	**3,315**	**102,698**
12	I-295 at SR 114 Interchange	42,347	2,180	2,046	420	**2,466**	**46,993**
13	SR 146 Between SR 104 and Pound Hill Road	39,108	1,885	2,058	507	**2,565**	**43,558**
14	I-95 Between Exit 17 and Exit 18	163,766	8,370	4,976	2,292	**7,268**	**179,403**
15	SR 138 East of Route 2	12,920	341	158	-	**158**	**13,418**
16	I-95 Between Exit 4 and Exit 5	37,845	2,792	3,066	2,279	**5,345**	**45,981**
17	SR 102 South of Route 14	1,564	80	31	-	**31**	**1,675**
18	I-295 Between Exit 3 and Exit 14	72,050	5,111	2,106	583	**2,689**	**79,849**
19	SR 146 Between SR 116 and SR 123	65,102	2,596	1,523	275	**1,797**	**69,495**
TOTAL		1,439,289	72,410	43,913	16,739	**60,652**	**1,572,350**
		91.5%	4.6%	2.8%	1.1%	**3.9%**	**100.0%**

It should be noted that these 19 locations were selected as potential tolling sites prior to the final decision being made on the 14 tolling locations that the Louis Berger Team also evaluated (as also shown in Figure 3-5). Due to slight difference in actual traffic count location, it is difficult to make a direct comparison between the CDM Smith/TTG traffic counts, and the current investment-grade study efforts performed by the Louis Berger Team. Nonetheless, the total average weekday traffic estimate in Table 3-11 is similar in overall magnitude to the corresponding average weekday traffic estimate in Table 3-4.

There are however, notable differences in the estimated proportion of vehicle classifications across both studies. Whereas the Louis Berger Team's traffic counts in Table 3-4 suggests that approximately three percent of traffic is comprised of tractor trailers, the TTG counts in Table 3-11 imply a higher tractor trailer percentage of approximately four percent. The primary difference in these relative proportions accrues

to the respective estimates of tandem trailer volumes. Whereas both studies show a similar volume of single tractor trailers – approximately 43,000 – the Level 2 Study estimated almost ten times the volume of tandem tractor trailers.

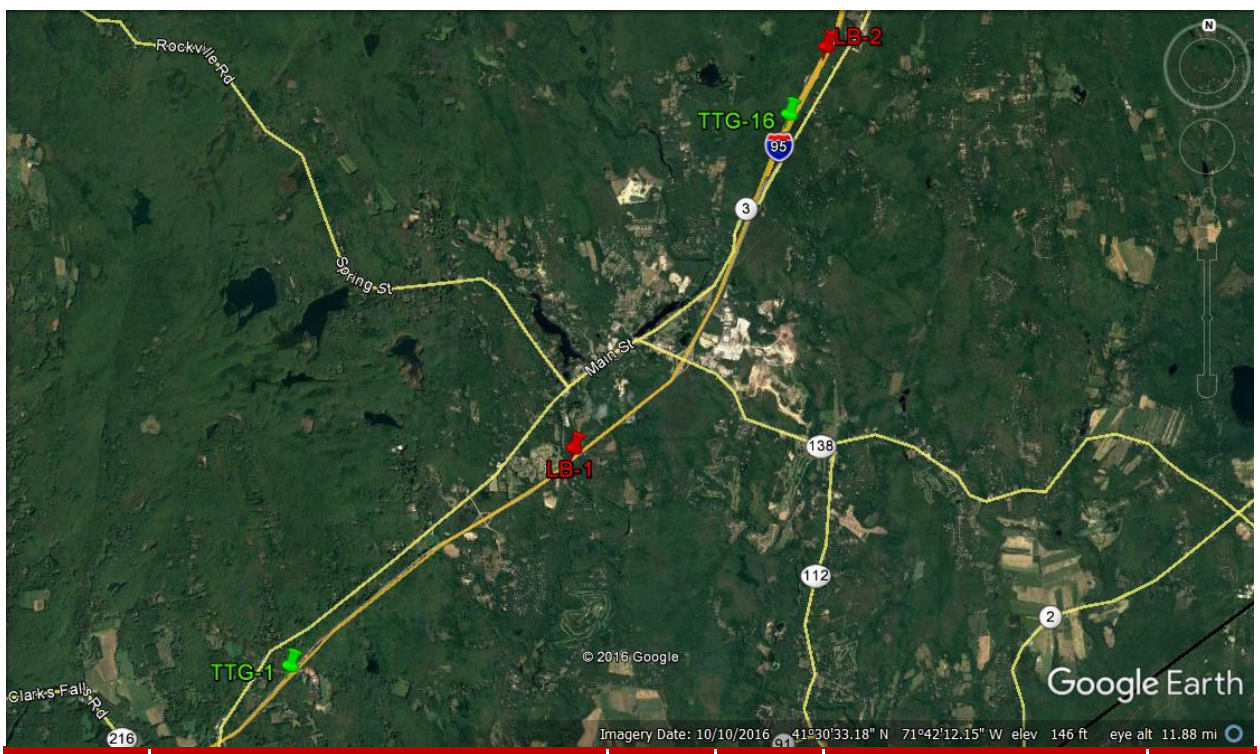
3.4.3 Traffic Count Comparison to Previous Study

The Louis Berger Team conducted a comparison of the current investment-grade study traffic counts in Table 3-4, against estimates obtained from the previous Level 2 study. Due to the revised position of the 14 final locations, there were only a handful of locations where a direct comparison to the CDM Smith/TTG counts could be performed. Therefore, where possible and/or applicable, the Louis Berger Team also compared the current traffic counts against the data RIDOT RVD locations.

3.4.3.1 Location 2 (I-95 NB/SB North of Nooseneck Hill Road – Rte 3)

Figure 3-6 shows the current traffic count locations 1 and 2. A direct comparison between LB-1 and TTG-1 in Figure 3-6 ignores the differences in traffic volumes arising from the interchange that lies between the two locations. However, a direct comparison of LB-2 and TTG-16 was conducted due to the fact that traffic within the intervening stretch of I-95 between those two locations was unaltered by factors other than the two time periods over which the respective data was collected (August 2015 v. August 2016).

FIGURE 3-6. LOCATION 2 COMPARISON



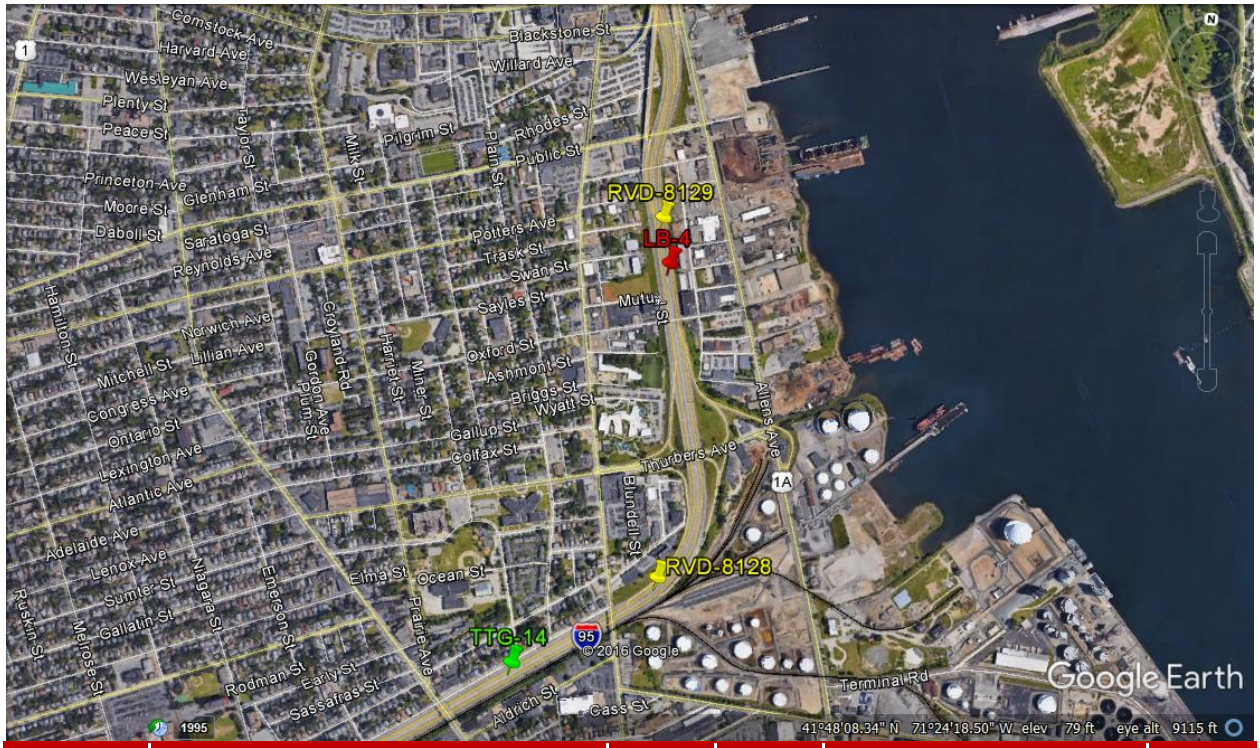
ID	LOCATION	Cars	Single Unit Trucks	Tractor Trailers			TOTAL Traffic
				Single Trailer	Tandem Trailer	Subtotal	
LB - 2	I-95 NB/SB North of Nooseneck Hill Road	47,301	1,684	3,785	77	**3,861**	**52,847**
TTG - 16	I-95 Between Exit 4 and Exit 5	37,845	2,792	3,066	2,279	**5,345**	**45,981**
	Difference	9,457	(1,108)	719	(2,202)	**(1,483)**	**6,865**
	Difference in %	25.0%	-39.7%	23.4%	-96.6%	**-27.8%**	**14.9%**

The accompanying table in Figure 3-6 shows that while overall traffic is generally similar in magnitude, tractor trailer volumes are notably higher in the TTG data, driven largely by differences in the estimates of Tandem Trailer volumes.

3.4.3.2 Location 4 (I-95 NB/SB North of Oxford Street)

Figure 3-7 shows traffic count location 4 (LB-4) and the closest TTG and RVD counters. The most apt comparison in this case is between LB-4 and RVD-8129. Both TTG-14 and RVD-8128 are located on the other side of an interchange that would disrupt a more direct comparison of traffic volumes.

FIGURE 3-7. LOCATION 4 COMPARISON



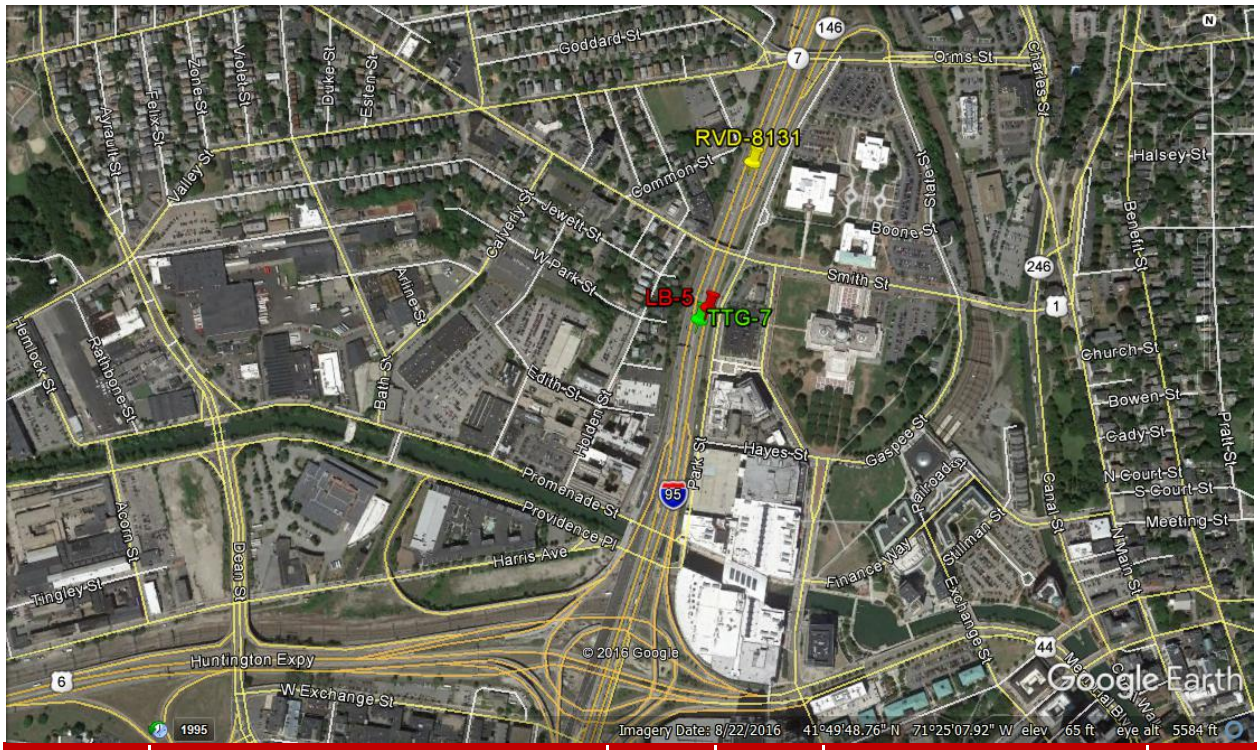
ID	LOCATION	Cars	Single Unit Trucks	Tractor Trailers			TOTAL Traffic
				Single Trailer	Tandem Trailer	Subtotal	
LB - 4	I-95 NB/SB North of Oxford Street	190,479	5,720	4,949	60	**5,009**	**201,208**
RVD - 8129	I-95, Just South of the I-195 Interchange	156,785	13,538	5,126	2,637	**7,763**	**178,087**
	Difference	33,693	(7,818)	(177)	(2,577)	**(2,754)**	**23,121**
	Difference in %	21.5%	-57.7%	-3.5%	-97.7%	**-35.5%**	**13.0%**

Similar to the situation observed at Toll Location 2, the overall traffic volume is relatively close in general magnitude, but there is a larger relative difference in the estimate of tractor trailer volumes. Once again, the difference in tractor trailer volumes is more noticeable in the tandem trailer category.

3.4.3.3 Location 5 (I-95 NB/SB South of Smith Street)

Even though toll location 5 has since been excluded from consideration as a potential tolling location, the traffic data collected at this site is still useful from a benchmarking and comparison perspective. Figure 3-8 shows traffic count location 5 (LB-5) and the closest TTG and RVD counters. TTG-7 presents the most applicable comparison to location 5. However, even though there is an off ramp in the northbound direction that affects a direct comparison of LB-5 against RVD-8131, RVD-8131 was still included in this spot analysis of traffic volumes for reference purposes.

FIGURE 3-8. LOCATION 5 COMPARISON



ID	LOCATION	Cars	Single Unit Trucks	Tractor Trailers			TOTAL Traffic
				Single Trailer	Tandem Trailer	Subtotal	
LB - 5	I-95 NB/SB South of Smith Street	235,968	6,473	4,165	42	**4,206**	**246,648**
TTG - 7	I-95 between Exit 22A and Exit 23	213,098	12,445	6,517	3,711	**10,228**	**235,771**
	Difference	22,870	(5,972)	(2,352)	(3,669)	**(6,021)**	**10,877**
	Difference in %	10.7%	-48.0%	-36.1%	-98.9%	**-58.9%**	**4.6%**
LB - 5	I-95 NB/SB South of Smith Street	235,968	6,473	4,165	42	**4,206**	**246,648**
RVD - 8131	I-95, 0.3 Mile South of Route 146	184,236	17,481	5,994	1,435	**7,429**	**209,145**
	Difference	51,732	(11,008)	(1,829)	(1,393)	**(3,222)**	**37,502**
	Difference in %	28.1%	-63.0%	-30.5%	-97.1%	**-43.4%**	**17.9%**

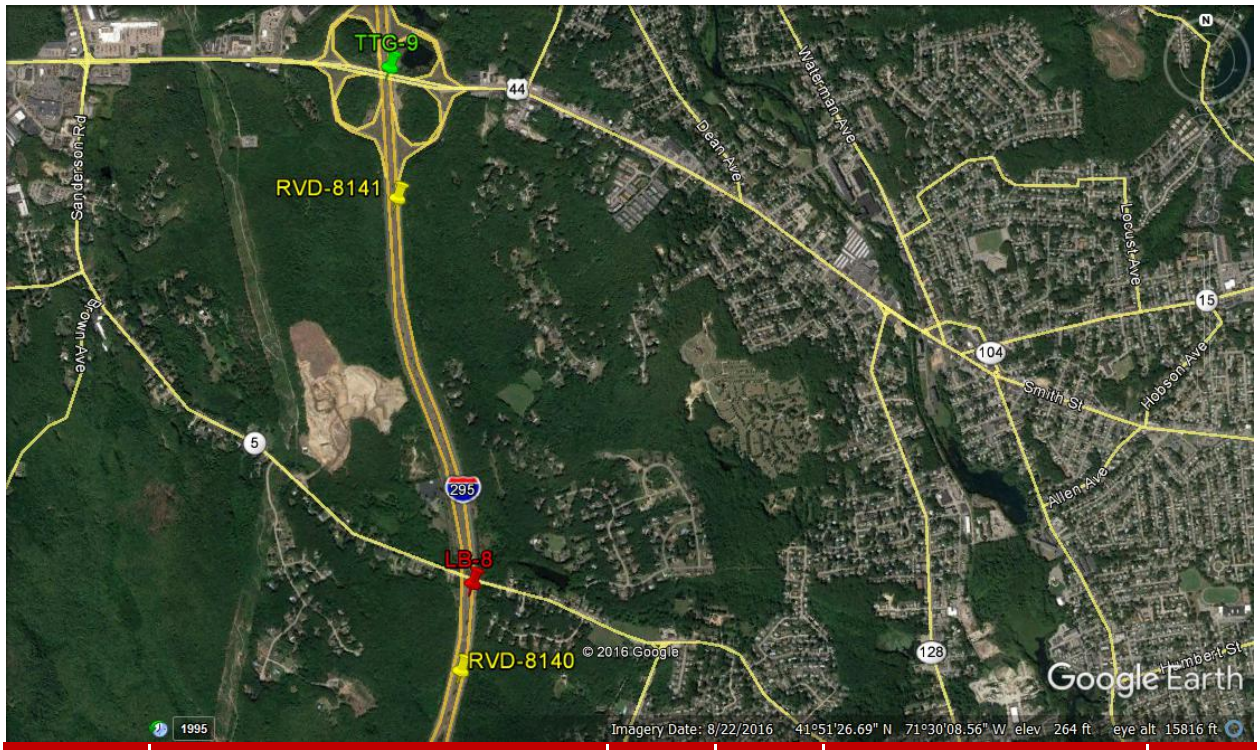
While the comparison against TTG-7 once again shows close similarities in the overall volume of traffic, the difference in tractor trailer volume estimates once again is largely driven by the TTG estimate of tandem tractor trailers. In this instance however, there is also a more notable variance in the volume of

singtractor trailers. Both the TTG-7 and RVD-8131 traffic volumes appear to reflect a similar volume of single tractor trailers but a somewhat notable difference in tandem trailer vehicle estimates – some of the differences between these two counts may be due to the effects of the northbound off-ramp.

3.4.3.4 Location 8 (I-295 NB/SB South of Greenville Avenue – Rte 5)

Figure 3-9 shows traffic location 8 (LB-8) and the closest TTG and RVD counters. Both RVD-8141 and 8140 are directly comparable since there are no traffic movements in between those locations – the closest TTG location (TTG-9) however, is located right in the center of the I-295 interchange with Route 128.

FIGURE 3-9. LOCATION 8 COMPARISON



ID	LOCATION	Cars	Single Unit Trucks	Tractor Trailers			TOTAL Traffic
				Single Trailer	Tandem Trailer	Subtotal	
LB - 8	I-295 NB/SB South of Greenville Avenue	84,943	3,079	2,279	78	**2,357**	**90,379**
RVD - 8140	I-295, 0.28 Mile South of Greenville Ave (Rte 5)	78,921	5,936	2,636	46	**2,682**	**87,539**
	Difference	6,022	(2,857)	(356)	31	**(325)**	**2,840**
	Difference in %	7.6%	-48.1%	-13.5%	68.0%	**-12.1%**	**3.2%**
LB - 8	I-295 NB/SB South of Greenville Avenue	84,943	3,079	2,279	78	**2,357**	**90,379**
RVD - 8141	I-295, 0.4 Mile South of Putnam Pike (Rte 44)	75,355	2,894	1,552	405	**1,957**	**80,206**
	Difference	9,588	185	727	(327)	**400**	**10,173**
	Difference in %	12.7%	6.4%	46.9%	-80.8%	**20.5%**	**12.7%**

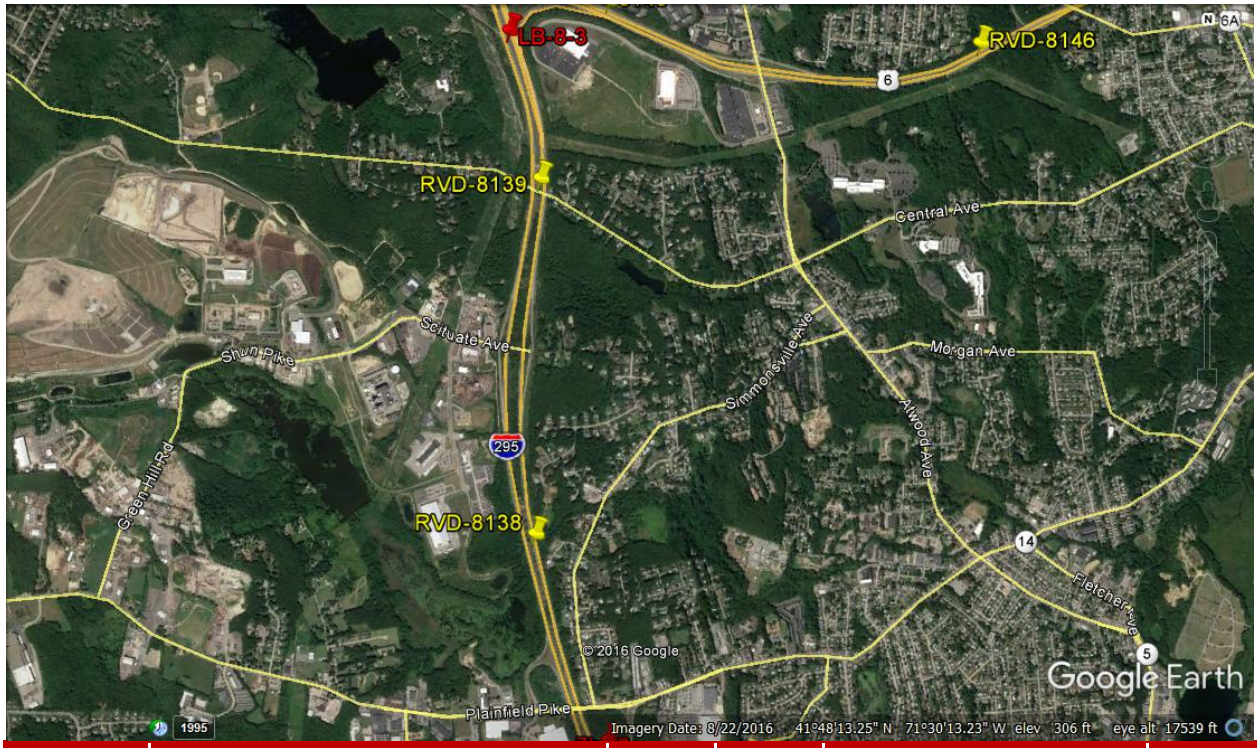
The comparison of location 8 traffic to the corresponding RVD-8140 station yields very close similarities both in the estimate of overall traffic volumes and even in the estimate of tractor trailer volumes. The comparison to RVD-8141 however, yields greater variance in both those metrics, with the previously observed pattern of a significantly higher proportion of tandem tractor trailers.

The comparison of traffic volumes at RVD-8140 and RVD-8141 reveals notable differences in overall volumes, but more interestingly, differences in vehicle class distributions as well. These variances are particularly noteworthy given the lack of intervening movements between RVD-8140 and RVD-8141, and may highlight some of the issues associated with using radar detection devices for both traffic counts and vehicle classifications.

3.4.3.5 Location 8-3 (I-295 SB South of Route 6)

Figure 3-10 shows traffic location 8-3 (LB-8-3) and the closest RVD counter (RVD-8139). As with the comparisons at other locations, the volume of both traffic and single tractor trailers at location 8-3 is in line with comparable RVD station; however the volume of tandem trailer vehicles is much higher in the RVD estimates.

FIGURE 3-10. LOCATION 8-3 COMPARISON



ID	LOCATION	Cars	Single Unit Trucks	Tractor Trailers			TOTAL Traffic
				Single Trailer	Tandem Trailer	Subtotal	
LB - 8-3	I-295 SB South of Route 6	42,724	2,031	1,331	31	**1,362**	**46,117**
RVD - 8139	I-295, 1.5 Mile North of Plainfield Pike (SB)	38,973	3,033	1,528	304	**1,832**	**43,838**
	Difference	3,751	(1,002)	(197)	(273)	**(470)**	**2,279**
	Difference in %	9.6%	-33.1%	-12.9%	-89.7%	**-25.7%**	**5.2%**

3.4.3.6 Location 10 (I-195 Between Gano St & Taunton Ave)

Figure 3-11 shows traffic location 10 that separates location 10-1 (I-195 in the westbound direction) from location 10-2 (I-195 in the eastbound direction). The corresponding table of traffic comparisons in this area therefore also separates eastbound and westbound traffic movements with the RVD-8117 counter providing traffic volumes in the westbound direction, while both TTG-6 and RVD-8135 provide applicable traffic volumes in the eastbound direction.

FIGURE 3-11. LOCATION 10 COMPARISON

ID	LOCATION	Cars	Single Unit Trucks	Tractor Trailers			TOTAL Traffic
				Single Trailer	Tandem Trailer	Subtotal	
LB - 10-1	I-195 WB East of Taunton Ave Ramps	67,154	2,267	1,568	21	**1,589**	**71,009**
RVD - 8117	I-195, 0.5 Mile West of Broadway (WB)	61,835	3,979	1,849	316	**2,165**	**67,978**
	Difference	5,319	(1,712)	(281)	(295)	**(576)**	**3,031**
	Difference in %	8.6%	-43.0%	-15.2%	-93.4%	**-26.6%**	**4.5%**
LB - 10-2	I-195 EB West of Gano Street	88,147	2,769	1,682	15	**1,697**	**92,613**
TTG - 6	I-195 Between Exit 2 and Gano Street (EB)	71,154	3,827	1,750	359	**2,108**	**77,089**
	Difference	16,993	(1,058)	(67)	(344)	**(411)**	**15,524**
	Difference in %	23.9%	-27.6%	-3.8%	-95.9%	**-19.5%**	**20.1%**
LB - 10-2	I-195 EB West of Gano Street	88,147	2,769	1,682	15	**1,697**	**92,613**
RVD - 8135	I-195, 0.25 Mile West of Exit 3 (EB)	69,711	4,949	1,718	267	**1,984**	**76,645**
	Difference	18,435	(2,179)	(35)	(252)	**(288)**	**15,968**
	Difference in %	26.4%	-44.0%	-2.1%	-94.6%	**-14.5%**	**20.8%**

As with the majority of the results observed at the other comparison locations, there is a general similarity in both the total traffic and single tractor trailer volumes, but more notable disparities in the estimates of tandem tractor trailer volumes. The total traffic volume at location 10-1 is much closer to the RVD-8117 volume, while a 20 percent difference in overall volumes is observed in the comparison against both TTG-6 and RVD-8135 at location 10-2 – both TTG-6 and RVD-8135 display similar total volume and vehicle classification estimates. Because the estimated number of tandem trailers at this location is relatively small (less than 500), and single trailers form the bulk of the tractor trailer totals, the difference in the total volume of tractor trailers at both 10-1 and 10-2 is also relatively small.

3.4.3.7 Location 13 (Route WB/EB 6 at Woonasquatucket River Crossing)

Figure 3-12 shows traffic location 13 (LB-13) and the closest RVD counter (RVD-8147). The difference in overall traffic volumes is relatively higher than some of the other site comparisons (likely due to general changes in traffic volumes over time), but there is a close correspondence in the volume of single tractor trailers. As with the comparison at other locations, there is an order of magnitude difference in the volume of tandem tractor trailer estimates but because this volume is also relatively low, the comparison of total tractor trailer volumes at this location is very close.

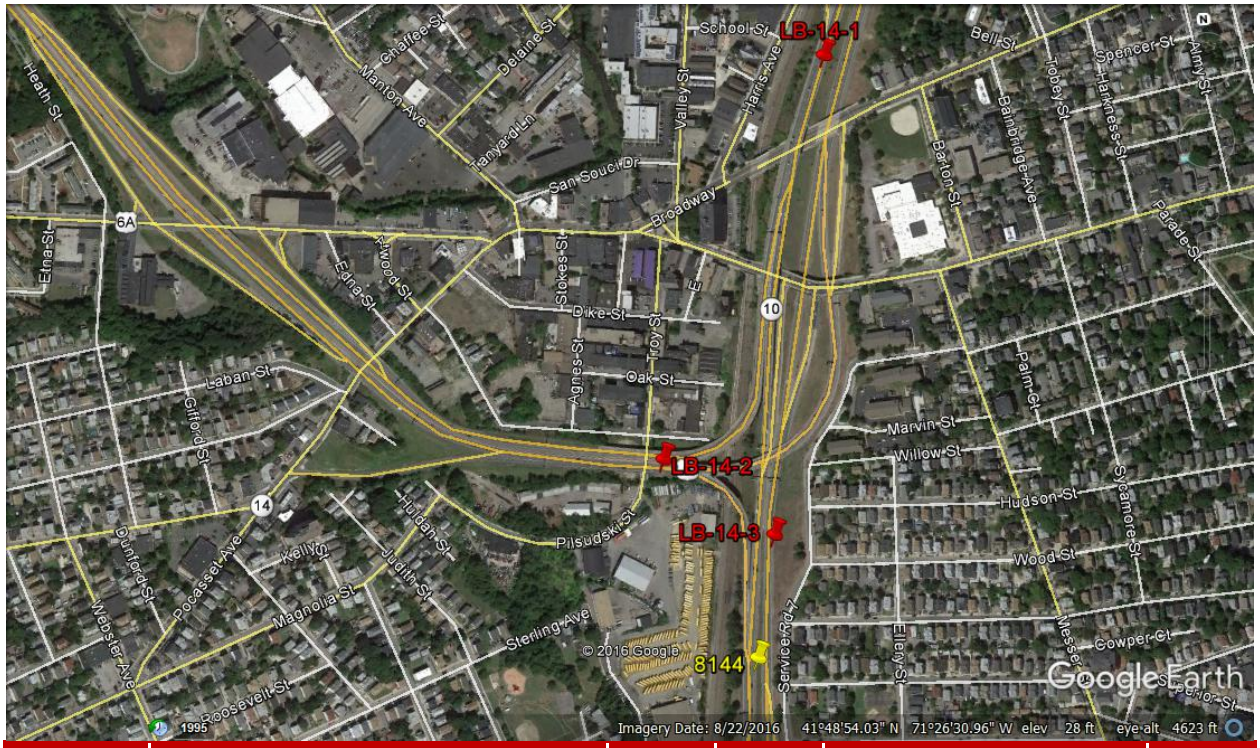
FIGURE 3-12. LOCATION 13 COMPARISON

ID	LOCATION	Cars	Single Unit Trucks	Tractor Trailers			TOTAL Traffic
				Single Trailer	Tandem Trailer	Subtotal	
LB - 13	Route WB/EB 6 at Woonasquatucket River	60,414	2,326	731	5	**736**	**63,476**
RVD - 8147	US-6, 0.25 Mile East of Glenbridge Ave	51,017	1,902	701	127	**828**	**53,747**
	Diifference	9,397	424	30	(123)	**(92)**	**9,729**
	Difference in %	18.4%	22.3%	4.3%	-96.2%	**-11.2%**	**18.1%**

3.4.3.8 Location 14-3 (Route 10 NB South of Route 6)

Similar to location 5, location 14-3 has also been excluded from consideration as a potential tolling location. Nonetheless, traffic counts collected from this location still provide a useful benchmarking data point. Figure 3-13 shows traffic location 14-3 (LB-14-3) and the closest RVD counter (RVD-8144). Because location 14-3 only counts movements in the northbound direction on Route 10, the comparison to RVD-8144 is limited to traffic in the northbound directions only.

FIGURE 3-13. LOCATION 14-3 COMPARISON



ID	LOCATION	Cars	Single Unit Trucks	Tractor Trailers			TOTAL Traffic
				Single Trailer	Tandem Trailer	Subtotal	
LB - 14-3	Route 10 NB South of Route 6	39,960	924	130	3	**133**	**41,016**
RVD - 8144	RI-10, 0.4 Mile South of Broadway (NB)	38,484	881	226	31	**257**	**39,622**
	Diifference	1,476	42	(96)	(28)	**(124)**	**1,394**
	Difference in %	3.8%	4.8%	-42.6%	-90.7%	**-48.4%**	**3.5%**

Once again, the volume of total vehicles between the two studies is very close and even though the volume of tractor trailers counted as part of this investment-grade study is roughly half the number recorded from RVD location, the volume of tractor trailer trips is relatively small and a large part of this difference may be due to temporal variation. As observed at the other locations, there is an order of magnitude difference between the current and previous counts of tandem tractor trailers at this location.

3.4.3.9 Previous Study Comparison Summary

The general pattern described in the traffic count and classification comparisons at individual locations is that there is generally a close similarity between the total traffic volumes of the current and previous study. Differences in total volumes are likely subject to temporal effects and year-over-year changes in

traffic volumes. The comparison between the two study efforts also revealed typically close estimates of single tractor trailers but notable divergence in the volume and relative proportion of tandem tractor trailers. Whereas the current investment-grade effort generally produced an estimate of tandem trailers that represented approximately 5 percent of the total tractor trailer estimate, tandem trailers comprised almost 30 percent of total tractor trailers in the previous study.

This particular difference in vehicle classification may be due in large part to the type of equipment used to collect and classify the traffic data – radar detection used in the previous studies, while primary reliance on video monitors for the current investment-grade effort.

3.4.4 Traffic Count Comparison to TLAP Data

As a final check on the traffic volumes, the Louis Berger Team conducted a comparison of tractor trailer counts obtained from Connecticut Counts to tractor trailer estimates developed by Skycomp Inc – another member of the Louis Berger Team that conducted Time Laps Aerial Photography (TLAP) surveillance over three tolling locations – 5, 10, and 14 (Section 5.2).

The TLAP volumes were conducted on August 17 at three separate time during the day:

- Morning Peak: 7:00am to 8:30am
- Midday: 11:20am to 12:45pm
- Evening Peak: 4:00pm to 5:30pm

A comparison of tractor trailer traffic volumes collected during these three combined periods to the corresponding video data is presented in Table 3-12. The resulting estimates of tractor trailer traffic are very close between the two data sources (with GEH statistics all below the traditional threshold of 5.0) and thereby provide greater confidence in the accuracy of the video count data collected

TABLE 3-12. COMPARISON OF TLAP & VIDEO TRACTOR TRAILER COUNTS

Location			Tractor Trailer Count		GEH Stat
Toll Area	ID	Description	TLAP	Video	
5	5	I-95 NB/SB South of Smith Street	873	977	3.4
10	10-1	I-195 WB East of Taunton Ave Ramps	323	418	4.9
	10-2	I-195 EB West of Gano Street	417	409	0.4
14	14-1	Route 10 SB North of Route 6	77	72	0.6
	14-3	Route 10 NB South of Route 6	47	37	1.5

3.5 Conclusions

The traffic count estimates obtained from current investment-grade study effort compare well in overall magnitude to the previous studies. The corresponding estimates of tractor trailer volumes are notably lower than the previous study estimates but this difference is primarily due to differences in the estimate of tandem tractor trailers.

The validation of the traffic counts against independently obtained TLAP data provides the Louis Berger Team with the additional confidence that the average weekday traffic estimates presented in this technical memorandum provide a solid basis for other downstream tasks.

4.0 STATED PREFERENCE SURVEY

As part of the Level 3 investment-grade study, the Louis Berger Team conducted a stated preference (SP) survey to support the traffic and revenue forecast. The SP survey included hypothetical choice experiments that require respondents to choose between route options with different toll and travel time characteristics. Using discrete choice modeling techniques, the resulting data was then used to understand the propensity to use a tolled road, and tractor trailer drivers' willingness-to-pay (WTP) for any potential travel time savings and other benefits of not diverting to a non-tolled roadway. The WTP for travel time savings is also referred to as the value of time (VOT) and is a key input the traffic assignment step of the travel demand model that was ultimately used to generate the traffic and revenue forecasts.

It should be noted that the drivers' VOT is only one aspect of the time-related cost of freight transportation. Other freight transportation cost are related to the duration of the trip including the cost to operate the vehicle as well the cost of the goods not being used productively while in transit. The latter is dependent on the value of the freight, how quickly products become obsolete, whether they spoil over time and the consequence of untimely delivery, which could range from late delivery charges to delay of a production process to which the load is an input. The SP survey conducted for this study focuses on the VOT of the driver and only drivers with discretion over route choice decisions were qualified to participate.

The route choice decision for tractor trailers and commercial vehicles is more complex than that of autos. For autos, it is typically assumed that drivers choose the route based on time and cost, and to a lesser extent, travel time reliability. For commercial vehicles, pre-trip route planning and en-route adjustments are not always assigned to the driver and the decision maker may be a dispatcher or other participant in the supply chain. While this survey focuses on capturing the driver's VOT, company policies and shipper agreements may cause this VOT to be intertwined with the other factors. For instance, a driver may also be responsible for the late fee charged by the shipper for late delivery.

This technical memorandum outlines the various steps and considerations required to meet the objectives of the stated preference survey. It includes discussions of market area, survey planning and administration, and survey instrument design. Appendix B provides an example of the draft survey instrument used to support this study.

4.1 Target Market

4.1.1 Geographic Coverage and Considerations

The Level 2 T&R Study showed that 26 percent of tractor trailer trips are entirely within Rhode Island, 55 percent have only one trip end in Rhode Island; and 19 percent are through trips, which have neither trip end in Rhode Island. The Louis Berger Team used this initial assessment of trip origin and destination in survey planning to ensure reasonable coverage of each trip type.

4.1.2 Travel Market Segmentation

The overall market was broken down into different segments based on each segment's unique characteristics.

- **Distance -** Longer trips may have more opportunities and potential for diversion, but on the other hand drivers of longer trips may also exhibit a higher willingness to pay for travel time savings. Many of the longer trips also traverse through states where highway tolling already occurs – e.g. New York, New Jersey and Massachusetts.

Other segmentations that were explored but not included in the final model specification.

- **Company Location** – Rhode Island trucking companies may have a different attitude towards the tolling program then out-of-state companies.
- **Trip Origin and Destination –** Trips may be disaggregated into through trips, trips with both ends within the state and trips with one end in state.
- **Time of Day** – Trips may disaggregated between peak and off-peak travel time
- **Decision maker –** Decision makers include drivers as well as other officers that are responsible for pre-departure route planning such as fleet managers and dispatchers. The survey was administered to drivers only, and only drivers who are responsible for departure route planning and/or en-route changes were eligible to participate. The survey thus did not provide any information on the VOT of tractor trailers for which persons other than the driver are responsible for the route choice.

4.2 Survey Administration

The survey was administered as an intercept survey. Drivers of tractor trailers were interviewed from October 3 to 7, 2016 and from October to 14, 2016 at the two following locations:

- Travel Centers of America #253, I-95, West Greenwich, RI
- Port of Providence (ProvPort)

Surveys collected by the ETC Institute using electronic tablets to access the online survey instrument created by Louis Berger. To qualify for the full survey, the driver needed to have discretion over the route planning decision or be authorized to make en-route changes, either independently or with approval of the fleet manager/ dispatcher. Of all 437 intercepted tractor trailer drivers who agreed to participate, 75 percent (327) met these qualifications.

4.3 Survey Instrument Design

The survey instrument included the following types of questions:

- Screening Questions – Screening questions determined whether a person is qualified to participate in the survey.
- Route Decision – Driver status, company policies with regards to pre-trip route planning, en-route adjustments, toll reimbursement and employee compensation.
- Current trip – Data was collected to characterize the trip the respondent was making at the time of the interview
- Stated Preference Section – Respondents were presented with a series of hypothetical choice scenarios that describe different travel time savings and toll scenarios. The current trip described in previous questions was used to frame the hypothetical choice experiment.
- Company's attitude towards tolls - Drivers were asked how often they drive in areas where roads are tolled.
- Driver income

4.3.1 Screening

To be qualified to participate in the survey, potential respondents needed to meet the following requirements:

- Age 18 or older
- Driver of tractor trailer

- Route choice decision maker - To qualify for the complete survey, the driver needed to be responsible for the planning and/or the en-route changes.

4.3.2 Reference Trip

Respondents who met the screening criteria were asked to describe their most recent (for occasional travelers) or typical (for frequent travelers) qualifying trip. This reference trip provided the context for framing the hypothetical choice experiments.

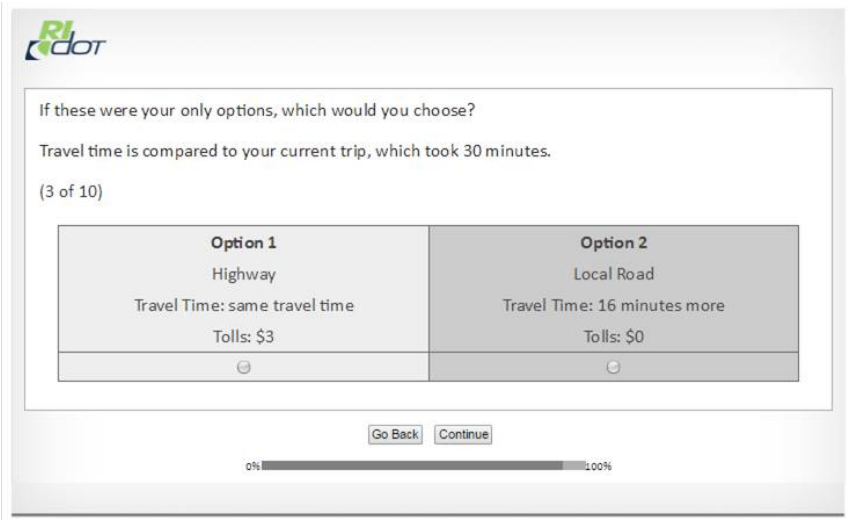
Questions regarding the most recent or typical trip:

- Origin - Location
- Destination - Location
- Corridor
- Day of week
- Departure time
- Arrival time
- Tolls paid

4.3.3 Choice Exercise

The choice exercise explored respondents' willingness to pay for travel time savings. The section began with an introduction of the choice exercise and instructions on how to complete it. As part of the exercise, respondents were presented with 10 hypothetical choice sets similar to the example presented in Figure 4-1. In each choice set, respondents were asked to choose between a tolled highway and a free local road.

FIGURE 4-1. HYPOTHETICAL CHOICE EXPERIMENT EXAMPLE



In each choice set, each route option was described using the following characteristics:

- Toll price (in dollars)
- In-Vehicle Travel Time (in minutes)

For each choice set, respondents were asked to make the choice considering a trip with the same origin and destination pair as the reference trip and similar circumstances as that trip in terms of purpose, timing when choosing between the route options.

4.4 Survey Results

A total of 437 tractor trailer drivers agreed to participate in the survey. To qualify for the full survey, the driver needed to be in charge of the route planning decision or be authorized to make en-route changes, either independently or with approval of the fleet manager/ dispatcher. Table 4-1 provides the results of the qualification rates based on the number of tractor trailers owned by the driver's employer.

Drivers from companies with fewer tractor trailers were more likely be responsible for route choice decisions, and thus qualified for the survey, than those from larger companies. Drivers with a single tractor trailer were most likely to qualify (97 percent). Of all 437 intercepted tractor trailer drivers who agreed to participate, 75 percent (327) met these qualifications.

TABLE 4-1. QUALIFIED RESPONDENTS BY NUMBER OF TRACTOR TRAILERS

	Total	% Qualified
1 truck	76	97%
2 to 5 trucks	47	79%
6 to 20 trucks	71	79%
21 to 50 trucks	34	76%
51 to 100 trucks	32	72%
101 to 200 trucks	31	77%
200 to 500 trucks	45	64%
501 to 1000 trucks	19	42%
More than 1000 trucks	73	66%
Don't know	11	36%
Total	**439**	**75%**

Most respondents were self-employed owner-operators or private fleet drivers as shown in Table 4-2. As expected, self-employed owner-operators were more likely be responsible for route choice decisions (97 percent) than private fleet drivers (62 percent).

TABLE 4-2. QUALIFIED RESPONDENTS BY TYPE OF SERVICE

	Total Responses	% Qualified
Self-employed Owner-Operator	116	97%
For hire truckload	26	92%
For hire less than truck load (parcel, express)	3	67%
Specialized Trucking	34	85%
Local Delivery	11	91%
Drayage/Cartage	1	100%
Private Fleet	254	62%
Don't know	1	100%
Total	**446**	**75%**

* Multiple selections possible per respondent

Both qualified and unqualified respondents were asked about their company's attitude towards toll and route choice. Table 4-3 shows that about one third (34 percent) of qualified drivers (i.e. those that are

responsible for route choice decisions in the planning stage and/or after the trip has begun) indicated that they try to avoid toll roads as much as possible – or an instructed by their company to do so. Other frequent responses among qualified respondents were the instruction to only use of toll road if part of the assigned route (22 percent) or if necessary to stay on schedule (21 percent) as well use the fastest route regardless of tolls (16.4 percent). Among those who were not responsible for route choice and were therefore not qualified to participate in the full survey, 70 percent confirmed that they are only permitted to use a toll road if part of the assigned route, while 14 percent and 9 percent indicated the company selects the fastest route regardless of tolls or selects toll roads only if necessary to stay on schedule.

TABLE 4-3. COMPANY ATTITUDE TOWARDS TOLLS & ROUTE CHOICE

	Qualified Respondents *	Not Qualified Respondents *
Avoid toll roads as much as possible	34%	6%
Use toll road only if part of assigned route	22%	70%
Use toll road only if necessary to stay on schedule	21%	9%
Use toll road if travel time savings are worthwhile given the cost of the toll	4%	2%
Use of toll road needs to be preapproved to get reimbursed for tolls	1%	0%
Use fastest route, regardless of tolls	16%	14%
Driver's choice	3%	0%
Other	2%	0%
Don't know	5%	0%

* Multiple selections possible per respondent

4.4.1 Qualified Respondents

There were a total of 327 qualified respondents, which were drivers were in charge of the route planning and/or were permitted to make en-route changes. These respondents completed all applicable questions in the survey instrument, including the stated choice exercise.

4.4.1.1 Type of Service

Among the qualified respondents, the largest groups were private fleet drivers (48 percent) followed by self-employed owner-operators (34 percent).

TABLE 4-4. TYPE OF SERVICE

	Percent of Responses*
Self-employed Owner-Operator	34%
For hire truckload	7%
For hire less than truck load (parcel, express)	1%
Specialized Trucking	9%
Local Delivery	3%
Drayage/Cartage	0%
Private Fleet	48%

* Multiple selections possible per respondent

4.4.1.2 State of Registration

Only 8 percent of the qualified respondents were registered in Rhode Island. The state with the single largest number of respondents was Indiana (11 percent) and Illinois (9 percent). Massachusetts accounted for 7 percent of the respondents.

TABLE 4-5. STATE OF REGISTRATION

	Percent of Respondents
Indiana	11%
Illinois	9%
Rhode Island	8%
Massachusetts	7%
Pennsylvania	6%
Ohio	6%
New Jersey	6%
Michigan	4%
Texas	4%
Oklahoma	3%
Connecticut	3%
New York	3%
Florida	3%
Missouri	2%
Mississippi	2%
South Carolina	2%
California	2%
Maryland	2%
Minnesota	2%
Wisconsin	2%
Other	15%
Total	**100%**

4.4.1.3 Route Choice Decision

The route choice decision consists of two parts. First, there is the route planning decision, which takes place before the trips starts. Second, there are en-route changes, which are changes to the planned route made after the trip started. As explained above, drivers were only qualified to participate in the survey if they are responsible to make at least one of these decisions. Of the qualified respondents, 75 percent were responsible for the route planning. An additional 16 percent were not responsible for route planning but were permitted to make en-route changes without prior approval of the fleet manager or dispatcher. Finally, the remaining 9 percent, were permitted to make en-route changes with the approval of the fleet manager or dispatcher.

TABLE 4-6. ROUTE CHOICE DECISION

Decision maker	Route Planning	En-Route Changes	
		Driver	Driver with Approval of Fleet Manager / Dispatcher
Driver	74.70%	74.70%	0.00%
Dispatcher/Fleet Manager	24.70%	15.30%	9.40%
Other	0.60%	0.60%	0.00%
Total	**100.00%**	**90.60%**	**9.40%**

4.4.1.4 Tolls & E-ZPass

More than half (58 percent) of respondents used a tolled road or bridge as part of their current trip. Thirty-five percent and thirty percent, respectively, reported that they were tolled in New Jersey or New York.

TABLE 4-7. CURRENT TRIP TOLL PAYMENT BY STATE

	Percent of respondents with current Trip*
Massachusetts	13%
New York	30%
New Jersey	35%
Other state	16%
No	42%
Don't know	1%

* Multiple selections possible per respondent

Half of drivers who planned their route expected to be fully reimbursed for the tolls that they incurred on their current trip. Among those who did not plan their route, 62.5 percent expected to be fully reimbursed.

TABLE 4-8. CURRENT TRIP TOLL REIMBURSEMENT BY ROUTE PLANNING DECISION-MAKER

	Driver	Dispatcher / Fleet Manager	Other	Total
Yes, fully reimbursed	50.40%	62.50%	0.00%	**53.20%**
Yes, partly reimbursed	2.20%	2.10%	0.00%	**2.10%**
No, not reimbursed	46.80%	33.30%	0.00%	**43.10%**
Don't know	0.70%	2.10%	100.00%	**1.60%**
Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Most (72 percent) respondents had an E-ZPass account. Only three percent of these were issued in Rhode Island.

TABLE 4-9. E-ZPASS STATE OF ISSUE

	% of Respondents
Rhode Island	3%
Massachusetts	5%
New York	6%
New Jersey	7%
Other State	50%
No E-ZPass	28%
Total	**100%**

4.4.1.5 Driver Income

Based on the income distribution provided in Table 5-10, the Louis Berger Team estimated the median driver income at approximately $74,000 – implying an hourly wage of approximately 35 dollars an hour. Eighteen percent of drivers reported incomes of at least $100,000.

TABLE 4-10. E-ZPASS STATE OF ISSUE

	Percent
Less than $10,000	1%
$10,000 to $14,999	0%
$15,000 to $24,999	0%
$25,000 to $34,999	2%
$35,000 to $49,999	7%
$50,000 to $74,999	28%
$75,000 to $99,999	18%
$100,000 to $149,999	13%
$150,000 to $199,999	2%
$200,000 or more	3%
Prefer not to disclose	25%
Total	**100%**

4.4.2 Choice Exercise

Using the choice exercise data from the survey, discrete choice analysis techniques were used to estimate the willingness to pay for travel time savings they would realize by not diverting to local roads.

4.4.2.1 Discrete Choice Analysis Overview

Discrete choice analyses are based on the utility theory of economics that rates the options available to a decision maker based on a combination of input variables. The equation below provides an example of a typical utility function used in toll road analysis:

$$\textbf{Utility} = C_{TR} + (\beta_1 \times \textbf{Travel Time}) + (\beta_2 \times \textbf{Toll Cost})$$

Where:

β_1 = travel time coefficient
β_2 = toll cost coefficient
C_{TR} = toll road bias

The magnitudes of the travel time and cost coefficients (β_1 and β_2) are statistically estimated from the choices made by respondents during the stated preference survey choice exercises. Both these measures represent the perceived disutility to a driver, of each additional minute or toll dollar cost encountered during a trip. Interacting toll cost with trip distance allows the model to represent the relationship between value of time and trip distance.

4.4.2.2 Value-of-Time (VOT)

Following the model estimation process, the implied value-of-time (VOT) can be determined by observing the rate at which tractor trailer drivers are willing to substitute time and cost while maintaining the same level of utility or satisfaction. The VOT is widely understood to represent the estimated price an individual is willing-to-pay to save time on a given trip. VOT is typically calculated using the equation below and is typically expressed in terms of $/hr (hence the multiplication of the time coefficient by 60 to represent the perceived disutility per additional hour of travel time).

$$\text{VOT} = \frac{\beta_{\text{traveltime(utils/min)}} \times 60_{\text{(min/hour)}}}{\beta_{\text{cost(utils/\$)}}}$$

4.4.2.3 Model Estimation and Value-of-Time

Given the uncertainty in determining the VOT applicable to tractor trailers, the Louis Berger Team elected to develop a distribution of VOT using a mixed logit specification. The mixed logit specification includes a fixed toll-trip duration coefficient and a random travel time coefficient defined by a lognormal distribution.

The advantage of using a distribution of VOTs rather than a single value is that it captures the different time disutility, and thus different VOT, among users within a segment. This is especially important in truck freight analysis since the VOT is known to vary based on the factors described in the introduction to this section.

Table 4-11 presents the results of mixed logit model specification using the SP survey data collected for this study. This specification includes a fixed toll cost coefficient that is interacted with logarithm of trip duration, as well as random travel time coefficient that is defined by a lognormal distribution.

The interactive trip duration and cost variable allows the model to capture the difference in VOT between short and long distance trips. Based on the team's analysis of the survey data, short distance trips (less than two hours in duration) were estimated to have an average duration of approximately an hour, while long distance trips (greater than two hours in duration) were estimated to have an average duration of approximately 11 hours.

Based on the cost and time coefficients from Table 4-11, Table 4-12 shows that the mean VOT for a tractor trailer driver making a 1 hour trip, is $28.93 with a standard deviation of $24.30. For an 11 hour trip, the derived mean VOT is $45.87 with a standard deviation of $38.54.

Table 4-11. Mixed Multinomial Logit Model

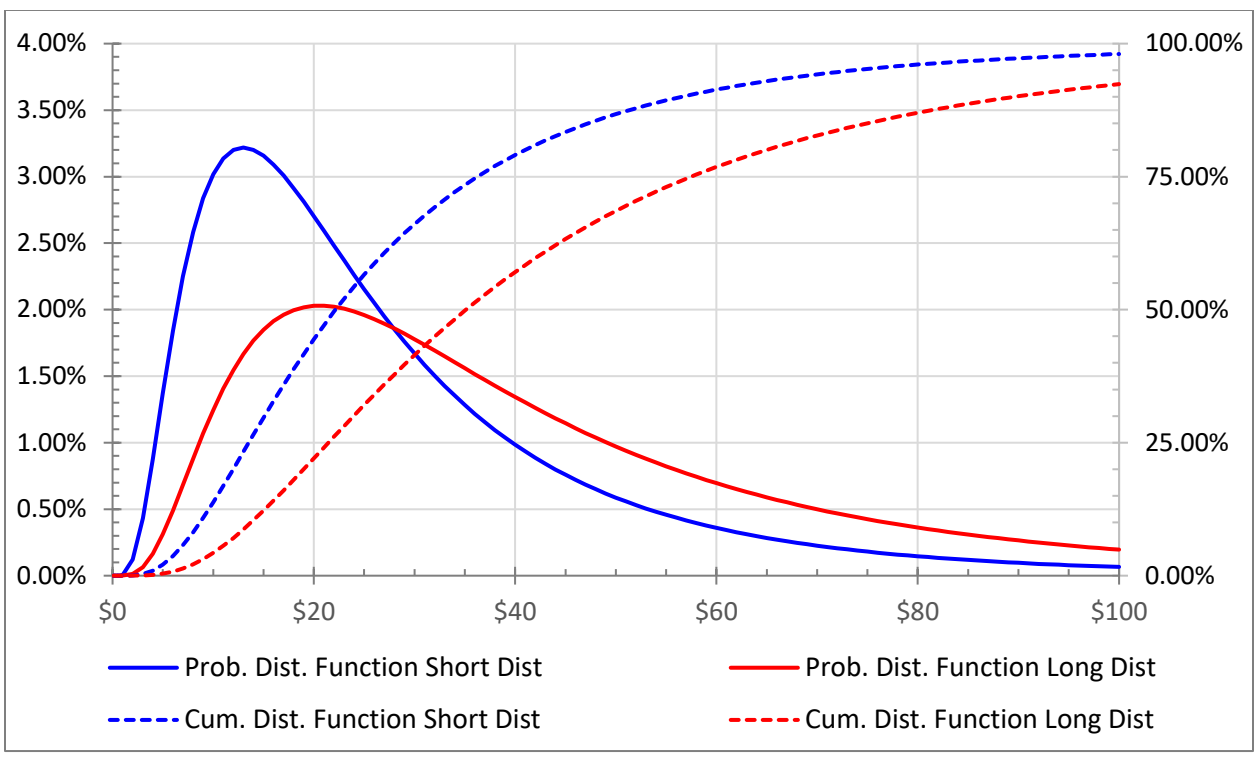
Variable (Units)	Coefficient	t-Stat
Fixed Parameters		
Toll Cost / Ln(Trip Duration)	-1.65555	14.49
Random Parameters		
Travel Time (Mean)	-1.90214	-22.60
Travel Time (Standard Deviation)	0.730835	14.71
Number of Observations	4208	
Number of Respondents	263	
Log Likelihood (0)	-906.631	
Log Likelihood (β)	-791.351	

Table 4-12. Lognormal Distribution VOT Parameters

	Short Distance	Long Distance
Mean	$ 28.93	$ 45.87
Standard Deviation	$ 24.30	$ 38.54

The probability and cumulative density functions of VOT for both short distance and long distance trips are presented in Figure 4-2. The differences between the two distributions can best be observed by comparing the cumulative distribution curves – whereas approximately 45 percent of short distance trips display a value of time of $20/hr, only 22 percent of long distance trips display the same VOT.

Figure 4-2. Value of Time Distributions



4.4.2.4 Benchmarking

The U.S. Department of Transportation (U.S. DOT) 2015 Value of Time guidance does not included guidance on the overall VOT in freight transportation with the exception of the value of time of the driver which is based on the estimated hourly wages of the driver.

The previous Level 2 Study used the driver wage approach set forth in U.S. DOT guidelines to set the VOT assumptions. Starting with an estimated hourly wage of $19.00/hr, a 25 percent increase was also applied to account for company overhead and other potential opportunity costs. This resulted in a single VOT assumption of $23.76/hr.

A literature review on the value-of-time returned a wide range in the reported values-of-time based on several different methodological approaches and analytical perspectives. An adaptive stated preference study in Minnesota derived the truck VOT at $49/hr[4], while another stated preference study in California estimated the VOT for trucks at $28/hr[5].

Table 4-13 compares this study's SP parameters against similar measures obtained from two comparable studies in the U.S: an SP survey conducted as part of the Atlanta Managed Lane System Plan, and the I-710 Study in Los Angeles[6]. A comparison of the model parameters (mean and standard deviation) and resulting VOT distribution metrics (mean/median/mode) show the RIDOT study results to be consistent with the other study outputs and should therefore provide confidence in the application of these parameters in the investment-grade traffic and revenue forecasts.

TABLE 4-13. VOT BENCHMARK COMPARISON

	Atlanta Managed Lanes (2010)	I-710 Major Corridor-Los Angeles (2005)	RIDOT Study (2016)	
			Short Distance	Long Distance
Mean	$22.81	$30.00	28.93	45.87
Std Dev	$25.15	$40.00	24.30	38.54
Mean	$22.81	$30.00	$28.93	$45.87
Median	$15.32	$18.00	$22.15	$35.12

[4] Smalkoski, B., Levinson, D., 2005. Value of Time for Commercial Vehicle Operators in Minnesota, Journal of the Transportation Research Forum 44:1 pp. 89-102.
[5] Kawamura, K. Perceived Value of Time for Truck Operators, Transportation Research Record 1725, Transportation Research Board, Washington, D.C., 2000.
[6] Cambridge Systematics, Inc. White Paper # 7-Truck Only Toll (TOT) Lanes Final Report, Prepared for Oregon Department of Transportation, 2009

5.0 Travel Demand Model Development

The traffic and revenue forecast was developed using a customized version of the Rhode Island Statewide Model (RISM). A brief overview of the model and a description of the adjustments made for this study are described in this section of the report.

5.1 Introduction to RISM

The RISM is a four-step travel demand model developed and maintained by the Rhode Island Statewide Planning Program that covers the State of Rhode Island plus bordering communities in Connecticut and Massachusetts. The model performs daily highway and transit assignments for three trip purposes: home-based work, home-based other, and non-home based. It includes population and household forecasts developed based on the 2013 statewide and municipal population projections prepared by Statewide Planning, as well as employment forecasts developed specifically for the RISM (Section 2.0).

5.1.1 Zone Structure

The RISM includes 1554 Traffic Analysis Zones (TAZs) that encompass the State of Rhode Island as well as the bordering towns in Massachusetts and Connecticut as shown in Figure 5-1. The TAZ boundaries were developed based on aggregated 2010 census blocks.

Figure 5-1. RISM Coverage Area

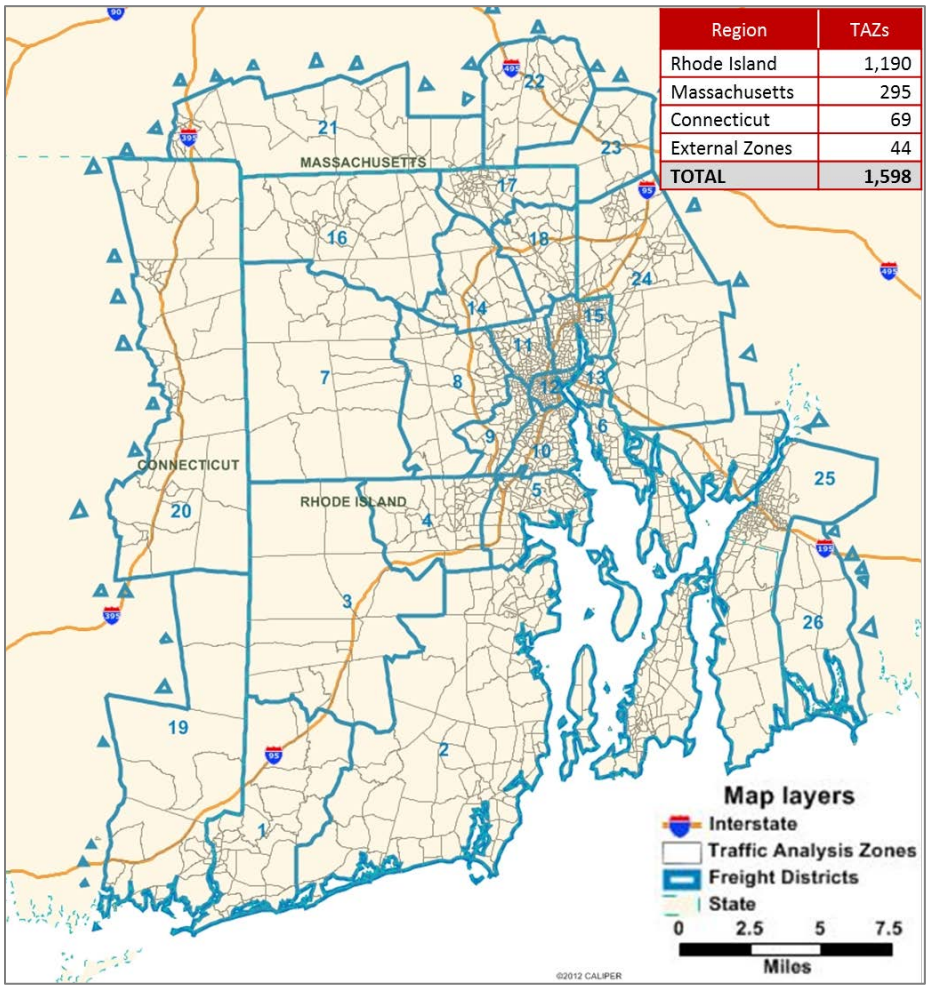
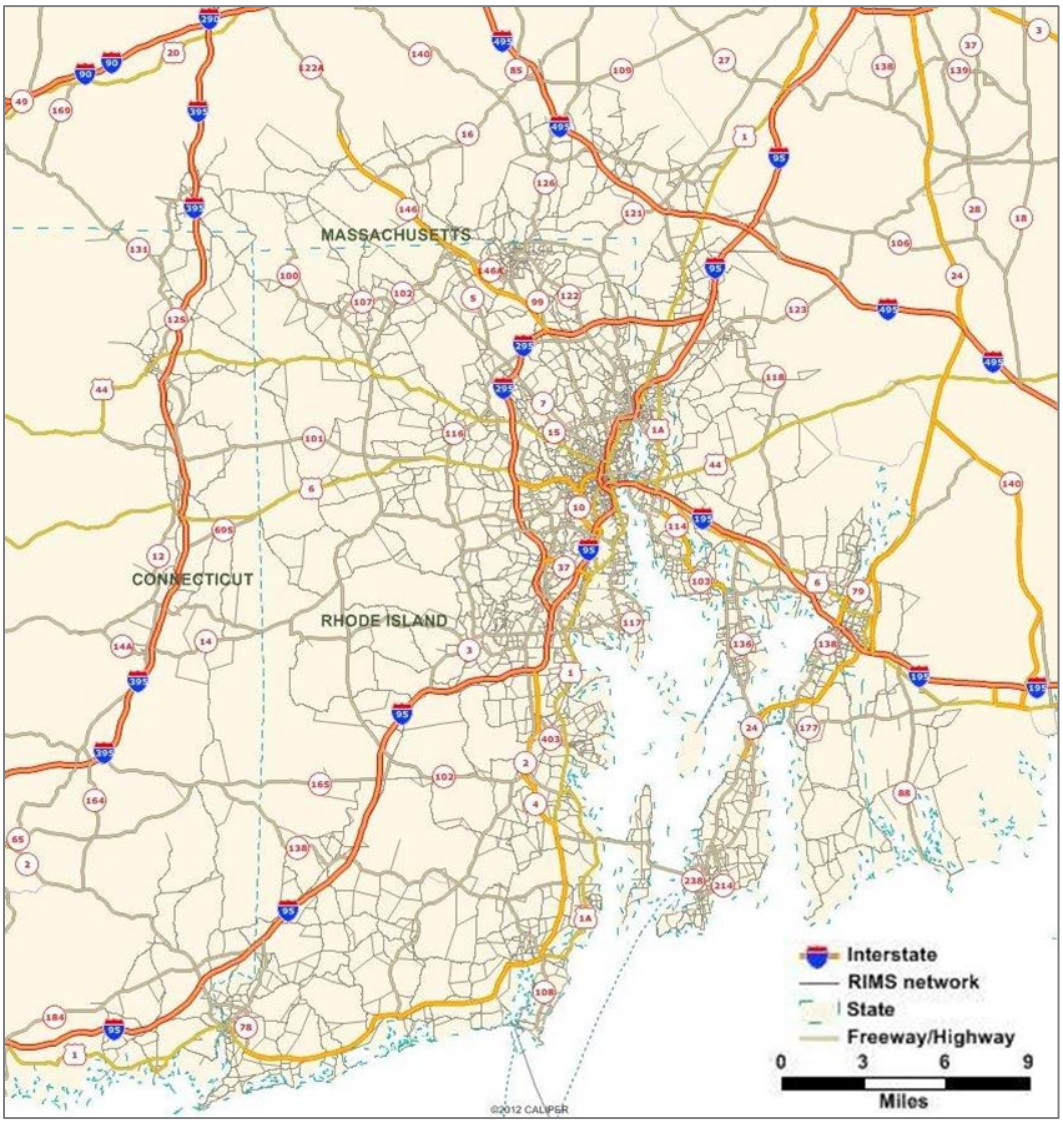


Figure 5-1 also shows the boundaries of 27 freight districts that were defined and used in the Level 2 study. Each of the 27 freight districts comprises several RISM TAZs, and thereby provides a useful level of aggregation for reporting and comparison purposes. To take into account trips starting and/or ending outside of the model area, the RISM includes a total of 44 external stations as also shown by the triangular shapes surrounding the border of the modeling coverage area in Figure 5-1. The table in the top right corner of the figure provides a summary of the TAZ distribution by state and external zone categorization.

5.1.2 Network

The RISM roadway network was completely updated in 2014 to accurately reflect the characteristics of Rhode Island roadways, including number of lanes, directionality and access control. The functional classifications and count data included in the network were recently updated based on data received from Statewide Planning in 2014 and 2015, respectively.

FIGURE 5-2. RISM NETWORK



5.2 Model Adjustment and Customization

To ensure a more accurate representation of the travel demand affecting the tractor trailer tolling program, the Louis Berger Team made a number of modifications to the RISM. The following subsections of this report outline the changes made to RISM in support of this investment-grade traffic and revenue study.

5.2.1 Tractor Trailer Trip Tables

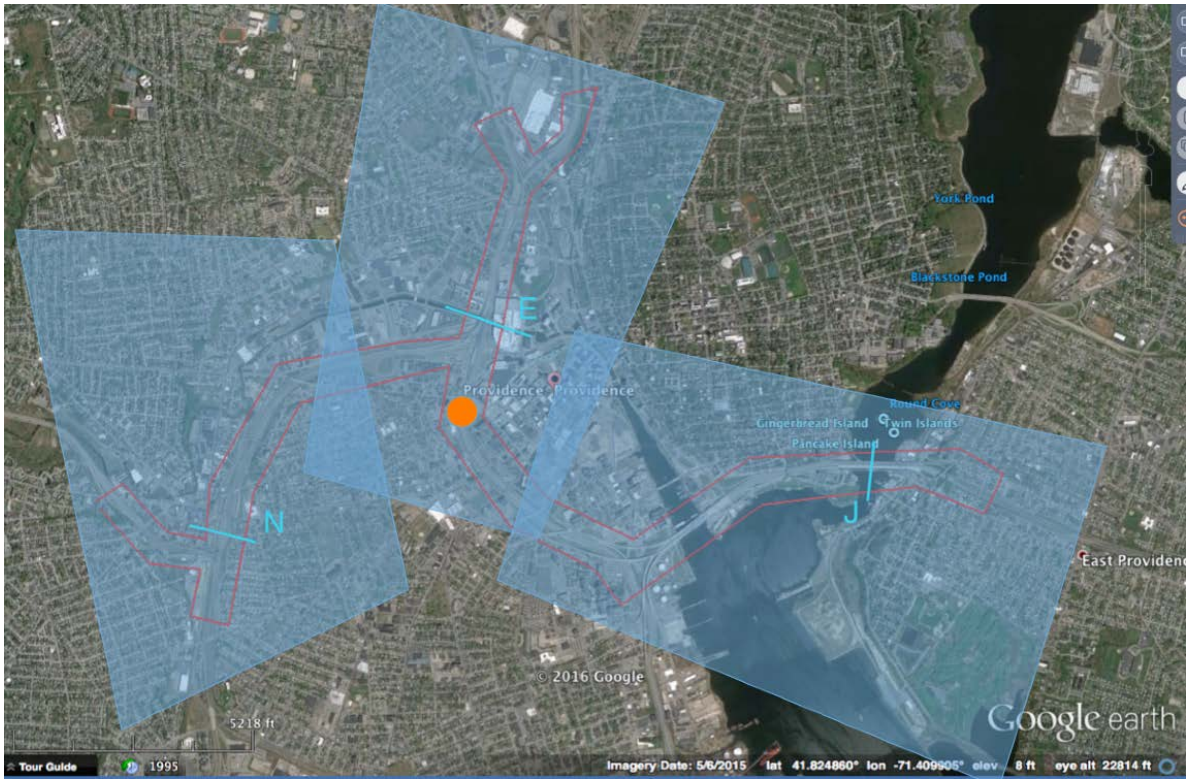
As indicated in the introduction to this section of the report, the RISM only includes three trip purposes that do not account for tractor trailer movements. The Louis Berger Team therefore generated the tractor trailer trip tables critical to this investment-grade study through a multi-step process that triangulated a number of different data sources.

INRIX TRIPS data formed the basis of the origin-destination (O-D) matrix used for this study. Skycomp – a member of the Louis Berger Team, first verified the validity of the INRIX data by comparing the INRIX tractor trailer O-D patterns to those corresponding patterns derived from Time Lapse Aerial Photography (TLAP) data collected at three select gantry locations. Once the INRIX data was validated at this local level, the wider INRIX data base was used as the seed matrix in the origin-destination matrix estimation (ODME) process used to develop the base year trip table that was expanded and calibrated to match the traffic counts described in Section 3.0.

5.2.1.1 Time Laps Aerial Photography (TLAP)

Figure 5-3 shows the area covered by the TLAP data collection along I-95, I-195, US 6, and RI 146 that captured traffic movements at toll gantry locations 5 (E), 10 (J) and 14 (N). Aerial photographs were taken once per second over three 90 minute periods at each location on Augusts 17th and 18th.

FIGURE 5-3. AERIAL PHOTOGRAPHY COVERAGE AND ANALYSIS AREA

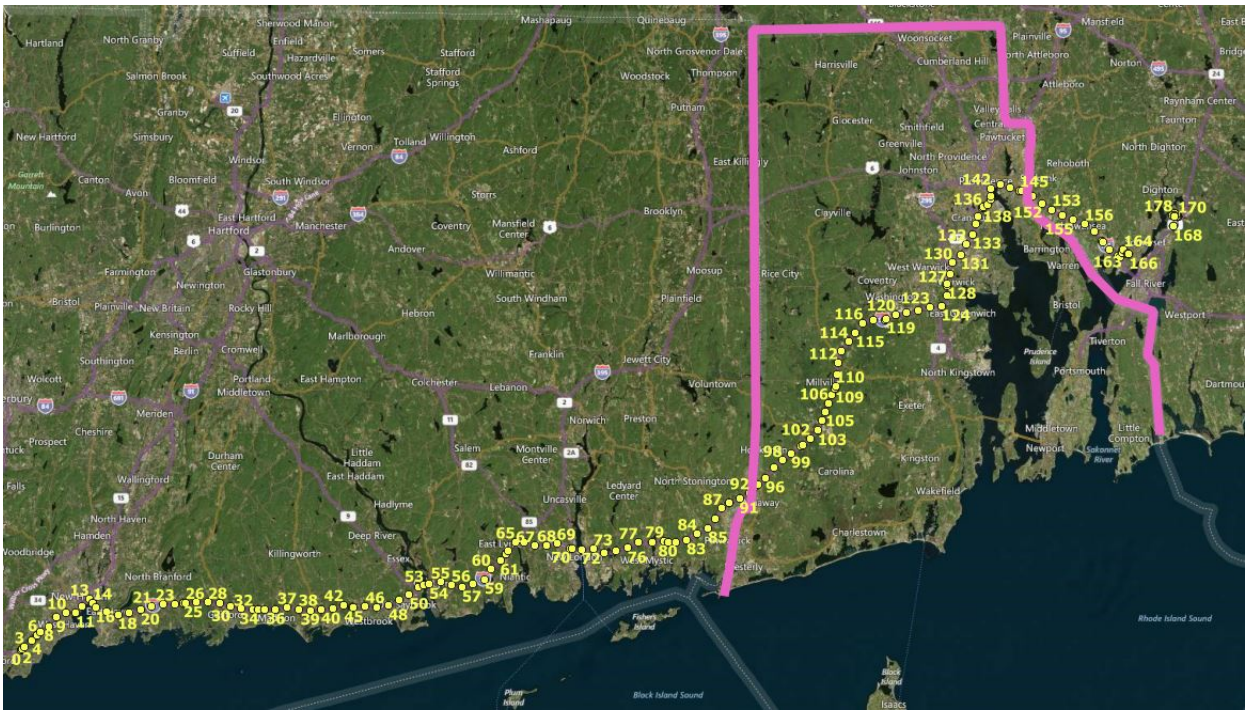


The resulting 5,600 images were analyzed via a combination of manual and computer-assisted methodologies. Tractor trailers were identified and assigned a unique ID when they first entered the image area and their movements were traced through subsequent images until they exited the study area. Because all the entrances and exits in the study area were numbered, the travel paths traced by tractor trailers could be summarized in a localized O-D matrix of the photography study area.

5.2.1.2 INRIX Trips Data

INRIX, a private data vendor, collects location data from a large number of vehicles traveling on U.S. roads by purchasing tracked GPS pings from operators of connected vehicle technologies and smartphone software. The spacing of the GPS pings varies by trip, and ranges from one second to approximately five minutes. As such, the INRIX data can be used to gain a sense of vehicle origins, destinations, and trip paths for a large subset of vehicle trips taken in the U.S. Figure 5-4 shows an example trip, from Connecticut to Massachusetts, as tracked in the INRIX database. Furthermore, because each device tracked in the INRIX database has a unique identifier, it is possible to identify tractor trailers that make repeated trips through the same location on a given day. This feature of the INRIX data is further discussed in Section 6.1.2 of this report as this volume of repeat trips has implications on toll discounts.

FIGURE 5-4. EXAMPLE TRIP FROM INRIX DATABASE



O-D data derived from an INRIX database formed the basis for the tractor trailer trip table used for this study. Because the INRIX database contains only a sample of trips taken through any study area, the Louis Berger Team evaluated this data against other sources to ensure the resulting trip tables provided a reliable basis for the traffic and revenue forecast. The TLAP data compiled by Skycomp was used to validate the INRIX O-D data within the corridor defined by Figure 5-3. The verification compared O-D pairs generated by the INRIX and TLAP data.

All tractor trailer trips that crossed either tolling gantries 5, 10 and 14 were pulled from the INRIX database. These trips were then summarized by where they entered and exited the Skycomp photography area. The resulting O-D patterns were then compared against those obtained from the TLAP data. A close correspondence was observed between the INRIX and TLAP O-D matrices. Figure 5-5 shows an example of the comparison analysis conducted, with the cells highlighted in yellow forming the most significant basis for comparison.

FIGURE 5–5. EXAMPLE OF INRIX AND TLAP COMPARISON ANALYSIS

TLAP vs INRIX O-D Comparison
AM Survey Period, Site E Southbound

RAW

TLAP AM SB

			(MAJOR)		DESTINATIONS			(MINOR / MOST RAMPS)			
ORIGINS	(count)	100	115-120	170	210		150	200	165	260	290
275	107	3	7	74	16		1	1	4		1
280	41	1	3	17	16		2	1		1	
285	2	1		1							
	150	5	10	92	32		3	2	4	1	1

INRIX AM SB

	Column Labels		(MAJOR)		DESTINATIONS			(MINOR / MOST RAMPS)			
ORIGINS	(count)	100	115-120	170	210	D-LocalDTP	D-LocalN	D-LocalS	D-LocalSP	D-LocalSPr	D-LocalSPr
275	769	25	16	522	147	15	9	6	1	23	5
280	454	6	16	119	277	7	3	10	3	11	2
	1223	31	32	641	424	22	12	16	4	34	7

PERCENTAGES

TLAP AM SB

			(MAJOR)		DESTINATIONS			(MINOR / MOST RAMPS)			
ORIGINS		100	115-120	170	210		150	200	165	260	290
275	71.3%	2.0%	4.7%	49.3%	10.7%		0.7%	0.7%	2.7%	0.0%	0.7%
280	27.3%	0.7%	2.0%	11.3%	10.7%		1.3%	0.7%	0.0%	0.7%	0.0%
285	1.3%	0.7%	0.0%	0.7%	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%
	100.0%	3.3%	6.7%	61.3%	21.3%		2.0%	1.3%	2.7%	0.7%	0.7%

INRIX AM SB

	Column Labels		(MAJOR)		DESTINATIONS			(MINOR / MOST RAMPS)			
ORIGINS		100	115-120	170	210	D-LocalDTP	D-LocalN	D-LocalS	D-LocalSP	D-LocalSPr	D-LocalSPr
275	62.9%	2.0%	1.3%	42.7%	12.0%	1.2%	0.7%	0.5%	0.1%	1.9%	0.4%
280	37.1%	0.5%	1.3%	9.7%	22.6%	0.6%	0.2%	0.8%	0.2%	0.9%	0.2%
	100.0%	2.5%	2.6%	52.4%	34.7%	1.8%	1.0%	1.3%	0.3%	2.8%	0.6%

Following the validation exercise, the Louis Berger Team compiled INRIX data records for tractor trailers with at least one GPS ping within Rhode Island during August 2016. The resulting trips defined the proportions of a raw O-D matrix that formed basis of the travel demand model's base year tractor trailer trip table through the application of the origin-destination matrix estimation (ODME) process.

5.2.1.3 Base Year Trip Table

The INRIX data described in the previous section was scaled down to represent a typical weekday and was then used to produce a seed matrix for the origin destination matrix estimation (ODME) process. The ODME process was run for each of the five time periods described in Section 5.2.2 and both auto and tractor trailer trip tables were then adjusted and calibrated to match the observed traffic counts described in Section 3.0. Table 5-1 presents the base year trip table aggregated and summarized by the 27 freight districts. Figure 5-6 through 5-8 provide a graphical presentation of the major tractor trailer traffic movements in Table 5-3. The three figures distinguish trips originating and destined within Rhode Island (internal-internal trips), trips with an origin or destination within Rhode Island (internal-external/external-internal), and trips going through Rhode Island (external-external).

Table 5-1. Base Year Trip Table Origins and Destinations Summed by Freight District

Freight Dist.			Destinations																											
			Internal																	External										
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	Sum
Origins	Internal	1	766	106	115	26	10	10	1	3	4	25	6	12	2	2	20	2	4	3	25	26	23	6	12	9	24	6	874	2,123
		2	181	4804	170	203	458	174	14	95	78	369	47	174	33	13	184	22	23	38	11	148	102	55	33	123	369	112	126	8,158
		3	90	140	570	231	207	12	6	34	17	608	9	54	5	9	32	12	6	8	38	66	35	26	27	18	59	20	703	3,042
		4	28	361	281	1097	592	18	8	107	90	441	30	103	5	13	53	17	11	15	4	43	70	41	18	35	25	15	106	3,627
		5	19	339	124	638	1483	13	10	92	87	569	20	75	8	11	97	18	17	49	8	74	144	46	42	61	26	8	87	4,163
		6	9	195	3	6	15	679	0	2	5	23	10	8	169	4	95	2	8	32	1	1	24	93	153	336	428	197	4	2,502
		7	1	17	7	8	6	1	126	100	5	7	14	3	0	10	9	39	6	9	1	453	32	8	2	1	2	0	1	871
		8	3	135	45	92	138	6	89	1412	224	233	100	21	5	201	66	33	25	47	3	401	230	94	47	23	8	3	61	3,744
		9	6	114	22	71	134	5	7	194	444	399	51	72	3	7	38	10	10	9	2	36	23	8	8	15	9	2	11	1,708
		10	29	453	418	273	787	40	4	154	300	1974	124	417	16	37	203	34	22	42	5	50	159	71	246	359	74	20	231	6,542
		11	7	88	8	37	58	13	6	89	70	410	929	261	17	66	295	34	22	62	2	44	46	16	64	117	22	2	17	2,804
		12	8	114	14	32	114	20	1	8	67	684	243	855	22	23	338	13	12	55	2	2	27	16	201	318	14	2	27	3,233
		13	2	21	1	3	6	141	0	1	2	14	6	15	326	2	189	5	7	18	0	1	8	27	55	328	138	31	11	1,360
		14	2	24	29	16	14	7	26	163	8	99	78	46	15	744	70	75	55	211	1	40	262	33	13	33	8	2	25	2,099
		15	13	179	18	32	196	97	7	44	15	441	322	292	192	57	2078	35	61	249	4	45	68	174	301	859	131	29	104	6,043
		16	4	32	18	13	17	3	31	31	8	29	26	8	2	124	35	385	433	36	2	79	1015	69	151	10	5	2	16	2,584
		17	4	29	11	10	14	10	5	43	7	22	17	12	6	130	59	359	642	121	1	31	547	285	77	48	16	3	13	2,522
		18	2	33	5	9	20	35	6	34	9	95	48	29	15	156	191	25	152	827	1	17	203	125	533	486	58	8	44	3,164
	External	19	25	11	61	2	4	1	1	1	2	12	2	3	1	1	6	2	2	1	1	4	2	4	0	2	3	1	3	158
		20	21	84	68	37	79	3	498	327	35	56	48	11	4	39	66	103	46	29	4	27	229	36	63	20	10	13	8	1,964
		21	11	104	22	57	54	51	30	151	28	186	73	38	12	754	79	1058	339	231	3	199	54	37	152	71	54	32	19	3,898
		22	6	77	35	21	44	61	4	66	7	47	17	14	22	52	152	54	272	103	2	34	26	7	7	59	38	3	41	1,271
		23	8	77	23	23	56	130	2	67	5	169	56	75	29	11	387	176	76	574	0	33	130	8	14	100	29	1	186	2,447
		24	7	156	11	28	99	351	1	21	10	266	159	196	340	25	929	17	63	586	2	14	76	68	101	325	100	13	116	4,080
		25	25	357	56	44	90	403	1	8	13	236	29	50	183	9	160	6	22	61	4	7	71	42	18	124	532	44	157	2,750
		26	3	112	34	23	36	142	0	1	1	35	6	31	25	1	31	3	3	16	1	4	56	4	2	12	64	5	40	691
		27	958	95	420	75	81	9	0	26	8	166	48	25	10	13	115	9	11	43	2	7	10	32	255	142	302	85	20	2,968
Sum			2,237	8,256	2,587	3,107	4,815	2,436	884	3,275	1,551	7,615	2,519	2,900	1,468	2,513	5,974	2,548	2,350	3,476	128	1,883	3,672	1,433	2,594	4,034	2,551	660	3,050	80,516

Figure 5-6. Frequency of Origin-Destination Pairs for Internal-Internal Trips

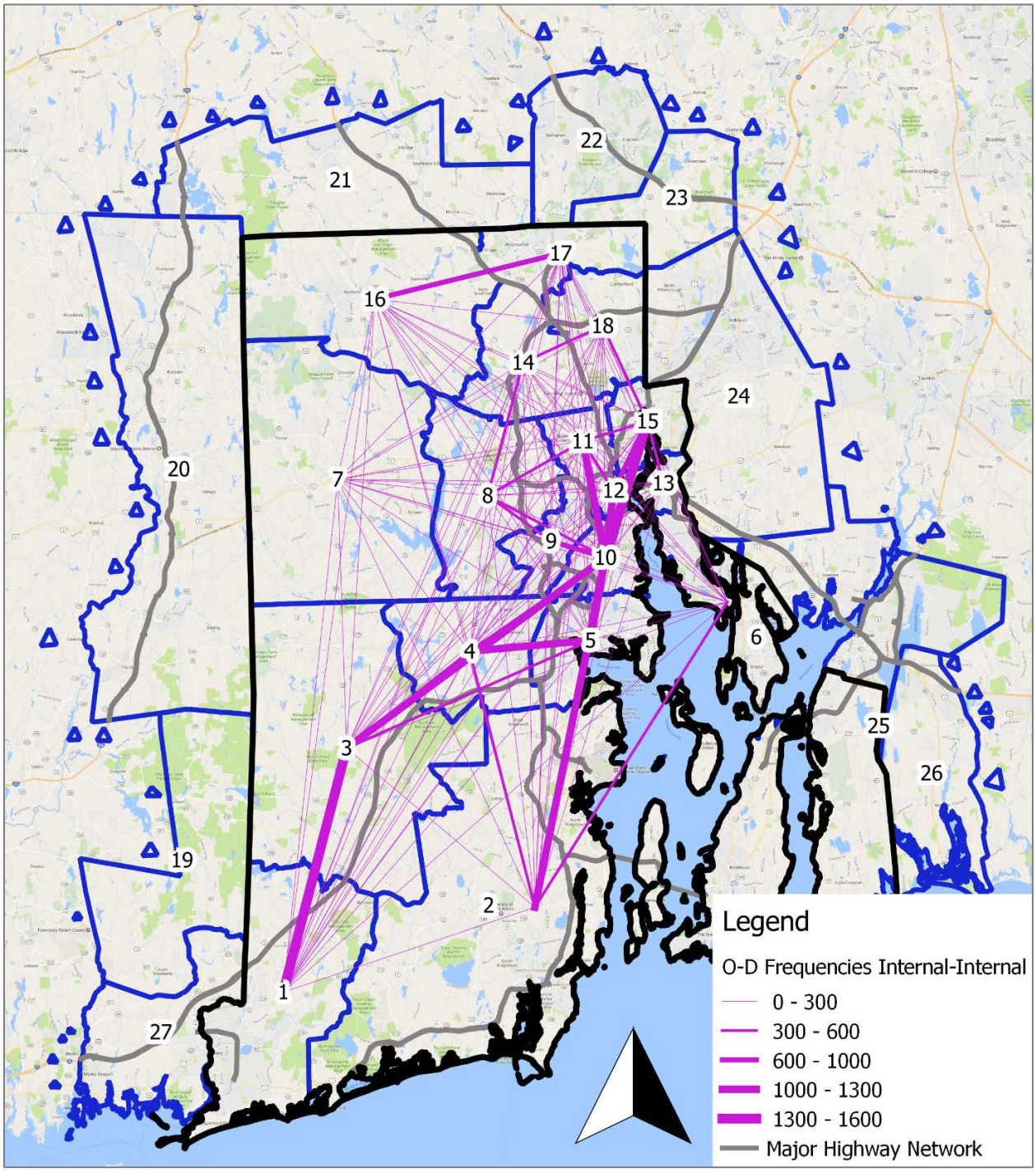


Figure 5-7. Frequency of Origin-Destination Pairs for Internal-External/External-Internal Trips

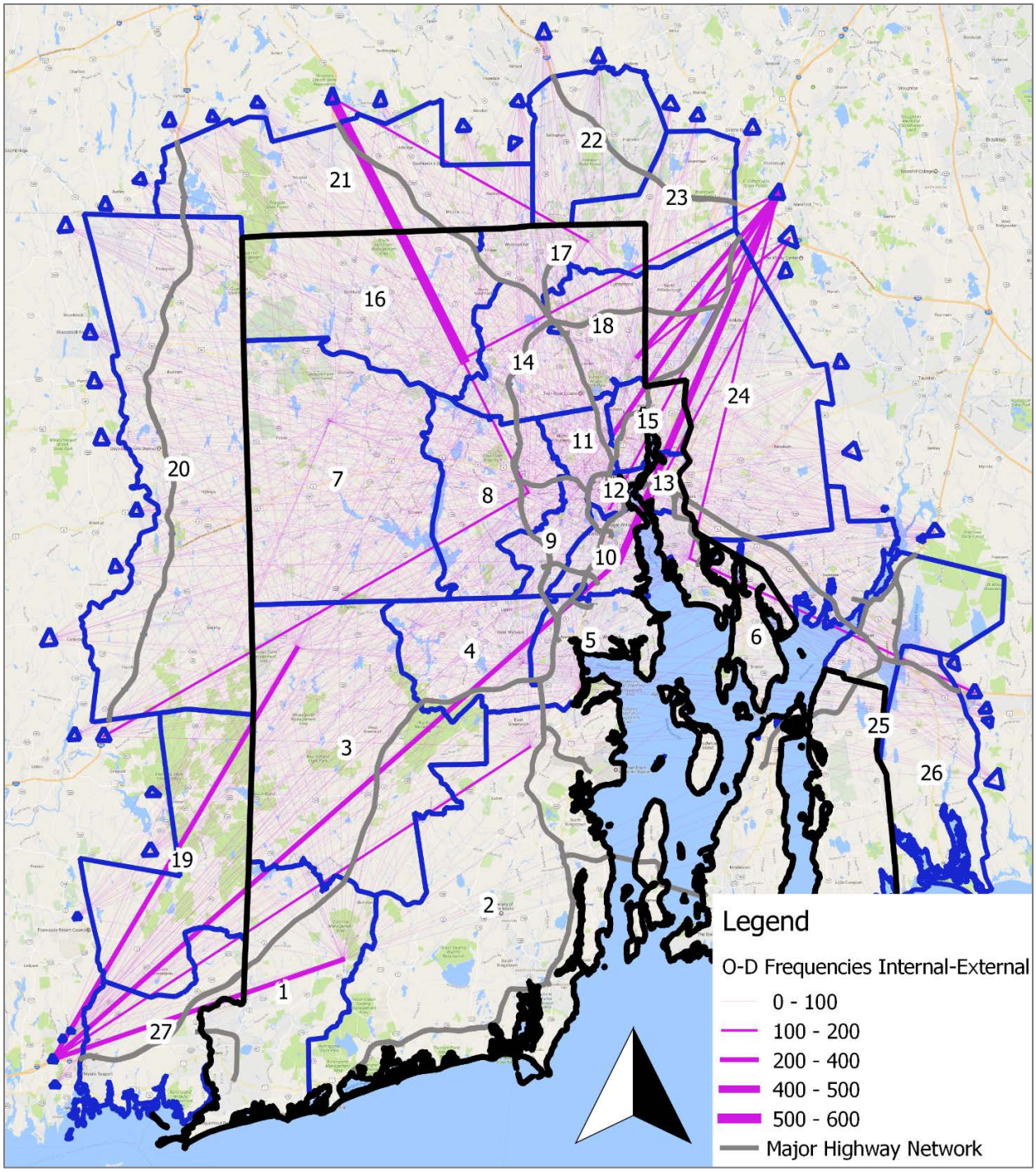


Figure 5-8. Frequency of Origin-Destination Pairs for External-External Trips

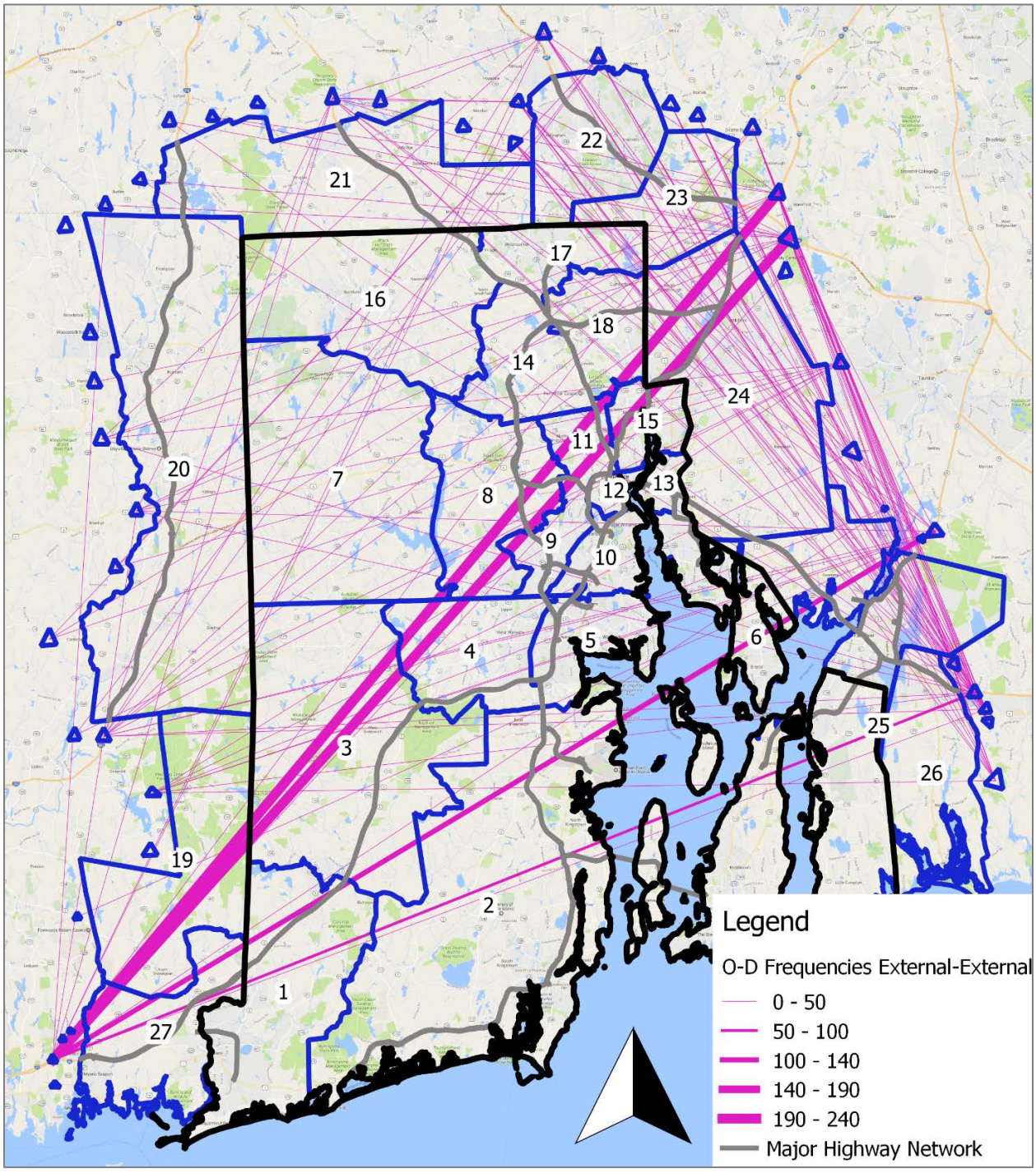


Table 5-2 summarizes the distribution of trips based on their characterization of internal or external trip origin/destination. This table shows that almost 60 percent of trips are internal to Rhode Island while only approximately 5 percent of trips external-external trips.

This pattern of trip making differs from the Level 2 Study that showed almost equal distribution across the four categories, and implies a greater proportion of relatively short distance trips with a high concentration of trip activity originating or terminating in the dense urban core around downtown providence.

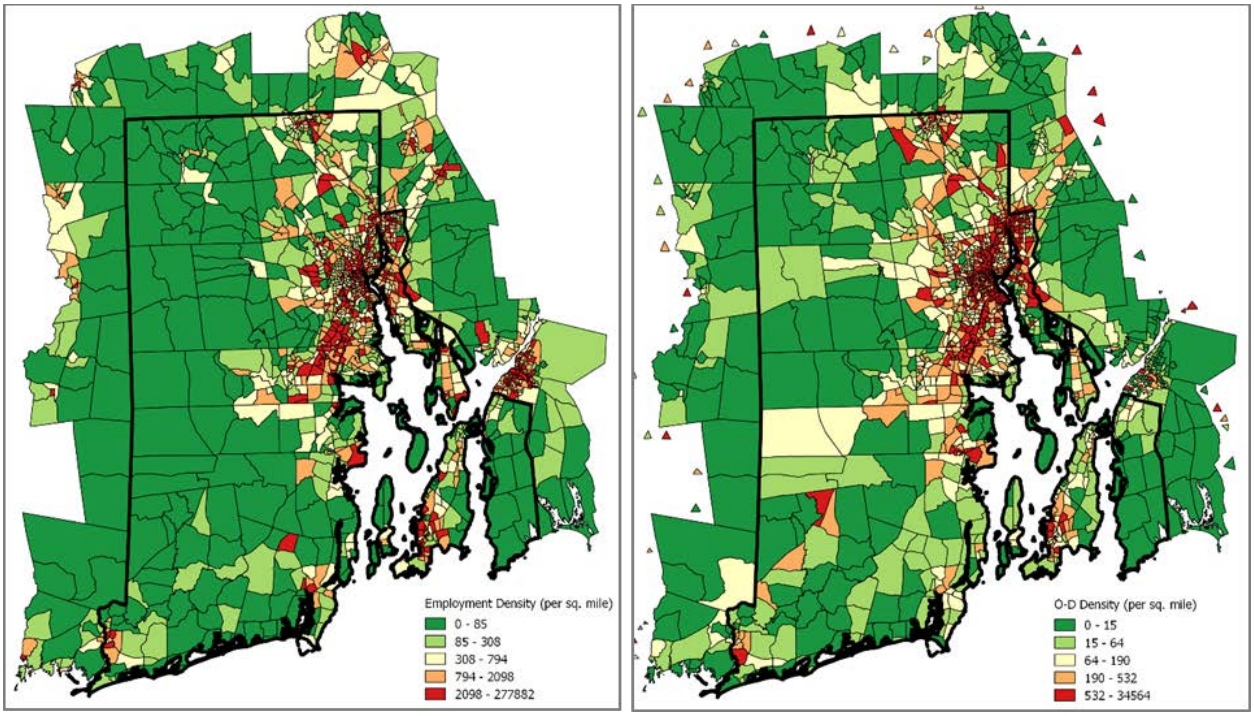
Table 5-2. Base Year Trip Table Origin-Destination Characteristics

	Internal-Internal (I-I)	Internal-External (I-E)	External-Internal (E-I)	External-External (E-E)	TOTAL
Volume	44,911	15,379	15,600	4,626	**80,516**
Percentage	55.8%	19.1%	19.4%	5.7%	**100.0%**

The Level 3 Study trip patterns adhere closer to traditional expectations of trip length frequency distributions that typically show high proportions of short distance trips that rapidly attenuate as trip length increases.

Figure 5-9 shows two heat maps that independently compare the density of total regional employment (left side) to the density of combined origins and destinations (right side). The resulting patterns of activity are similar with clustering primarily around Providence, RI, and additional concentrations of origins and destinations found at the TAZs that represent the highway entrances to and exits from Rhode Island in the southeast and northwest of the state. This close correspondence in spatial intensity further corroborates the validity of the base year trip table.

Figure 5-9. Density of Employment, and Origins and Destinations, by TAZ



5.2.1.4 Future Year Trip Table

The future year matrix was developed through the application of procedures in the quick response freight manual and their interaction with the forecasted changes in the future socioeconomic characteristics of the region. The resulting changes to the trip table characteristics are presented in Table 5-3.

TABLE 5-3. BASE AND FUTURE YEAR TRIP TABLE ORIGIN-DESTINATION CHARACTERISTICS

		Internal-Internal (I-I)	Internal-External (I-E)	External-Internal (E-I)	External-External (E-E)	TOTAL
2016	Volume	44,911	15,379	15,600	4,626	**80,516**
	Percentage	55.8%	19.1%	19.4%	5.7%	**100.0%**
2040	Volume	49,863	16,829	17,046	4,927	**88,665**
	Percentage	56.2%	19.0%	19.2%	5.6%	**100.0%**
CAGR (2015-2040)		0.42%	0.36%	0.36%	0.25%	**0.39%**

While the relative composition of the trip table remains approximately the same in 2040 (in terms of the four trip categories) as it does in 2015, the implied growth rates over this time period show slightly faster rates of growth for internal trips (I-I). The overall rate of annualized growth of 0.39 percent, is lower than the rates of growth assumed for the Level 2 Study (0.75 percent) and are also lower than the rates implied by both the FAF and ICAT forecasts discussed in Section 2.0 of this report. As such, these model assumptions take a relatively conservative view of future growth of the addressable tractor trailer market.

5.2.2 Time-of-Day

The native RISM only performs daily assignments which do not account for variations in demand and corresponding capacity during an average day. The Louis Berger Team therefore modified the model to perform a separate assignment for each of the following five time periods:

6. Midnight to 6 AM (Early AM)
7. 6 AM to 9 AM (AM Peak)
8. 9 AM to 3 PM (Midday)
9. 3 PM to 6 PM (PM Peak)
10. 6 PM to midnight (Night)

Roadway capacities for each time period were defined by (1) first dividing the roads' daily capacity by 24 to obtain average hourly capacity and by (2) then multiplying average hourly capacity by the factors below:

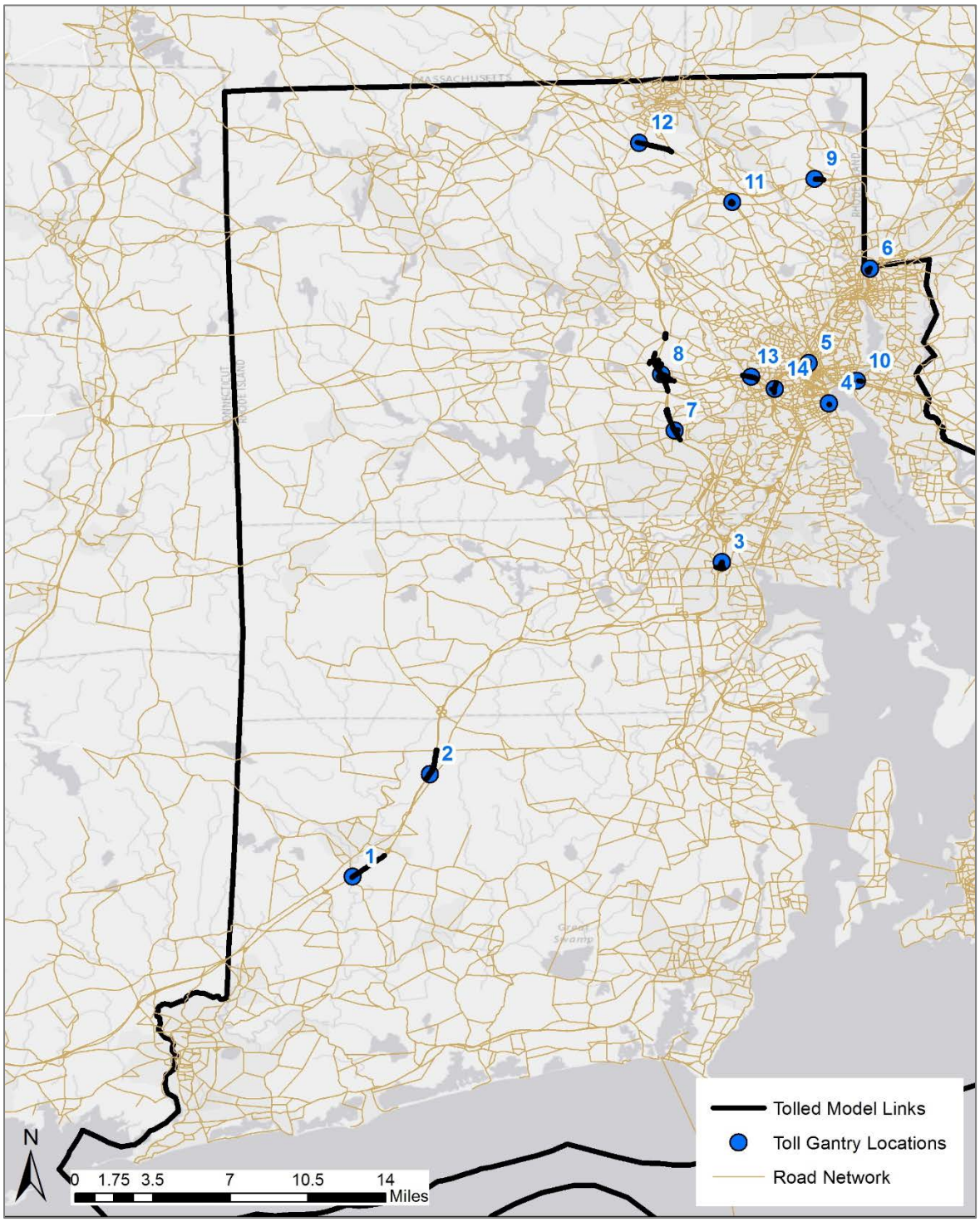
- Early AM: 5.00
- AM Peak 2.61
- Midday: 5.0
- PM Peak: 2.87
- Night: 5.00

As part of this modification, the Louis Berger Team created separate auto and tractor trailer trip tables for each of the five time periods.

5.2.3 Tolling Locations

To incorporate the tolls in the RISM, the Louis Berger Team coded the roadway network links to reflect the location of the proposed toll gantries as shown in Figure 5-10.

FIGURE 5-10. RISM ROADWAY NETWORK WITH CODED TOLL LOCATIONS



5.2.4 Value-of-Time (VOT) and Vehicle Operating Costs (VOC)

For the model to reflect the effect of tolls on route choice, the Louis Berger Team incorporated VOT estimates in the assignment step of the modified RISM. The VOT estimates were based on the SP survey described in Section 4.0.

Based on the SP survey, short distance trips tend to have a lower VOT than those making long distance trips. To take into account the heterogeneity of VOT within each distance segment, distributions of VOT for the short- and long-distance market segments were developed as described in Section 4.0 (Figure 4-2).

To operationalize these distributions into the RISM model, both the short and long distance VOT distributions were divided into equally sized quintiles as shown by the differently shaded areas in Figure 5-11, and an average VOT was estimated for each quintile. Table 5-4 presents the resulting upper threshold VOT values used to define each quintile in Figure 5-11, and the corresponding average VOTs that were calculated.

FIGURE 5-11. VALUE OF TIME DISTRIBUTIONS

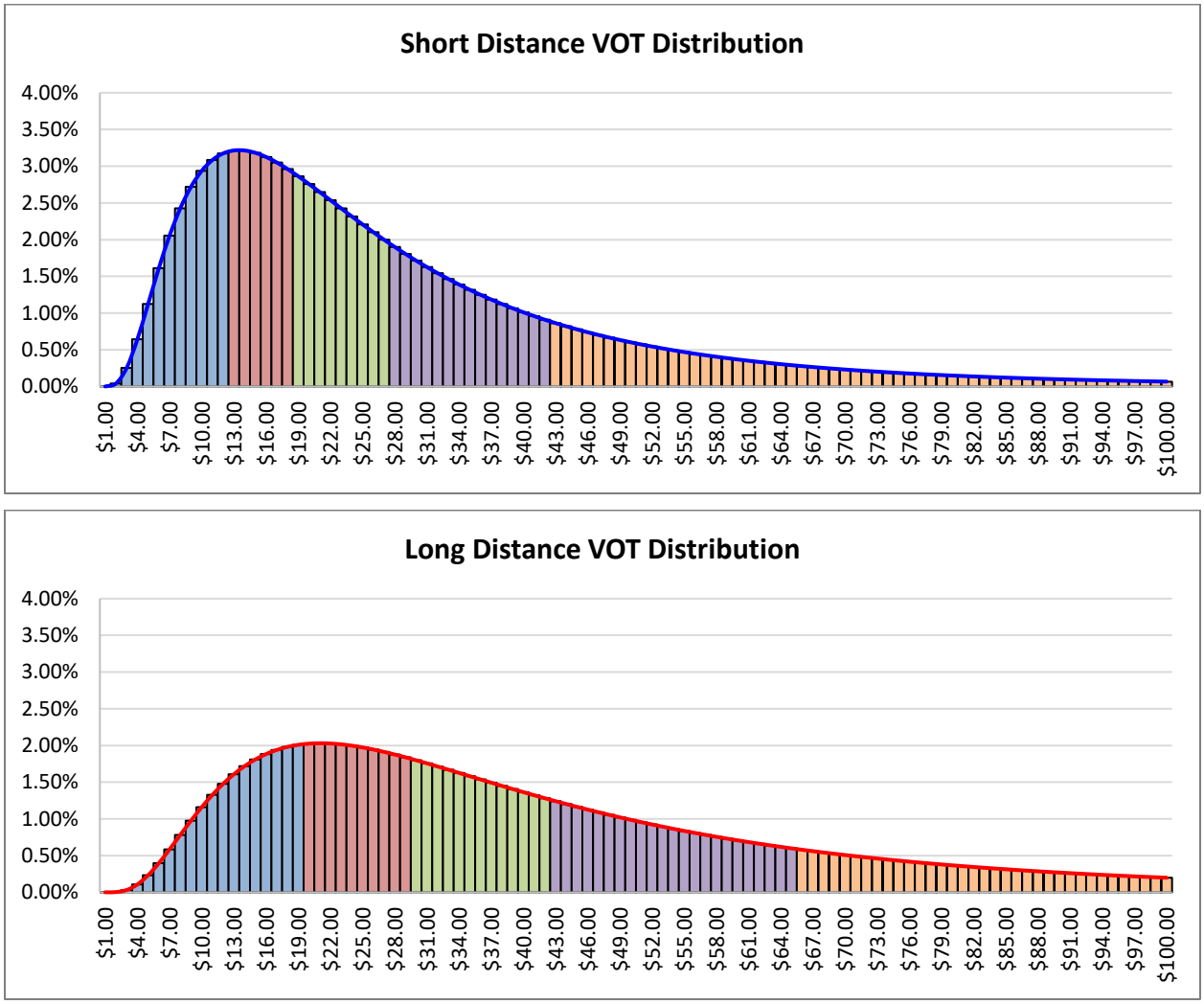


TABLE 5-4. AVERAGE VOT ESTIMATES

Quintile	Short Distance			Long Distance		
	Upper Threshold		Average VOT	Upper Threshold		Average VOT
	Percent	VOT		Percent	VOT	
0-20	20%	$12.00	**$8.89**	20%	$19.00	**$13.79**
20-40	40%	$18.00	**$15.45**	40%	$29.00	**$24.41**
40-60	60%	$27.00	**$22.70**	60%	$42.00	**$35.60**
60-80	80%	$41.00	**$33.65**	80%	$65.00	**$52.55**
80-100	100%	$212.00	**$65.48**	100%	$336.00	**$103.52**

The tractor trailer time-of-day trip tables were first split into a short and long distance trip tables with all trips of less than 2 hours in the short-distance trip table and the remainder in the long-distance trip table. For each time period, the short and long distance trip tables were further split into five equal sized trip tables with each trip table being assigned a VOT from one of the five short or long distance quintiles.

Vehicle operating costs were obtained from the American Transportation Research Institute's (ATRI) 2016 update of operational costs of trucking. This report found that the average cost per mile for tractor trailer operation to be $1.59/mile. The Louis Berger Team assumed this average cost to represent the mean of a normal distribution of vehicle operating cost with a standard deviation equal to 20 percent of the per mile cost. Similar to the VOT estimates, a VOC distribution was used to define cost variations for five quantiles each with an average VOC estimate corresponding to the 10th, 30th, 50th, 70th, and 90th percentile value of the VOC distribution.

5.2.5 Model Network Adjustments

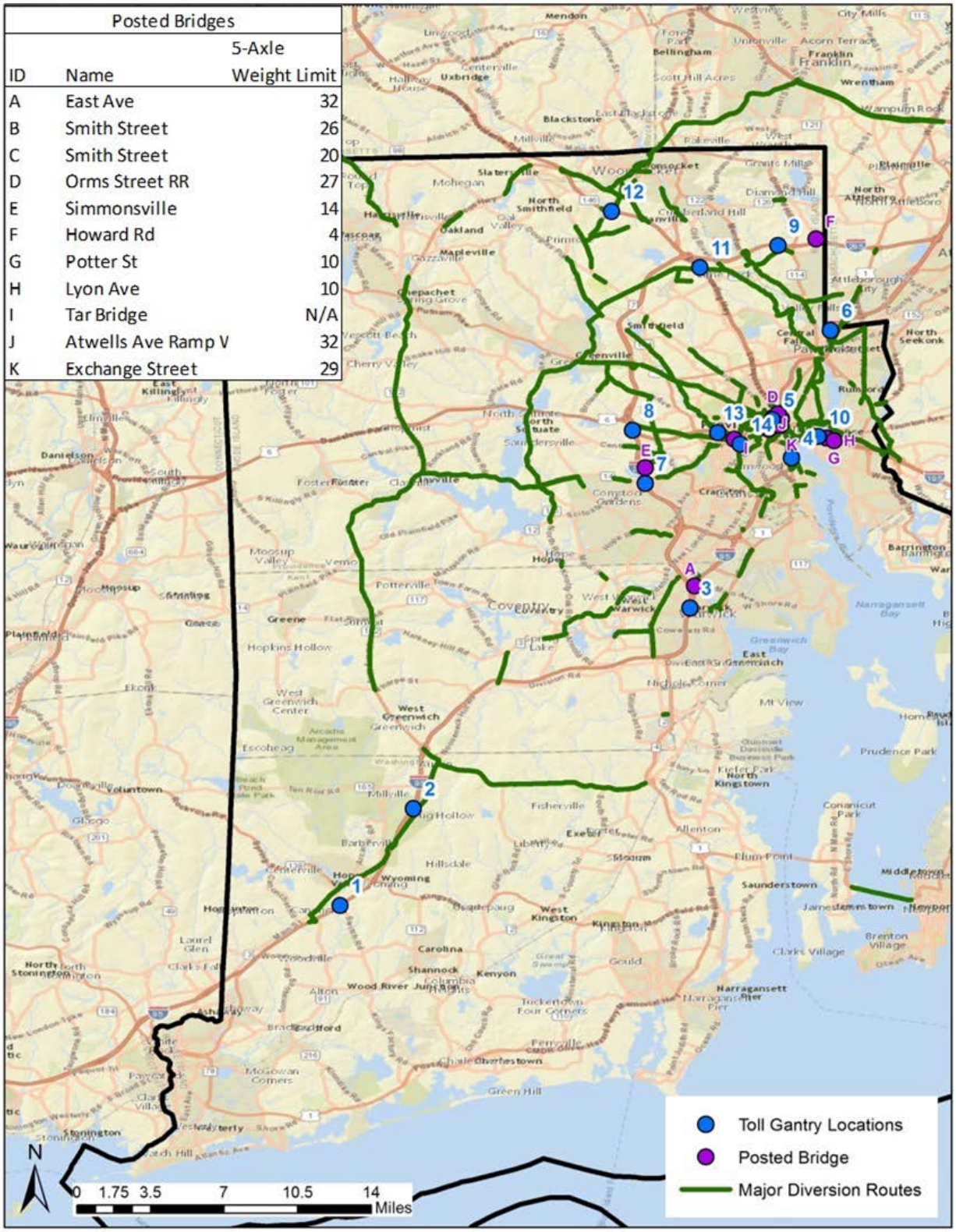
The Louis Berger Team conducted a detailed review of the model network to ensure that roadway links accurately represented travel conditions that might affect the rate of toll diversions. As part of this effort the team conducted an analysis of potential diversion routes to ensure their feasibility for tractor trailer diversions. Based on this assessment, the RISM roadway network was adjusted to better represent travel conditions through key alternative routes.

5.2.5.1 Diversion Route Analysis and Reconnaissance

The Louis Berger Team conducted an analysis of potential diversion routes by running the model assignment step using the updated trip tables described previously, and applying the toll rates defined in the Level 2 Study. The resulting patterns of diversions away from the tolled locations were used to determine primary diversion corridors and routes as shown in Figures 5-12 and 5-13.

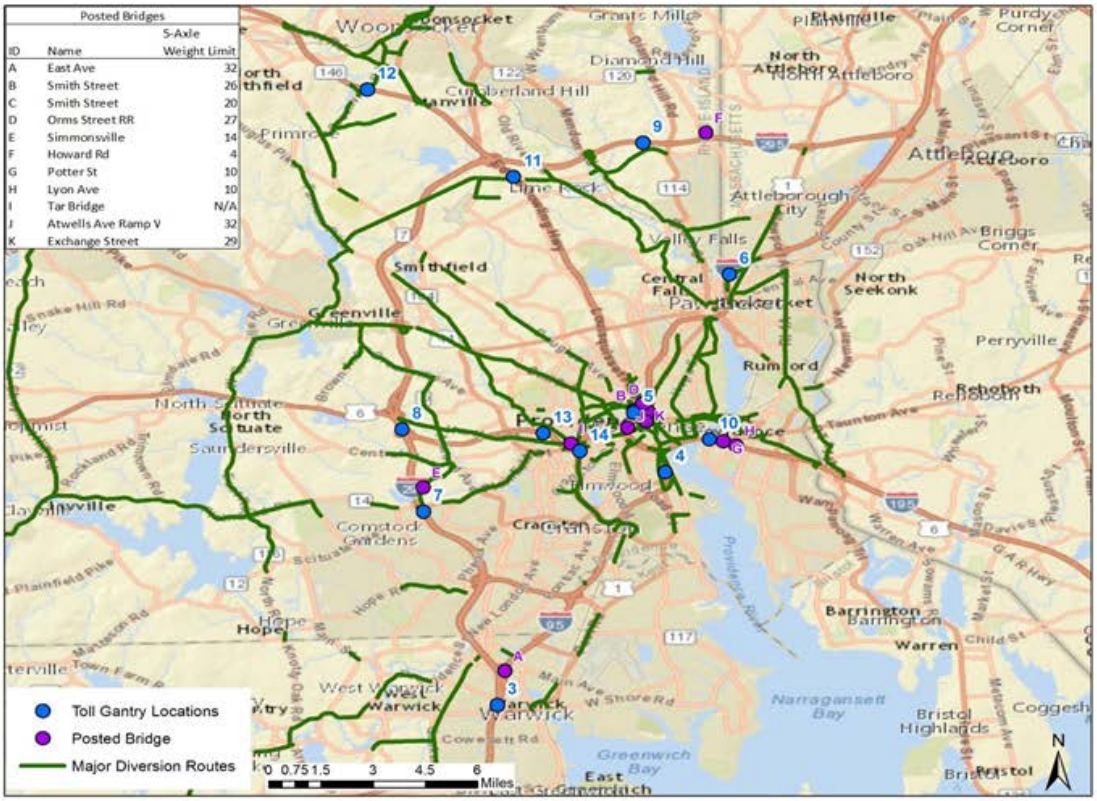
The team then evaluated the potential diversion routes to determine any potential restrictions such as posted bridges that might limit tractor trailer movements. The Louis Berger Team accessed RIDOT's inventory of posted bridges to identify facilities with weight or height restrictions that may impact the ability of tractor trailers to divert away from the toll facilities as shown by the annotations in Figure 5-12 and 5-13.

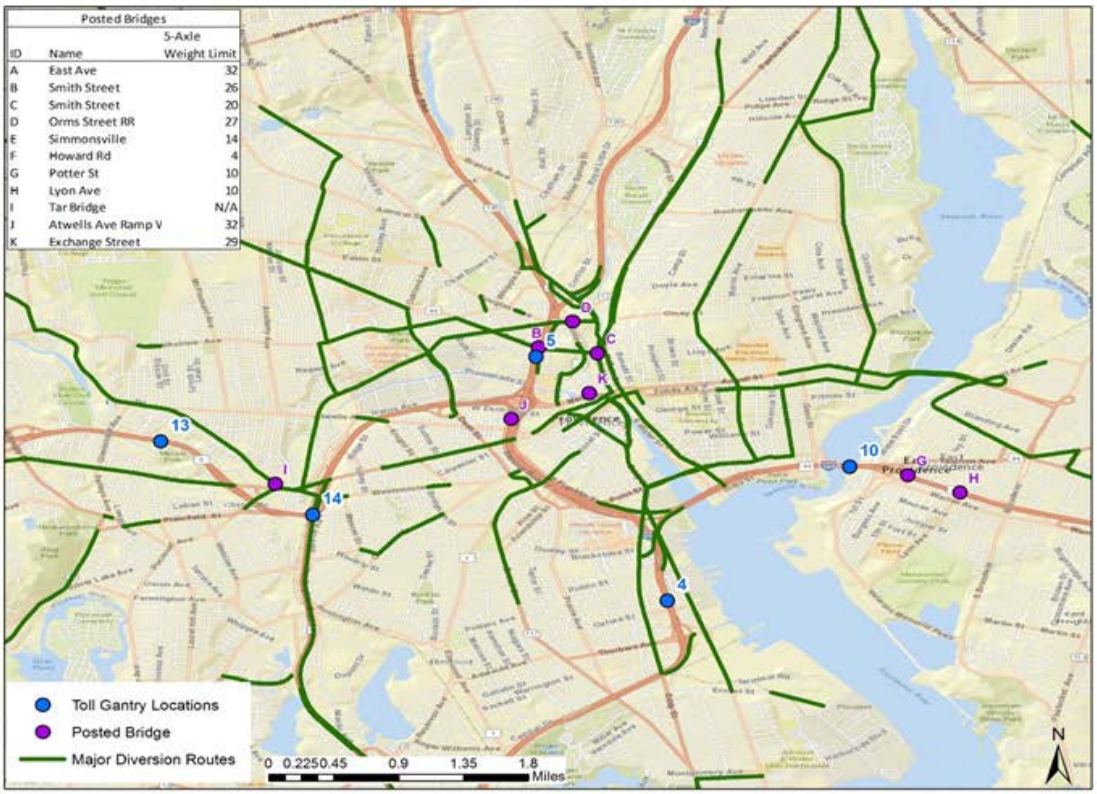
Figure 5-12. Major Diversion Routes (Statewide Perspective)



Posted Bridges		
ID	Name	5-Axle Weight Limit
A	East Ave	32
B	Smith Street	26
C	Smith Street	20
D	Orms Street RR	27
E	Simmonsville	14
F	Howard Rd	4
G	Potter St	10
H	Lyon Ave	10
I	Tar Bridge	N/A
J	Atwells Ave Ramp V	32
K	Exchange Street	29

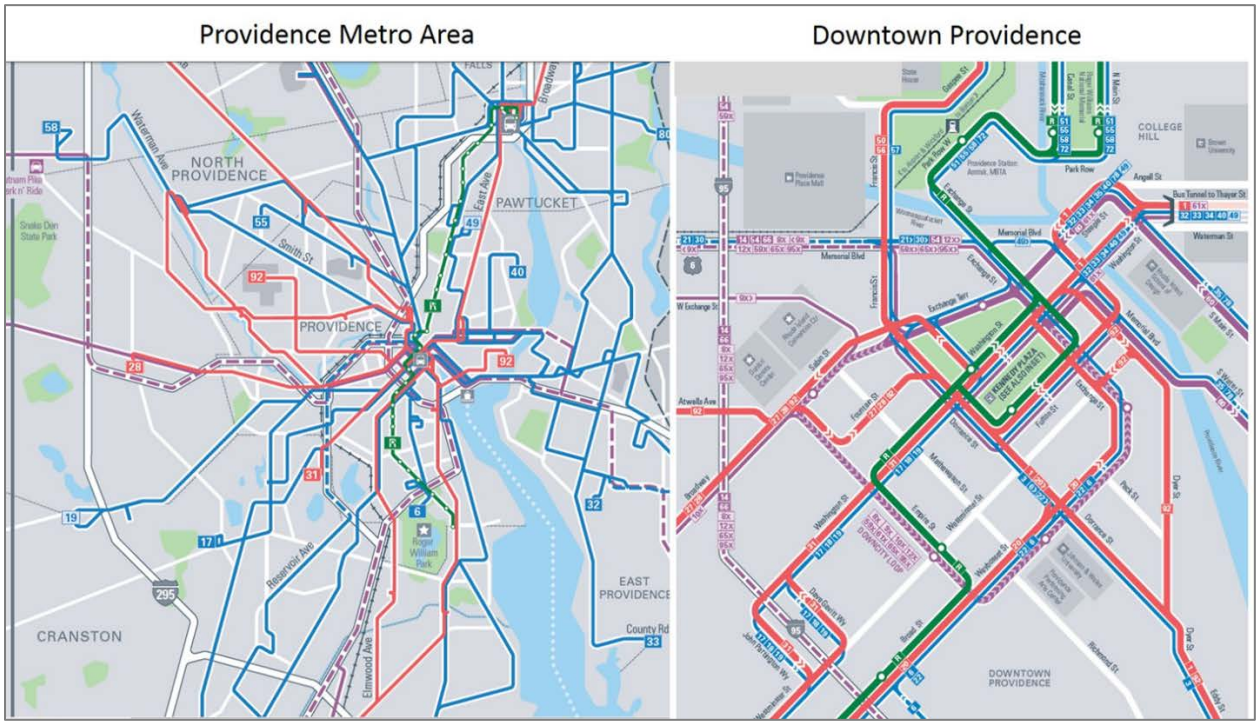
Figure 5-13. Major Diversion Routes (Local/Downtown Providence Perspective)





In addition to identifying the potential limitations to tractor trailer movements, the Louis Berger Team also evaluated the diversion routes to note difficult turning movements, signalized intersections and other impediments that would influence the diversion decisions of tractor trailer operators. Bus routes from the Rhode Island Public Transit Authority (Figure 5-14) were used as part of this analysis to help determine the feasibility of turning movements, particularly in the denser urban core where a large number of trips are expected to originate or terminate from.

FIGURE 5-14. RIPTA BUS MAP



Source: RIPTA

5.2.5.2 Network Adjustments

Based on the detailed review of the potential diversion route, the Louis Berger Team then modified the RISM network to better reflect the roadway conditions around the toll locations and anticipated diversion routes. Intersection delay, intersection penalties were added to the RISM network to more accurately reflect the time spent at intersections; the following penalties were applied to all intersections:

- Left turns: 30 seconds
- Right turns: 15 seconds
- No U-Turns allowed

Additional intersection penalties were added to 108 signalized intersections located in areas adjacent to toll sites based on the diversion analysis described above. The delays were applied to all movements including left turn, right turn and through movements and were differentiated based on the time period:

- Peak: 45 seconds
- Off-peak: 30 seconds

5.3 Base Year Model Calibration

Following the model adjustments described in the preceding sections, the Louis Berger Team calibrated the model to ensure it replicated traffic count data collected at the various tolling locations (Section 3.0). The results of the calibration effort are summarized in Table 5-5 that compares the model estimates of tractor trailers at each of the 14 toll locations, against the corresponding traffic count estimates. This table includes GEH statistic measures that provide an indication of the similarity between the modeled and actual traffic counts. Overall, the calibrated model performed well in replicating the actual traffic volumes. With the exception of locations 4, 5, and 13, all the GEH statistics are under the threshold value of 5.0 – indicating a good match between the modeled and actual traffic estimates. In the case of locations 4 and 5, the GEH statistic is only fractionally higher than the 5.0 threshold. Table 5-6 shows the results of the calibration effort by time-of-day.

Table 5–5. Base Year Model Tractor Trailer Calibration by Toll Location

Toll Location	Model	Actual	GEH Statistic
1	3,971	3,993	0.35
2	4,055	3,861	3.08
3	5,509	5,356	2.08
4	4,629	5,009	5.47
5	3,856	4,206	5.51
6	2,628	2,711	1.60
7	1,966	2,131	3.65
8	5,985	5,926	0.77
9	2,213	2,114	2.15
10	3,659	3,572	1.44
11	1,219	1,202	0.47
12	2,109	2,193	1.80
13	941	736	7.08
14*	1,202	1,202	0.01
TOTAL	**43,944**	**44,211**	**1.27**

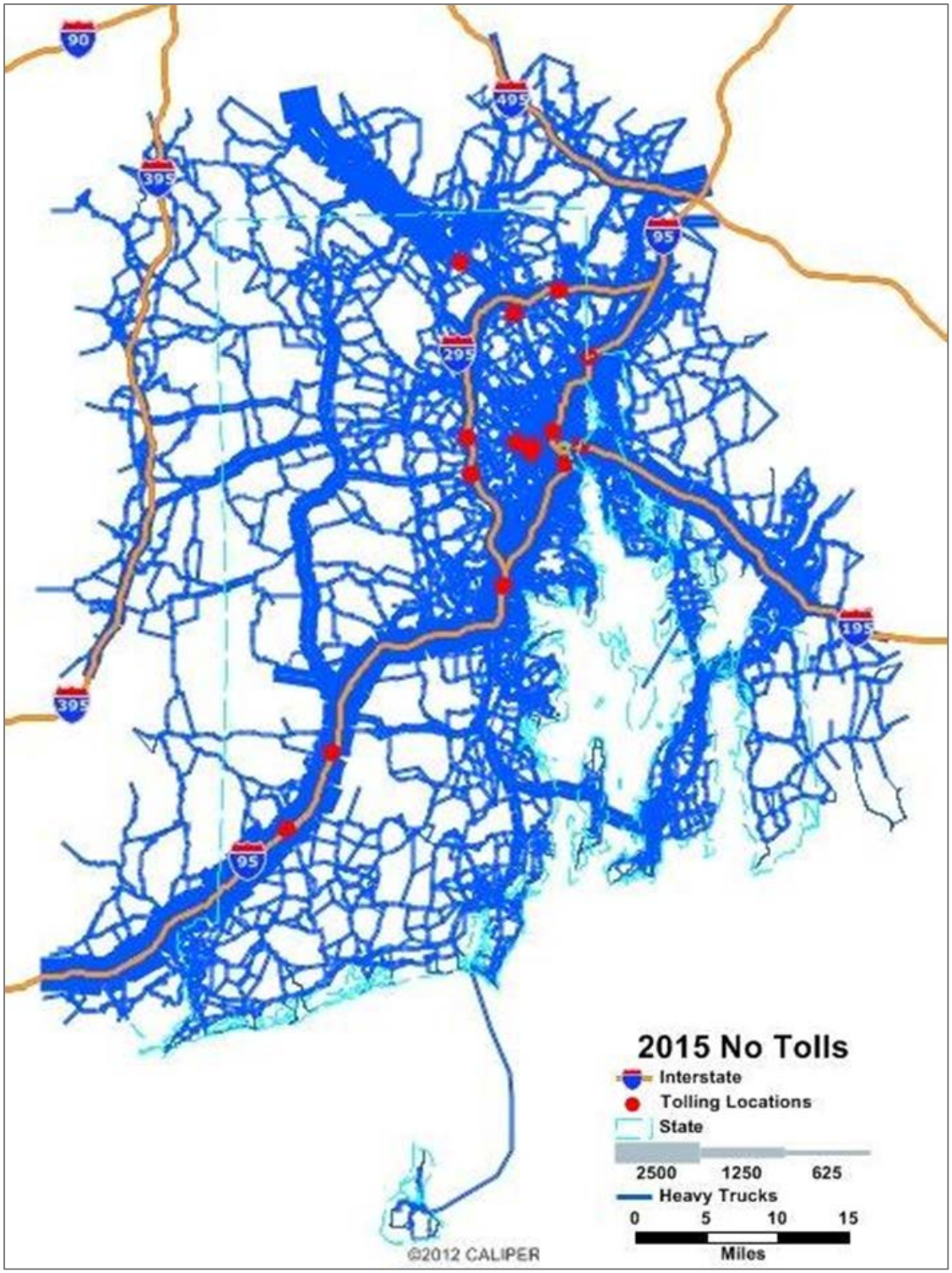
* Calibrated to traffic count location and not actual location (see Table 3-1)

Table 5–6. Base Year Model Tractor Trailer Calibration by Time-of-Day

Time-of-Day	Model	Actual	GEH Statistic
Early AM	7,936	7,893	0.48
AM Peak	8,144	8,286	1.57
Midday	16,657	16,902	1.89
PM Peak	5,033	4,966	0.95
Night	6,175	6,165	0.14
TOTAL	**43,944**	**44,211**	**1.27**

Figure 5-15 displays the resulting calibrated model tractor trailer traffic flows across the RISM network using thickness bands that are proportional to the volume of simulated traffic in the model. As expected, major corridors such as I-95, I-295 and I-195 carry the greatest volume of tractor trailer traffic.

FIGURE 5-15. CALIBRATED MODEL TRACTOR TRAILER TRAFFIC FLOWS



6.0 TRAFFIC AND REVENUE FORECASTS

The Louis Berger Team developed traffic and revenue forecasts for the RIDOT Bridge Tolling Program using the customized Rhode Island Statewide Model described in Section 5.0, that had been modified based on the study team's primary data collection efforts described in preceding sections of this report. This section of the report outlines the key components and the process used to develop the toll traffic and revenue forecasts.

6.1 Toll Sensitivity Analysis

As indicated in the introduction to this report, tolls will be assessed on tractor trailersat the fourteen general locations described in Section 1.0 (Figures 1-2 to 1-5). Based on the traffic counting exercise and the subsequent incorporation of that data in the trip table development and travel demand model calibration, the resulting estimates of tractor trailer traffic under the no toll condition at each of the 14 locations is presented in Table 6-1.

TABLE 6-1. BASE YEAR MODEL TRACTOR TRAILER TRAFFIC ESTIMATES BY LOCATION

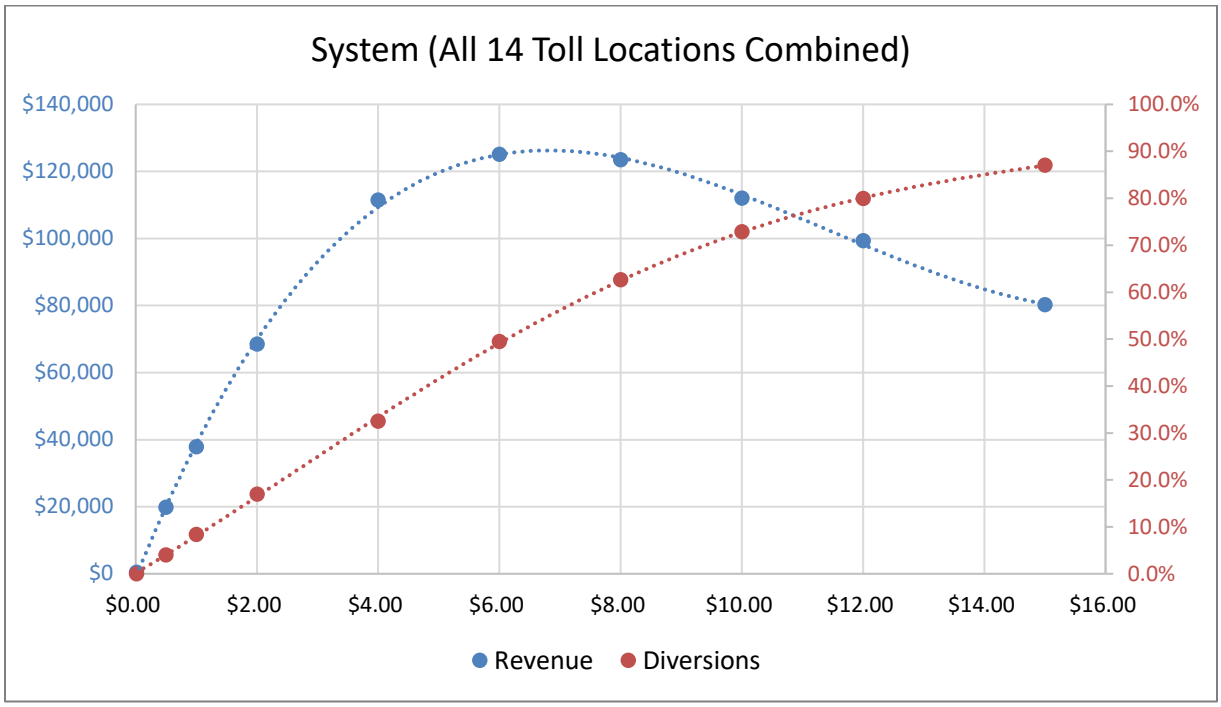
Toll Location	Description	Daily Traffic
1	I-95 NB/SB North of Mechanic Street	3,971
2	I-95 NB/SB North of Nooseneck Hill Road	4,055
3	I-95 NB/SB North of Centerville Road	5,502
4	I-95 NB/SB North of Oxford Street	4,628
5	I-95 NB/SB South of Smith Street	3,876
6	I-95 NB/SB North of East Street	2,640
7	I-295 NB/SB North of Plainfield Pike	1,964
8	I-295 NB/SB at Route 6 Interchanges*	3,283
9	I-295 NB/SB South of Leigh Road	2,212
10	I-195 EB/WB between Gano St & Taunton Ave	3,659
11	Rte 146 NB/SB North of Rte 116 SB On Ramp	1,225
12	Route NB/SB 146 at Route 104 Crossing	2,112
13	Route WB/EB 6 at Woonasquatucket River Crossing	922
14*	Route 10 NB/SB North of Dean Street Overpass	1,031
TOTAL		**41,080**

* Tractor trailer traffic count estimates at this site reflect the relocation of toll gantries to the Dean Street overpass
** Total adjusted to eliminate double counting of traffic movements through gantries 8e and 8f (Figure 1-3)

In order to determine the base case toll rates for each individual gantry location, the Louis Berger Team used the traffic assignment process in the modified statewide model to conduct a toll sensitivity analysis that tested a variety toll rate assumptions and calculated the resulting tractor trailer diversions away from the tolled highway facilities.

Several toll levels ($0.50, $1.00, $2.00, $4.00, $6.00, $8.00, $10.00, $12.00, and $15.00) were tested in separate scenarios and applied to each of the 14 proposed toll locations uniformly. Figure 6-1 shows the resulting plot of raw toll revenues, and the corresponding traffic diversion rates aggregated to the system level (i.e. all 14 locations combined).

Figure 6-1. Toll Revenue and Diversion Sensitivity Analysis (System Level)



Assuming a uniform toll was to be applied at all toll locations, Figure 6-1 implies that the revenue maximizing toll would be achieved by setting the toll at approximately $6.00. However, given the varying conditions at each toll location (trip patterns, availability and ease of alternative diversion route access, etc.), the shape and position of the revenue and diversion curves is expected to differ from location to location, and the corresponding revenue maximizing toll rates will also differ by location. Figure 6-2 presents the individual revenue and diversion curves derived for each location based on the toll rates tested.

Figure 6-2. Toll Revenue and Diversion Sensitivity Analysis (By Toll Location)

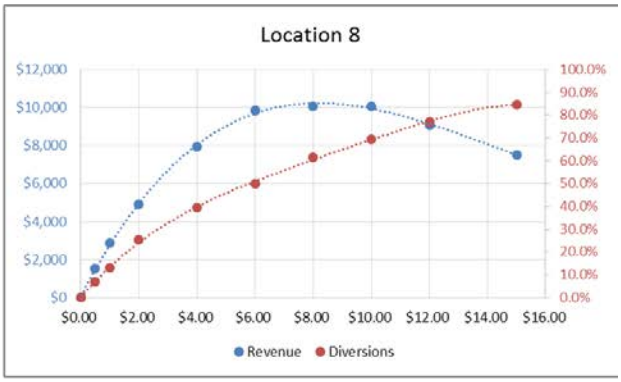
Location 3
$35,000
$30,000
$25,000
$20,000
$15,000
$10,000
$5,000
$0
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
$0.00 $2.00 $4.00 $6.00 $8.00 $10.00 $12.00 $14.00 $16.00
Revenue
Diversions

Location 4
$12,000
$10,000
$8,000
$6,000
$4,000
$2,000
$0
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
$0.00 $2.00 $4.00 $6.00 $8.00 $10.00 $12.00 $14.00 $16.00
Revenue
Diversions

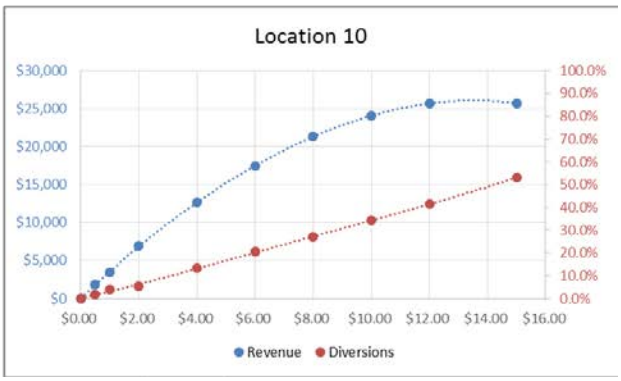
Location 5
$9,000
$8,000
$7,000
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
$0.00 $2.00 $4.00 $6.00 $8.00 $10.00 $12.00 $14.00 $16.00
Revenue
Diversions

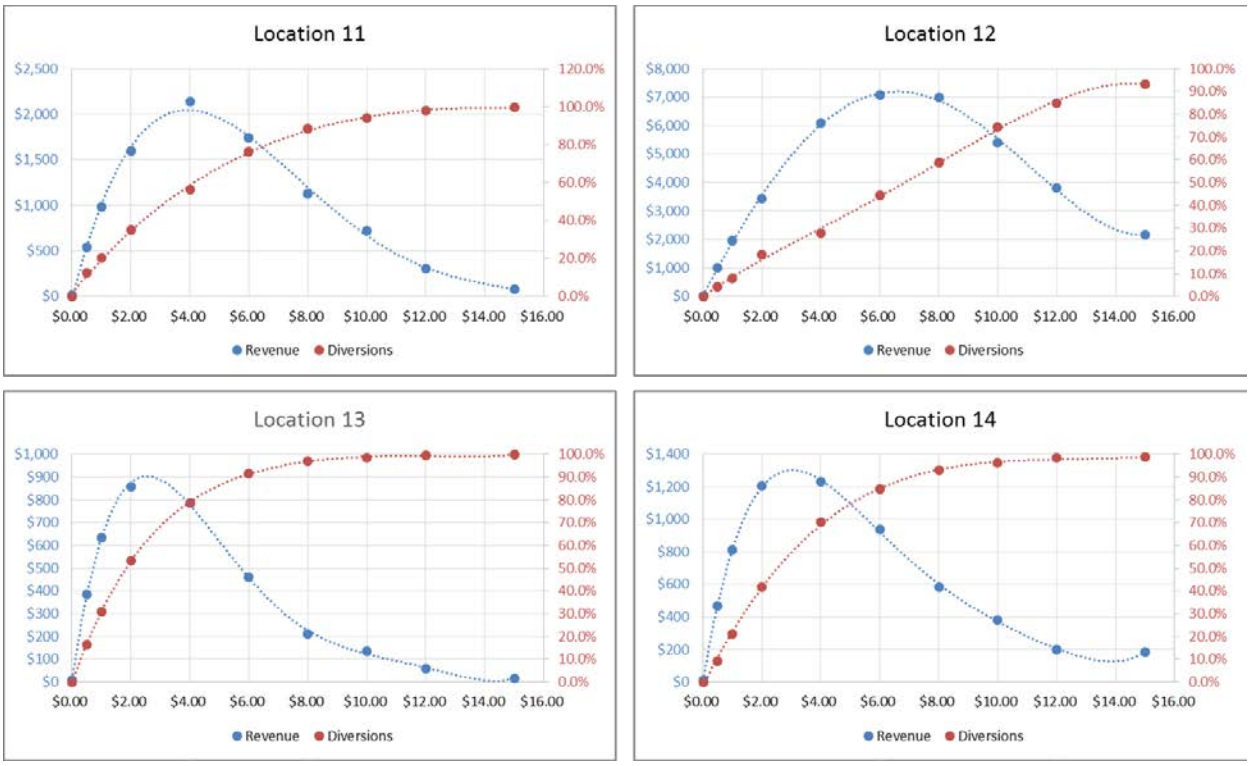
Location 6
$8,000
$7,000
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
$0.00 $2.00 $4.00 $6.00 $8.00 $10.00 $12.00 $14.00 $16.00
Revenue
Diversions

Location 7
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
$0.00 $2.00 $4.00 $6.00 $8.00 $10.00 $12.00 $14.00 $16.00
Revenue
Diversions


Location 8
$12,000
$10,000
$8,000
$6,000
$4,000
$2,000
$0
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
$0.00 $2.00 $4.00 $6.00 $8.00 $10.00 $12.00 $14.00 $16.00
Revenue
Diversions

Location 9
$8,000
$7,000
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
$0.00 $2.00 $4.00 $6.00 $8.00 $10.00 $12.00 $14.00 $16.00
Revenue
Diversions


Location 10
$30,000
$25,000
$20,000
$15,000
$10,000
$5,000
$0
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
$0.00 $2.00 $4.00 $6.00 $8.00 $10.00 $12.00 $14.00 $16.00
Revenue
Diversions



6.2 Traffic & Revenue Forecast Inputs/Assumptions

This section of the report outlines the various considerations incorporated into the traffic and revenue forecast.

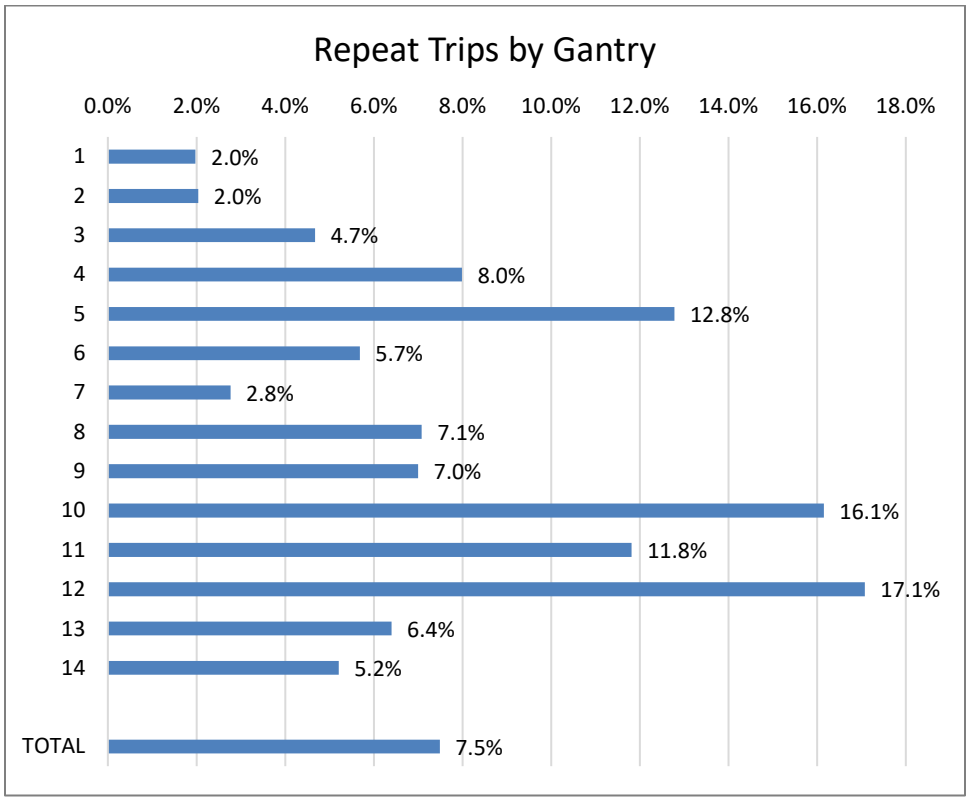
6.2.1 Toll Collection Assumptions

All electronic tolling (AET) technology will be utilized to assess tolls in the proposed system. The previous Level 2 study assumed that 75 percent of tractor trailers would be equipped with E-ZPass transponders. This E-ZPass penetration estimate is similar to the results of the stated preference survey that suggests a 72 percent penetration rate (Table 4-9).

Vehicles equipped with E-ZPass transponders will be charged through electronic tolling while vehicles without these devices will be billed via pay-by-mail. It is currently understood and assumed that the same toll will be assessed regardless of the payment type and that there will be no additional charges assessed to vehicles billed using pay-by-mail. However, pay-by-mail customers who fail to submit payment within the specified timeframe will be charged fines, fees or penalties as outlined in the RhodeWorks legislation.

As also indicated in the introduction to this report, tolls will only be applied once per gantry location in each direction over a 24-hour period – therefore tractor trailers with RFID devices (E-ZPass transponders) that pass the same gantry multiple times in the same direction and the same 24-hour period will only be charged a toll for the first movement captured. Given these considerations, the Louis Berger Team leveraged the INRIX Trip database to obtain estimates of the tractor trailers passing through same gantry multiple times in the same direction during a given day. Figure 6-3 presents the resulting estimates of repeat gantry use by toll location. As expected, with the exception of tolling location 12, the percentage of repeat trips tends to be highest in the dense urban core areas. These estimates of repeat trips by gantry was used to adjust the toll traffic estimates generated by the model before calculating associated revenues.

FIGURE 6-3. PERCENTAGE OF REPEAT TRACTOR TRAILER TRIPS BY GANTRY LOCATION



In addition to the multiple gantry adjustment described above, the total amount of tolls collected from tractor trailers with RFID devices making border-to-border through trips on I-95 across the state was not exceed $20.00 in each direction over a 24-hour period based on the legislation passed to support the tolling program. The tolling legislation also stipulated that maximum toll to be collected from the same individual tractor trailer shall not exceed $40.00 within a 24-hour period. The impact of these discounts on toll revenue were calculated after the base case toll traffic and revenue estimates were generated by the travel demand model, and the resulting traffic patterns analyzed. The resulting adjustments to toll revenue estimates is discussed in Section 6.3.

6.2.2 Annualization Factors

Because the modified travel demand model used in this analysis was calibrated to reflect average weekday traffic, the Louis Berger Team developed an annualization factor to convert resulting average weekday toll traffic and revenue estimates to annual volumes. An annualization factor of 291 was estimated based on the differences in average weekday and weekend traffic as outlined in Section 3.0 of this report (Tables 3-4 and Tables 3-5).

Table 6-2 presents the annualization factors calculated for each of the toll locations using traffic count data collected for both weekdays and weekends. Average day traffic count estimates were calculated by multiplying average weekday and average weekend traffic counts, by the number of week and weekend days in a given week and diving the sum of both products by seven. The subsequent annualization factors were calculated by multiplying the ratio of average day and average weekday traffic by 365, resulting in values that ranged between 280 and 296. Given the variation in resulting annualization factor estimates,

the Louis Berger Team applied the median value of 291 to the travel demand model's daily forecast estimate. Alternative annualization factors (high and low estimates) were evaluated in sensitivity tests.

TABLE 6-2. ANNUALIZATION FACTOR CALCULATION

Toll Location	Average Weekday	Average Weekend	Average Day	Annualization Factor
1	3,993	1,366	3,242	296
2	3,861	1,274	3,122	295
3	5,356	1,533	4,263	291
4	5,009	1,559	4,023	293
5	4,206	1,301	3,376	293
6	2,711	842	2,177	293
7	2,131	505	1,666	285
8	5,926	1,168	4,567	281
9	2,114	385	1,620	280
10	3,572	1,193	2,892	296
11	1,202	355	960	291
12	2,193	469	1,700	283
13	736	182	578	286
14	1,202	225	923	280
Low				**280**
Median				**291**
High				**296**

6.2.3 Post Processing Adjustments

The Louis Berger Team post processed the raw model outputs as part of the traffic and revenue forecast effort. Post processing of model outputs is typically performed in toll revenue forecasts to account for factors that cannot be practically incorporated into the traditional modeling tools and procedures. These factors, the methodology for post-processing, and key assumptions are discussed below.

As noted in the Level 2 Study, strict enforcement of regulations to promote the safe and efficient use of tractor trailers on local roadways can be expected to reduce the rate of diversions from the designated highway truck routes included in the Rhode Works toll program. Similar tractor trailer enforcement actions have been conducted in other states where public agencies have sought to minimize toll diversions and address public safety concerns related to truck use of alternate roads that are not well suited for heavy vehicle traffic. An increase by police in the frequency of vehicle stops and inspections, which result in fines and points assessed on driver's licenses for violations, has been known to provide a strong incentive for tractor trailers to stay on the designated highway toll corridor corridors and not divert to local routes that are more heavily policed. While many of the enforcement campaigns found in the literature are temporary in nature, the Louis Berger Team understands that significant resources have already been committed toward permanent enforcement efforts in Rhode Island: approximately half a

million dollars have been dedicated to support police enforcement of non-local tractor trailer use under the RhodeWorks program.

While this enforcement is likely to have significant effects on diversions, quantifying its effect represents a significant challenge in the modeling process.[7] Two examples of studies quantifying the effect of enforcement are instructive.

- In early 2004, Ohio stepped up enforcement against trucks on selected two-lane roads in an effort to force diverted traffic back onto the Turnpike[8] and evidence from those and other traffic safety enforcement efforts indicate heavy commercial traffic on the turnpike increased by as much as 36 percent for tractor trailers.
- The assumptions applied in a toll study for Interstate Route 80 in Wyoming implied that diversions could increase by about 25 percent without enforcement actions.[9] This Wyoming study therefore recommended a tolling enforcement zone along the 400 mile corridor with resources specifically dedicated towards this effort.

Based on these examples the Louis Berger Team adjusted the raw model outputs to account for police enforcement of non-local tractor trailer use of alternate local routes. The impact of these enforcement actions was assumed to reduce diversions by 50 percent. This assumption accounts for the fact that concentrated enforcement efforts are likely to be more effective in Rhode Island where the opportunity for diversion from the designated highway roadway network is not as extensive. Alternative assumptions for the effects of enforcement actions were also evaluated in sensitivity tests.

The other post processing adjustment applied to the forecast relates to multiple gantry use assumptions. As discussed in Section 6.2.1, tractor trailers with RFID devices that pass the same gantry multiple times in the same direction and the same 24-hour period will only be charged a toll for the first movement captured. Figure 6-3 provides an estimate of how much tolls at each location need to be reduced to account for multiple gantry use. However, reducing traffic estimates by these factors overstates the impact of multiple gantry use on toll revenue because the cost of paying a one-time toll for multiple use of gantry also reduces the 'effective toll rate' paid and should thereby reduce the incentives for tractor trailers to divert away. As a result, the Louis Berger Team also reduced the percentage of repeat trips in Figure 6-3 by 25 percent across all gantries. This reduction accounts for the lower 'effective toll rate' discount as well as the volume of tractor trailers not equipped with E-ZPass transponders (28 percent – Table 4-9) that would pay tolls each time they used the same gantry in a 24-hour period.

6.3 2016 Base Case Forecast Scenarios

The Louis Berger Team identified schedule of base case toll rates to be applied at each individual location based on an optimization exercise that sought maximize toll revenue while balancing several competing considerations such as:

- The cost of toll revenue collection per billed transaction.
- Minimizing the total cost of tolls on border-to-border through trip movements along I-95 (toll locations 1-6) subject to the $20.00 limit defined in the legislation supporting this program.

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[7] Proctor, G., Morckel, K., 2004. Northern Ohio Freight Strategy, Recommendations to Improve Traffic Safety and Congestion.
[8] Swan, P., Belzer, M., 2007. Empirical Evidence of Toll Road Traffic Diversion and Implications for Highway Infrastructure Privatization.
[9] Parsons Brinckerhoff, 2008. Interstate 80 Toll Feasibility Study Final Report, Prepare for the Wyoming Department of Transportation

- Maximizing toll revenue while also minimizing the rates of diversion at the overall system level.
- Maintaining a median toll rate within the $3.00-$6.00 range

Using these guidelines, a base case toll scenario was developed as shown in Table 6-3. As can be seen from the table, no tolls are applied to location 5 of 14 under the base case toll scenario.

Starting with no toll tractor trailer traffic volume estimate, the application of tolls results in varied levels of diversions away from the tolled facilities – these diversions include the post model enforcement impacts discussed in Section 6.2.3. The resulting estimate of toll traffic is also adjusted to account for estimates of multiple gantry use in the same direction as described in Section 6.2.1. The resulting adjusted traffic represents the billable transactions that on an average weekday will generate an estimated $153,000 which translates to approximately 45 million dollars annually.

Table 6-3. 2016 Base Case Toll Rate & Corresponding Revenues

Toll Location	No Toll Tractor Trailer Traffic	Toll Revenue Tractor Trailer Traffic Estimate				Revenue	
		Toll Rate ($2016)	Diversion Rate*	Toll Traffic		Daily	Annual (000's)
				Pre-Gantry Use Adj.	Multiple Gantry Adj.		
1	3,971	$3.75	10.1%	3,570	3,517	$13,190	$3,838
2	4,055	$4.50	9.7%	3,662	3,606	$16,226	$4,722
3	5,502	$7.00	16.1%	4,614	4,453	$31,169	$9,070
4	4,628	$2.50	14.5%	3,956	3,719	$9,297	$2,706
5	0	$0.00	0.0%	0	0	$0	$0
6	2,640	$2.25	2.4%	2,577	2,467	$5,552	$1,616
7	1,964	$6.50	34.7%	1,283	1,256	$8,167	$2,377
8	3,283	$8.50	34.0%	2,165	2,050	$17,429	$5,072
9	2,212	$7.50	31.8%	1,508	1,429	$10,718	$3,119
10	3,659	$10.00	13.9%	3,152	2,770	$27,701	$8,061
11	1,225	$4.00	26.0%	906	826	$3,303	$961
12	2,112	$6.75	24.0%	1,605	1,400	$9,448	$2,750
13	922	$2.00	29.6%	649	618	$1,236	$360
14	0	$0.00	0.0%	0	0	$0	$0
Total / (avg)	**36,173**	**$5.50**	**18.0%**	**29,649**	**28,112**	**$153,437**	**$44,651**

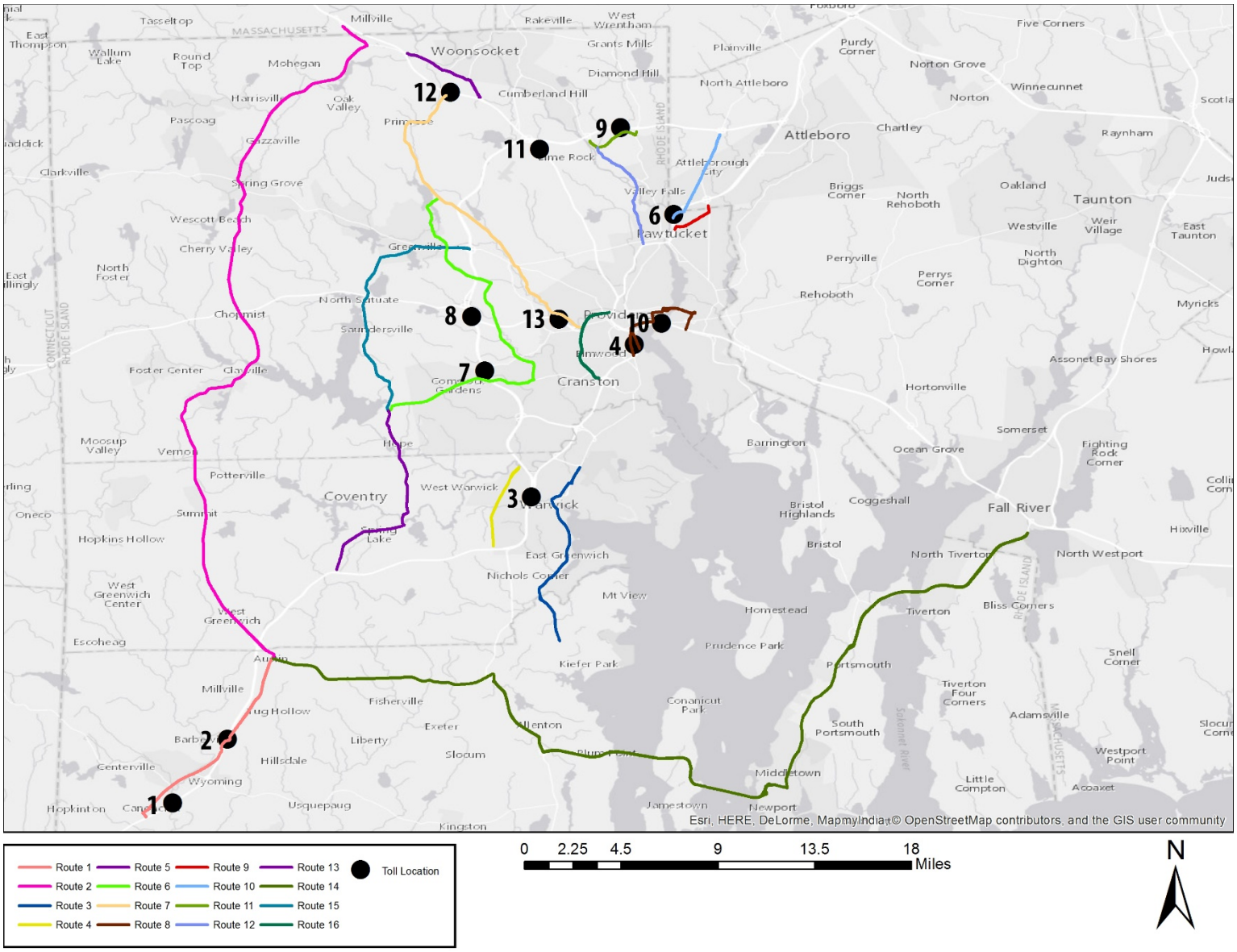
* Diversion rate includes effects of enforcement impacts

Overall, approximately 18 percent of tractor trailers are estimated to divert away from the tolled locations in the system. Figure 6-4 shows a regional overview of the primary diversion routes across the state. A more detailed discussion of the diversion route analysis is provided in Appendix C that also details the anticipated traffic impacts on adjacent roadway facilities across the state. Table 6-4 breaks down the diversion rate at each toll location by the O-D trip type. As expected, through trips (E-E) tend to display the lowest levels of toll diversion while conversely, intra state trips (I-I) tend to exhibit the greatest probability of diversion.

Table 6-4. Base Case Distribution of Tractor Trailer Diversion Rates by O-D Trip Type

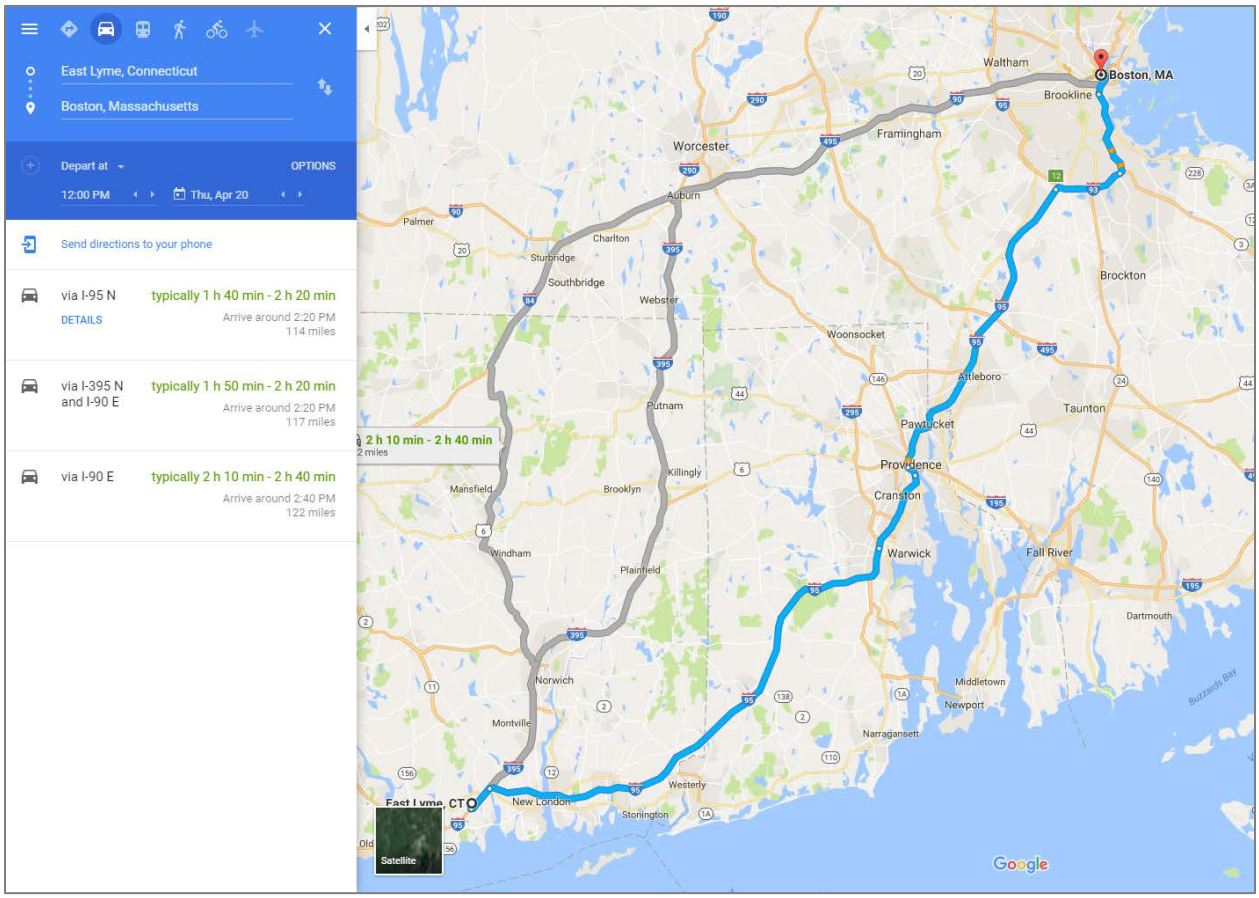
	Traffic	Diversion Rate	Distribution of Diversions by Trip Type			
			Internal-Internal (I-I)	Internal-External (I-E)	External-Internal (E-I)	External-External (E-E)
Location 1	3,971	10.1%	12.9%	37.0%	28.7%	21.5%
Location 2	4,055	9.7%	29.0%	19.8%	23.9%	27.4%
Location 3	5,502	16.1%	70.6%	11.0%	13.6%	4.8%
Location 4	4,628	14.5%	43.5%	14.2%	26.8%	15.4%
Location 6	2,640	2.4%	12.4%	64.4%	41.8%	-18.6%
Location 7	1,964	34.7%	49.0%	25.5%	20.7%	4.9%
Location 8	3,283	34.0%	40.6%	26.8%	23.6%	9.0%
Location 9	2,212	31.8%	12.4%	41.6%	30.9%	15.1%
Location 10	3,659	13.9%	29.9%	22.5%	27.4%	20.2%
Location 11	1,225	26.0%	15.5%	36.9%	35.2%	12.3%
Location 12	2,112	24.0%	14.2%	32.4%	41.1%	12.3%
Location 13	922	29.6%	40.9%	26.5%	26.5%	6.1%
TOTAL	**36,173**	**18.0%**	**36.0%**	**26.0%**	**25.9%**	**12.1%**

Figure 6-4. Base Case Toll Scenario Changes in Tractor Trailer Movements



The Louis Berger Team also separately evaluated the potential effect of long distance through movement diversions around the state resulting from the implementation of base case tolls. The most plausible alternative route requiring the use of I-395 and the Massachusetts Turnpike as shown in Figure 6-5 takes fractionally longer to traverse and also includes $11.00 in tolls for tractor trailers on the Massachusetts Turnpike, as well as additional vehicle operating costs for the additional travel mileage. Based on the VOT of long distance trips, the Louis Berger Team determined that this alternative route does not provide a competitive advantage over the tolled I-95 route through Rhode Island and is therefore unlikely to impact the base case toll revenue estimates.

FIGURE 6-5. ALTERNATIVE LONG DISTANCE THROUGH ROUTES



6.3.1 Alternative Toll Scenarios

The Louis Berger Team analyzed alternative scenarios where tolls were applied to locations 5 and 14.

- Alternative Scenario 1: Tolls applied to all locations except location 5
- Alternative Scenario 2: Tolls applied to all locations except location 14
- Alternative Scenario 3: Tolls applied to all locations

Tables 6-5 to 6-7 show the resulting diversion and revenue implications of these alternative scenarios in the 2016 base year. It should however be noted that the tolls under each of the alternative scenarios varies in accordance with separate toll optimization exercises that were conducted to ensure fidelity to the previously highlighted guidelines.

Table 6-5. 2016 Alternative Scenario 1 (No Toll at Location 5)

Toll Location	No Toll Tractor Trailer Traffic	Toll Revenue Tractor Trailer Traffic Estimate				Revenue	
		Toll Rate ($2016)	Diversion Rate*	Toll Traffic		Toll Rate ($2016)	Diversion Rate*
				Pre-Gantry Use Adj.	Multiple Gantry Adj.		
1	3,971	$3.75	9.9%	3,579	3,526	$13,223	$3,848
2	4,055	$4.50	9.4%	3,673	3,617	$16,275	$4,736
3	5,502	$7.00	15.0%	4,679	4,515	$31,606	$9,197
4	4,628	$2.50	10.7%	4,133	3,886	$9,715	$2,827
5	0	$0.00	0.0%	0	0	$0	$0
6	2,640	$2.25	3.0%	2,561	2,452	$5,517	$1,606
7	1,964	$6.50	34.2%	1,292	1,266	$8,226	$2,394
8	3,283	$8.50	33.8%	2,174	2,059	$17,498	$5,092
9	2,212	$7.50	31.7%	1,511	1,432	$10,738	$3,125
10	3,659	$10.00	13.7%	3,156	2,774	$27,740	$8,073
11	1,225	$4.00	25.1%	917	836	$3,344	$973
12	2,112	$6.75	23.0%	1,627	1,419	$9,577	$2,787
13	922	$2.00	31.1%	635	605	$1,210	$352
14	1,031	$3.00	22.7%	797	766	$2,297	$669
Total / (avg)	**37,204**	**$4.50**	**17.4%**	**30,736**	**29,151**	**$156,966**	**$45,678**

* Diversion rate includes effects of enforcement impacts

Table 6-6. 2016 Alternative Scenario 2 (No Toll at Location 14)

Toll Location	No Toll Tractor Trailer Traffic	Toll Revenue Tractor Trailer Traffic Estimate				Revenue	
		Toll Rate ($2016)	Diversion Rate*	Toll Traffic		Daily	Annual (000's)
				Pre-Gantry Use Adj.	Multiple Gantry Adj.		
1	3,971	$3.25	7.9%	3,658	3,604	$11,712	$3,408
2	4,055	$3.50	7.0%	3,771	3,714	$12,998	$3,782
3	5,502	$6.25	13.8%	4,742	4,576	$28,598	$8,322
4	4,628	$2.25	14.6%	3,953	3,716	$8,361	$2,433
5	3,876	$2.25	10.1%	3,485	3,151	$7,089	$2,063
6	2,640	$2.50	4.4%	2,523	2,415	$6,038	$1,757
7	1,964	$6.50	33.8%	1,299	1,272	$8,271	$2,407
8	3,283	$8.50	33.4%	2,186	2,070	$17,595	$5,120
9	2,212	$7.50	31.7%	1,510	1,430	$10,728	$3,122
10	3,659	$9.50	13.9%	3,152	2,770	$26,319	$7,659
11	1,225	$3.50	25.4%	914	833	$2,914	$848
12	2,112	$6.75	23.7%	1,611	1,405	$9,484	$2,760
13	922	$2.00	31.4%	632	602	$1,204	$350
14	0	$0.00	0.0%	0	0	$0	$0
Total / (avg)	**40,049**	**$3.50**	**16.5%**	**33,436**	**31,558**	**$151,311**	**$44,033**

* Diversion rate includes effects of enforcement impacts

TABLE 6-7. 2016 ALTERNATIVE SCENARIO 3 (TOLL AT ALL 14 LOCATIONS)

Toll Location	No Toll Tractor Trailer Traffic	Toll Revenue Tractor Trailer Traffic Estimate				Revenue	
		Toll Rate ($2016)	Diversion Rate*	Toll Traffic		Daily	Annual (000's)
				Pre-Gantry Use Adj.	Multiple Gantry Adj.		
1	3,971	$3.25	7.9%	3,655	3,601	$11,704	$3,406
2	4,055	$3.50	7.1%	3,767	3,710	$12,984	$3,778
3	5,502	$6.25	12.8%	4,797	4,629	$28,933	$8,420
4	4,628	$2.25	12.3%	4,059	3,816	$8,586	$2,499
5	3,876	$2.25	10.8%	3,456	3,124	$7,030	$2,046
6	2,640	$2.50	4.5%	2,521	2,413	$6,033	$1,756
7	1,964	$6.50	33.9%	1,298	1,271	$8,260	$2,404
8	3,283	$8.50	33.4%	2,185	2,069	$17,587	$5,118
9	2,212	$7.50	31.2%	1,521	1,441	$10,807	$3,145
10	3,659	$9.50	13.6%	3,162	2,779	$26,399	$7,682
11	1,225	$3.50	25.2%	917	835	$2,924	$851
12	2,112	$6.75	23.7%	1,611	1,405	$9,480	$2,759
13	922	$2.00	31.2%	635	604	$1,208	$352
14	1,031	$3.00	27.4%	748	719	$2,158	$628
Total / (avg)	**41,080**	**$3.50**	**16.4%**	**34,331**	**32,417**	**$154,093**	**$44,842**

* Diversion rate includes effects of enforcement impacts

6.4 2040 Base Case Forecast

Following the development of the 2016 base case forecast, the Louis Berger Team developed a future year forecast using the RISM 2040 horizon year. The 2040 base case forecast was developed with the following inputs and assumptions:

- 2040 trip tables as described in Section 5.2.1
- Base case tolls were held at the 2016 nominal rates

Figure 6-6 presents the consumer price index (CPI) scenarios obtained from Moody's Analytics. Whereas the native Moody's forecast referenced assumes an average annualized price increase of 2.3 percent, the alternative CPI modeling assumption uses an average annualized growth rate of 2.0 percent based on observations of more recent price increase rates (2006-2016).

Table 6-8 presents the resulting tractor trailer traffic levels, diversion estimates, and corresponding toll revenues generated in 2040 under the base case scenarios.

The lower diversion rates in the 2040 scenarios are the partially driven by increased future congestion on non-tolled alternative routes, but are also due to lower effective tolls (the real toll rate declines at 2.0 percent per year based on the CPI assumptions described above). So even though potential tractor trailer traffic at the 14 locations only increases by 6 percent between 2016 and 2040, the volume of overall toll tractor trailer traffic and revenue increases by approximately 14 percent (0.60 percent CAGR) under the base case scenario.

Figure 6-7 presents the estimated stream of revenues in nominal dollars starting in the year 2016. Forecasts beyond 2040 were estimated based on extrapolation of 2016 to 2040 annualized growth rates.

FIGURE 6-6. CONSUMER PRICE INDEX (CPI) SCENARIOS

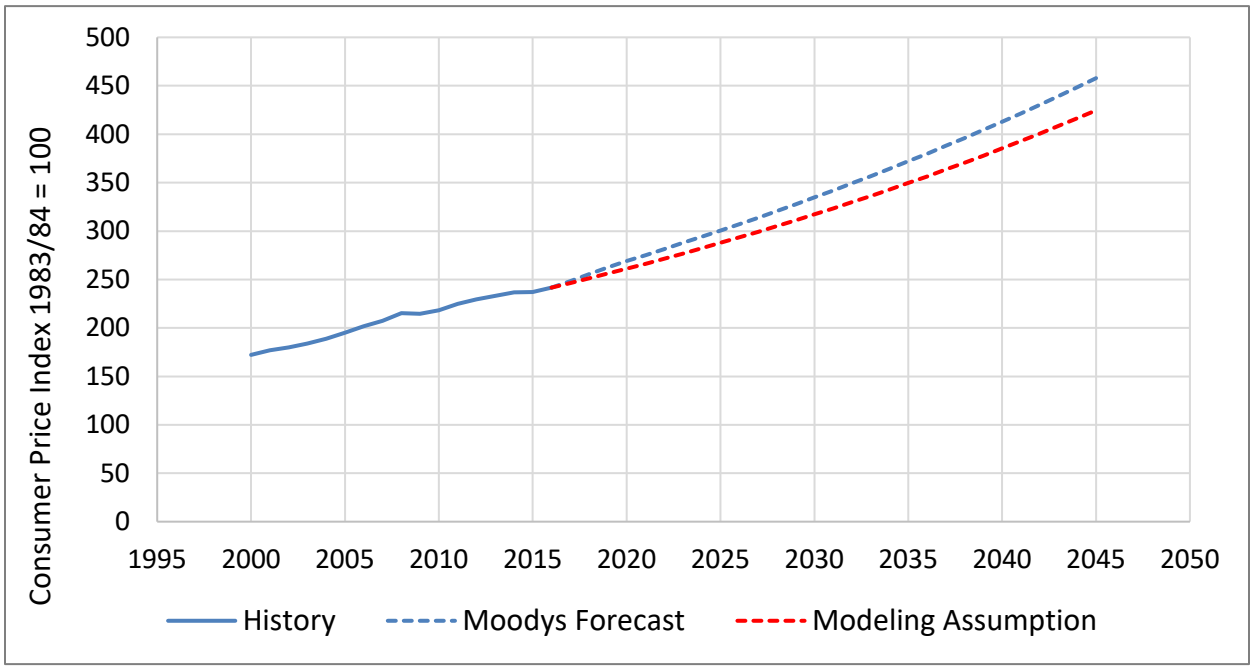
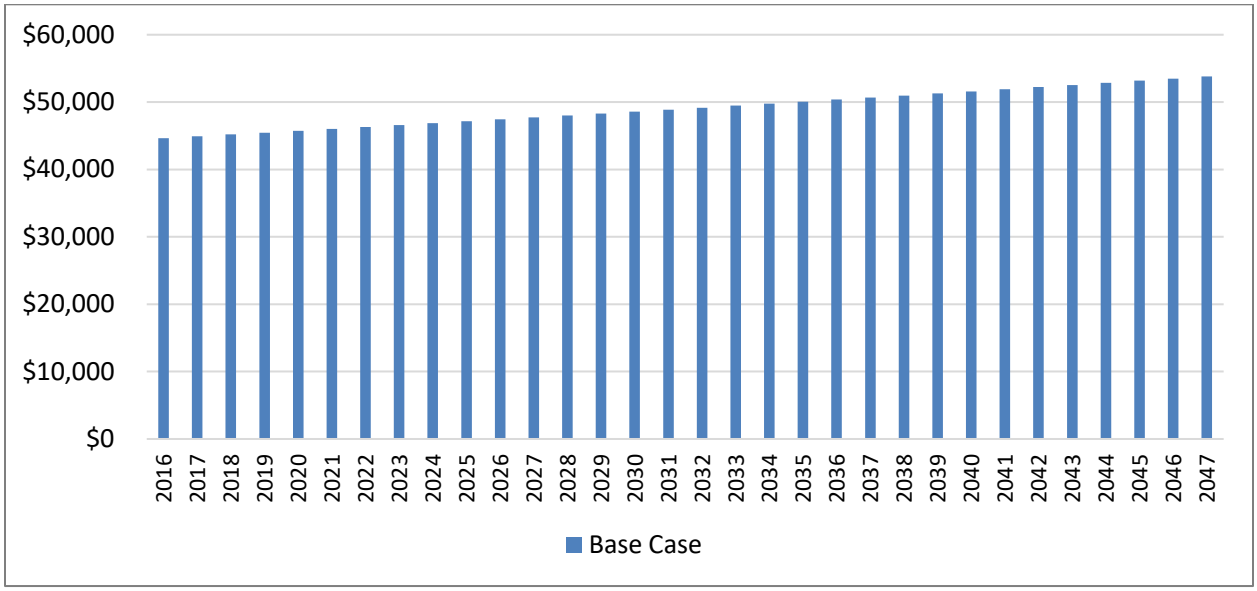


TABLE 6-8. 2040 BASE CASE TOLL RATE & CORRESPONDING REVENUES

Toll Location	No Toll Tractor Trailer Traffic	Toll Revenue Tractor Trailer Traffic Estimate				Revenue	
		Toll Rate ($2016)	Diversion Rate*	Toll Traffic		Daily	Annual (000's)
				Pre-Gantry Use Adj.	Multiple Gantry Adj.		
1	4,048	$3.75	6.1%	3,803	3,746	$14,049	$4,088
2	4,288	$4.50	5.0%	4,073	4,010	$18,047	$5,252
3	5,798	$7.00	7.8%	5,348	5,161	$36,125	$10,513
4	4,861	$2.50	6.4%	4,548	4,276	$10,689	$3,111
5	0	$0.00	0.0%	0	0	$0	$0
6	2,730	$2.25	0.1%	2,726	2,609	$5,871	$1,709
7	2,110	$6.50	22.8%	1,628	1,594	$10,362	$3,015
8	3,633	$8.50	26.6%	2,666	2,525	$21,461	$6,245
9	2,217	$7.50	22.4%	1,722	1,631	$12,235	$3,560
10	3,958	$10.00	9.2%	3,593	3,157	$31,574	$9,188
11	1,266	$4.00	16.7%	1,054	961	$3,844	$1,119
12	2,305	$6.75	15.2%	1,955	1,704	$11,505	$3,348
13	1,039	$2.00	22.4%	807	768	$1,536	$447
14	0	$0.00	0.0%	0	0	$0	$0
Total / (avg)	**38,254**	**$5.50**	**11.3%**	**33,921**	**32,144**	**$177,298**	**$51,595**

* Diversion rate includes effects of enforcement impacts

FIGURE 6-7. TOLL REVENUE (NOMINAL DOLLARS)



6.5 Sensitivity Tests

The Louis Berger Team also conducted a series of other sensitivity tests that altered some of the assumptions defined under the base case scenario. The list and brief description of sensitivity tests is provided below:

- **Alternative VOT scenarios** tested uncertainty around values-of-time by setting VOTs at 25 percent above and below the base case assumption levels.
- **Enforcement Impacts** tested alternative assumptions regarding the impact of enforcement actions on toll diversions and resulting toll revenues. The base case assumed enforcement actions would limit diversions to 50 percent the raw model estimate. Alternative assumptions assumed no enforcement action (i.e. raw model outputs), 50 percent decrease in base case assumptions (i.e. diversions equal to 25 percent the raw model outputs), and a 50 percent increase in base case assumptions (i.e. diversions equal to 75 percent the raw model outputs)
- **Alternative trip growth scenario** tested uncertainty in the growth assumptions of future year traffic. Differences between socioeconomic and demographic assumptions in the RISM and corresponding estimates of the same from Moody's Analytics were evaluated. Similarly, the model's tractor trailer trip growth rate assumptions were compared against projected growth rates implied by both the FAF and ICAT databases. Based on these observations, the Louis Berger Team tested the estimated effect of a 10 percent increase in the 2040 future year trip table.
- **Annualization rate scenario** altered the annualization factor from the base assumption of 291 to the low and high alternatives rates of 281 to 296 to account for possible variations in the rate of annualization as discussed in Section 6.2.2.

Table 6-9 presents the results of the sensitivity analysis as well as comparisons against the alternative toll scenarios described in Section 6.3.1.

Table 6-9. Sensitivity Analysis (Nominal Dollars)

	Base Case	Sensitivity Analysis								Alternative Scenarios		
		Value of Time		Enforcement Impact			Trip Growth	Annualization Factor		1	2	3
		-25%	+25%	None	50% Less	50% More		Low	High	No Toll Loc. 5	No Toll Loc. 14	Toll All Loc.
2016	$44,651	$44,127	$45,125	$34,562	$39,877	$50,507	$44,651	$42,918	$45,476	$45,678	$44,033	$44,842
2017	$44,921	$44,400	$45,382	$34,910	$40,179	$50,705	$45,100	$43,177	$45,750	$45,220	$44,279	$44,842
2018	$45,192	$44,675	$45,640	$35,261	$40,483	$50,903	$45,553	$43,438	$46,027	$45,500	$44,527	$44,842
2019	$45,465	$44,952	$45,900	$35,615	$40,789	$51,102	$46,010	$43,700	$46,305	$45,782	$44,776	$44,842
2020	$45,740	$45,231	$46,162	$35,973	$41,098	$51,302	$46,472	$43,964	$46,584	$46,066	$45,026	$44,842
2021	$46,016	$45,511	$46,425	$36,335	$41,409	$51,502	$46,939	$44,230	$46,866	$46,351	$45,278	$44,842
2022	$46,294	$45,793	$46,690	$36,700	$41,722	$51,704	$47,410	$44,497	$47,149	$46,638	$45,532	$44,842
2023	$46,574	$46,077	$46,956	$37,069	$42,037	$51,906	$47,887	$44,766	$47,434	$46,927	$45,787	$44,842
2024	$46,855	$46,362	$47,223	$37,442	$42,355	$52,109	$48,368	$45,036	$47,720	$47,218	$46,043	$44,842
2025	$47,138	$46,649	$47,492	$37,819	$42,676	$52,313	$48,853	$45,308	$48,009	$47,511	$46,300	$44,842
2026	$47,423	$46,938	$47,763	$38,199	$42,999	$52,517	$49,344	$45,582	$48,299	$47,805	$46,560	$44,842
2027	$47,709	$47,229	$48,035	$38,583	$43,324	$52,723	$49,840	$45,858	$48,590	$48,101	$46,820	$44,842
2028	$47,998	$47,522	$48,309	$38,971	$43,652	$52,929	$50,340	$46,135	$48,884	$48,399	$47,082	$44,842
2029	$48,288	$47,816	$48,584	$39,363	$43,982	$53,136	$50,846	$46,413	$49,179	$48,699	$47,346	$44,842
2030	$48,579	$48,113	$48,861	$39,758	$44,314	$53,344	$51,357	$46,694	$49,476	$49,001	$47,610	$44,842
2031	$48,873	$48,411	$49,139	$40,158	$44,650	$53,552	$51,872	$46,976	$49,775	$49,305	$47,877	$44,842
2032	$49,168	$48,711	$49,419	$40,562	$44,987	$53,762	$52,393	$47,259	$50,076	$49,610	$48,145	$44,842
2033	$49,465	$49,013	$49,701	$40,970	$45,328	$53,972	$52,920	$47,545	$50,378	$49,918	$48,414	$44,842
2034	$49,764	$49,316	$49,984	$41,381	$45,671	$54,183	$53,451	$47,832	$50,683	$50,227	$48,685	$44,842
2035	$50,064	$49,622	$50,269	$41,797	$46,016	$54,395	$53,988	$48,121	$50,989	$50,538	$48,958	$44,842
2036	$50,367	$49,929	$50,555	$42,218	$46,364	$54,607	$54,530	$48,412	$51,297	$50,851	$49,231	$44,842
2037	$50,671	$50,239	$50,843	$42,642	$46,715	$54,821	$55,078	$48,704	$51,607	$51,166	$49,507	$44,842
2038	$50,977	$50,550	$51,133	$43,071	$47,068	$55,035	$55,631	$48,998	$51,918	$51,483	$49,784	$44,842
2039	$51,285	$50,863	$51,424	$43,504	$47,424	$55,250	$56,190	$49,294	$52,232	$51,802	$50,063	$44,842
2040	$51,595	$51,178	$51,717	$43,941	$47,783	$55,467	$56,754	$49,592	$52,548	$52,331	$50,343	$51,244
2041	$51,907	$51,496	$52,012	$44,383	$48,144	$55,683	$57,324	$49,892	$52,865	$52,446	$50,624	$51,244
2042	$52,220	$51,815	$52,308	$44,829	$48,509	$55,901	$57,900	$50,193	$53,184	$52,771	$50,908	$51,244
2043	$52,536	$52,136	$52,606	$45,280	$48,876	$56,120	$58,482	$50,496	$53,506	$53,098	$51,193	$51,244
2044	$52,853	$52,459	$52,906	$45,735	$49,245	$56,339	$59,069	$50,801	$53,829	$53,427	$51,479	$51,244
2045	$53,172	$52,784	$53,207	$46,195	$49,618	$56,559	$59,662	$51,108	$54,154	$53,758	$51,767	$51,244
2046	$53,493	$53,111	$53,510	$46,659	$49,993	$56,781	$60,262	$51,417	$54,481	$54,092	$52,057	$51,244
2047	$53,817	$53,440	$53,815	$47,129	$50,371	$57,003	$60,867	$51,728	$54,810	$54,427	$52,348	$51,244

APPENDIX A – DETAILED AVERAGE WEEKDAY TRAFFIC COUNTS

As indicated in Section 3.0 of this report, traffic counts were collected at several locations defined by the proposed toll locations. Table A-1 below provides a summary of the average weekday tabulations by location while detailed hourly data from each of the 29 locations enumerated in the table below are also included in this appendix to provide an indication of the hourly variation in traffic volumes.

TABLE A-1 AVERAGE WEEKDAY TRAFFIC COUNTS

ID	LOCATION	Traffic Count Station ID	Cars	Single Unit Trucks	Tractor Trailers			TOTAL Traffic
					Single Trailer	Tandem Trailer	Subtotal	
1	I-95 NB/SB North of Mechanic Street	4034 / 4035	48,362	1,706	3,923	70	**3,993**	**54,061**
2	I-95 NB/SB North of Nooseneck Hill Road	4036 / 4037	47,301	1,684	3,785	77	**3,861**	**52,847**
3	I-95 NB/SB North of Centerville Road	4038 / 4039	175,403	5,414	5,161	122	**5,282**	**186,099**
3-a	I-95 NB/SB On/Off Ramps to/from Centerville Road	3993 / 3992	17,666	545	73	1	**73**	**18,283**
4	I-95 NB/SB North of Oxford Street	4040 / 4041	190,479	5,720	4,949	60	**5,009**	**201,208**
5	I-95 NB/SB South of Smith Street	4042 / 4043	235,968	6,473	4,165	42	**4,206**	**246,648**
6	I-95 NB/SB North of East Street	4044 / 4045	87,904	2,455	2,586	25	**2,611**	**92,970**
6-a	I-95 NB/SB On/Off Ramp to/from East Street	3995 / 3994	7,272	222	84	16	**100**	**7,595**
7	I-295 NB/SB North of Plainfield Pike	4046 / 4047	73,261	2,811	1,700	43	**1,742**	**77,815**
7-a	I-295 NB On Ramp from Route 14	3996	9,292	872	253	6	**259**	**10,423**
7-b	I-295 NB Off Ramp to Route 14	3997	5,569	794	122	7	**129**	**6,492**
8	I-295 NB/SB South of Greenville Avenue	4048 / 4049	84,943	3,079	2,279	78	**2,357**	**90,379**
8-1	I-295 NB South of Route 6A	4067NB	25,977	977	776	42	**817**	**27,771**
8-1a	I-295 NB Service Rd South of Rte 6A On Ramp	4067SV	5,160	182	82	1	**82**	**5,424**
8-2	I-295 SB North of Route 6A	4066SB	28,047	1,075	913	41	**954**	**30,077**
8-2a	I-295 SB/Service Road North of Route 6A Off Ramp	4066SV	12,953	424	140	1	**142**	**13,518**
8-3	I-295 SB South of Route 6	4068	42,724	2,031	1,331	31	**1,362**	**46,117**
8-a	Route 6 NB Off Ramp to I-295 NB	4065	14,857	443	209	2	**211**	**15,511**
9	I-295 NB/SB South of Leigh Road	4053 / 4054	62,728	2,109	2,041	72	**2,114**	**66,950**
10-1	I-195 WB East of Taunton Ave Ramps	4056	67,154	2,267	1,568	21	**1,589**	**71,009**
10-2	I-195 EB West of Gano Street	4055	88,147	2,769	1,682	15	**1,697**	**92,613**
10-a	Taunton Ave WB On Ramp to I-195 WB	3998	21,903	1,225	266	21	**287**	**23,415**
11	Rte 146 NB/SB North of Rte 116 SB On Ramp	4057NB/SB	60,075	1,548	1,166	25	**1,191**	**62,814**
11-a	Rte 146 SB On Ramp from Rte 116	3999	2,468	181	12	-	**12**	**2,661**
12	Route NB/SB 146 at Route 104 Crossing	4058 / 4059	40,338	1,597	2,137	56	**2,193**	**44,128**
13	Route WB/EB 6 at Woonasquatucket River Crossing	4060 / 4061	60,414	2,326	731	5	**736**	**63,476**
14-1	Route 10 SB North of Route 6	4064	63,523	1,821	565	6	**571**	**65,914**
14-2	Route 6 EB West of Route 10	4062	46,225	1,513	498	1	**499**	**48,236**
14-3	Route 10 NB South of Route 6	4063	39,960	924	130	3	**133**	**41,016**
TOTAL			1,666,071	55,185	43,325	886	**44,211**	**1,765,467**
			94.4%	3.1%	2.5%	0.1%	**2.5%**	**100.0%**

Traffic Data Collection ID 1 (Stations 4034/4035)

Location 1: I-95 NB/SB North of Mechanic Street

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	315	4	67	7	74	**393**	202	9	52	0	52	**263**	517	13	119	7	126	**656**
1:00	192	7	72	5	76	**274**	89	5	38	0	38	**132**	281	11	110	5	114	**406**
2:00	147	9	79	4	83	**238**	107	9	88	0	88	**204**	253	18	167	4	171	**442**
3:00	122	6	91	1	92	**219**	109	13	107	0	107	**229**	231	19	198	1	199	**448**
4:00	184	23	114	2	116	**323**	211	20	78	0	78	**308**	394	43	192	2	194	**631**
5:00	388	18	134	10	144	**549**	498	29	64	0	64	**590**	886	46	198	10	208	**1,139**
6:00	793	34	177	11	188	**1,015**	815	66	53	0	53	**934**	1,608	100	230	11	241	**1,948**
7:00	1,169	50	148	9	158	**1,377**	1,103	75	76	0	76	**1,254**	2,271	125	225	9	234	**2,631**
8:00	1,206	53	111	3	114	**1,373**	1,176	82	87	0	87	**1,345**	2,382	135	199	3	201	**2,718**
9:00	1,040	51	89	1	90	**1,182**	1,349	77	108	0	108	**1,533**	2,389	128	196	1	198	**2,715**
10:00	1,328	40	76	1	77	**1,445**	1,620	66	125	0	125	**1,812**	2,949	106	201	1	202	**3,257**
11:00	1,333	59	82	0	82	**1,474**	1,712	52	137	0	137	**1,901**	3,045	110	219	0	219	**3,375**
12:00	1,282	58	76	0	77	**1,416**	1,709	59	139	0	139	**1,907**	2,991	117	215	1	216	**3,324**
13:00	1,413	69	75	0	76	**1,558**	1,577	53	122	0	122	**1,752**	2,990	122	197	1	198	**3,310**
14:00	1,822	77	98	2	100	**1,999**	1,547	50	109	0	109	**1,706**	3,370	127	207	2	209	**3,705**
15:00	1,999	75	77	1	78	**2,152**	1,647	44	90	0	90	**1,780**	3,645	119	167	1	168	**3,933**
16:00	1,896	54	55	0	55	**2,006**	1,684	40	68	2	70	**1,793**	3,580	94	123	2	125	**3,799**
17:00	1,692	34	47	0	47	**1,773**	1,688	37	64	1	64	**1,789**	3,380	71	111	1	112	**3,562**
18:00	1,375	33	45	0	45	**1,454**	1,570	28	64	0	64	**1,663**	2,946	62	109	0	109	**3,117**
19:00	1,172	20	47	1	48	**1,240**	1,160	20	59	0	59	**1,239**	2,332	39	106	1	107	**2,479**
20:00	1,010	14	40	1	41	**1,065**	940	11	55	1	55	**1,007**	1,950	26	94	2	96	**2,072**
21:00	990	15	55	2	57	**1,062**	737	14	55	0	55	**806**	1,727	29	110	2	112	**1,868**
22:00	699	12	49	1	51	**761**	520	13	59	0	59	**591**	1,218	25	108	2	110	**1,353**
23:00	690	13	75	2	77	**780**	340	9	48	0	48	**398**	1,030	22	123	2	125	**1,177**
TOTAL	**24,255**	**828**	**1,979**	**64**	**2,043**	**27,126**	**24,107**	**879**	**1,944**	**5**	**1,950**	**26,935**	**48,362**	**1,706**	**3,923**	**70**	**3,993**	**54,061**
Peak	**1,999**	**77**	**177**	**11**	**188**	**2,152**	**1,712**	**82**	**139**	**2**	**139**	**1,907**	**3,645**	**135**	**230**	**11**	**241**	**3,933**

Traffic Data Collection ID 2 (Stations 4036/4037)

Location 1: I-95 NB/SB North of Nooseneck Hill Road

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	302	7	76	1	77	**386**	222	4	46	0	47	**272**	523	10	123	1	124	**658**
1:00	186	7	64	4	68	**261**	122	9	55	0	55	**187**	308	16	119	4	123	**448**
2:00	132	6	64	1	65	**203**	86	11	67	0	68	**165**	218	18	131	1	133	**369**
3:00	145	8	78	1	79	**232**	104	24	75	1	75	**204**	249	32	153	1	154	**435**
4:00	195	10	107	5	112	**317**	224	20	77	0	77	**321**	419	30	184	5	189	**638**
5:00	422	21	121	4	125	**567**	504	40	57	0	57	**601**	926	61	178	4	182	**1,168**
6:00	839	37	187	11	198	**1,074**	867	53	55	3	58	**978**	1,706	90	243	14	256	**2,052**
7:00	1,242	52	119	16	135	**1,429**	1,132	71	67	1	68	**1,270**	2,373	123	186	17	202	**2,699**
8:00	1,228	47	108	3	111	**1,386**	1,160	81	86	1	87	**1,328**	2,389	128	194	4	198	**2,714**
9:00	1,096	49	93	1	94	**1,238**	1,353	77	113	1	113	**1,543**	2,448	126	206	2	207	**2,781**
10:00	1,130	50	73	0	73	**1,252**	1,564	65	124	2	126	**1,756**	2,694	115	197	2	199	**3,008**
11:00	1,309	57	94	0	95	**1,460**	1,577	63	117	1	118	**1,758**	2,886	119	212	1	213	**3,218**
12:00	1,351	66	90	2	91	**1,508**	1,655	58	126	1	127	**1,840**	3,005	124	216	3	219	**3,348**
13:00	1,387	63	98	0	98	**1,548**	1,567	61	104	0	104	**1,733**	2,955	124	202	0	202	**3,281**
14:00	1,706	70	95	1	95	**1,872**	1,604	52	103	2	104	**1,761**	3,310	123	197	2	200	**3,633**
15:00	1,824	73	73	1	74	**1,971**	1,659	45	90	1	91	**1,795**	3,483	119	163	1	165	**3,766**
16:00	1,721	49	52	2	54	**1,824**	1,722	33	63	2	66	**1,820**	3,443	82	115	4	119	**3,644**
17:00	1,634	36	50	0	50	**1,720**	1,712	25	65	1	67	**1,804**	3,347	61	115	2	117	**3,524**
18:00	1,281	38	40	0	40	**1,359**	1,504	22	70	0	70	**1,597**	2,785	60	110	0	111	**2,956**
19:00	1,082	22	46	1	47	**1,151**	1,129	17	58	2	61	**1,207**	2,211	40	105	3	108	**2,358**
20:00	941	13	37	0	37	**991**	861	15	52	0	52	**928**	1,801	28	89	0	90	**1,919**
21:00	920	15	62	1	63	**998**	644	10	60	0	60	**714**	1,564	25	122	1	123	**1,712**
22:00	832	13	44	1	45	**890**	437	6	56	0	56	**499**	1,269	18	100	1	101	**1,389**
23:00	679	9	68	2	70	**758**	309	5	58	0	59	**373**	988	14	126	2	128	**1,131**
TOTAL	**23,582**	**818**	**1,939**	**57**	**1,995**	**26,395**	**23,719**	**866**	**1,846**	**20**	**1,866**	**26,452**	**47,301**	**1,684**	**3,785**	**77**	**3,861**	**52,847**
Peak	**1,824**	**73**	**187**	**16**	**198**	**1,971**	**1,722**	**81**	**126**	**3**	**127**	**1,840**	**3,483**	**128**	**243**	**17**	**256**	**3,766**

Traffic Data Collection ID 3 (Stations 4038/4039)

Location 1: I-95 NB/SB North of Centerville Road

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	1,011	16	73	3	76	**1,103**	669	10	53	3	56	**735**	1,680	27	126	6	132	**1,838**
1:00	420	12	60	1	61	**494**	327	13	59	3	63	**403**	748	26	119	4	124	**897**
2:00	289	15	71	3	74	**378**	209	20	75	2	77	**306**	499	35	146	5	150	**684**
3:00	291	21	86	2	88	**400**	234	30	80	1	81	**346**	525	51	166	3	169	**745**
4:00	643	27	104	6	110	**780**	625	44	75	4	79	**748**	1,269	71	179	10	189	**1,528**
5:00	1,447	56	156	6	162	**1,664**	2,151	95	77	2	79	**2,325**	3,598	150	233	8	241	**3,990**
6:00	3,994	114	214	10	224	**4,332**	3,951	197	122	2	124	**4,271**	7,945	311	335	12	348	**8,604**
7:00	6,774	188	190	9	198	**7,161**	5,406	306	129	1	130	**5,842**	12,180	494	319	10	328	**13,002**
8:00	6,450	163	173	5	178	**6,791**	5,546	291	140	1	141	**5,978**	11,996	454	313	6	318	**12,769**
9:00	4,863	188	162	1	163	**5,214**	4,838	275	192	1	193	**5,306**	9,702	462	354	2	356	**10,520**
10:00	4,546	195	142	0	142	**4,883**	4,775	201	189	2	191	**5,168**	9,321	396	331	2	333	**10,050**
11:00	4,721	215	151	1	151	**5,087**	5,010	207	194	1	195	**5,412**	9,731	422	345	1	346	**10,499**
12:00	4,758	216	140	0	141	**5,115**	5,161	186	186	0	186	**5,533**	9,919	402	326	1	327	**10,648**
13:00	4,854	218	144	2	146	**5,217**	5,072	190	176	0	176	**5,438**	9,926	407	320	2	322	**10,655**
14:00	5,900	225	145	1	147	**6,272**	5,693	184	158	1	159	**6,036**	11,594	409	303	2	306	**12,308**
15:00	6,898	222	109	1	110	**7,230**	6,160	136	113	0	113	**6,410**	13,059	358	222	1	223	**13,640**
16:00	6,484	170	80	1	80	**6,734**	6,413	106	90	1	91	**6,610**	12,897	276	170	1	171	**13,344**
17:00	6,909	117	74	4	77	**7,104**	6,704	75	84	1	85	**6,864**	13,613	192	158	5	162	**13,968**
18:00	4,925	115	55	1	57	**5,097**	5,307	58	84	1	85	**5,450**	10,232	173	139	2	141	**10,547**
19:00	3,747	75	56	1	57	**3,879**	3,655	44	73	4	77	**3,776**	7,401	120	129	5	134	**7,655**
20:00	3,290	39	48	1	49	**3,378**	2,883	29	52	5	57	**2,969**	6,173	68	100	7	107	**6,348**
21:00	2,679	25	53	0	53	**2,756**	2,268	18	56	11	67	**2,353**	4,947	42	109	11	120	**5,109**
22:00	2,000	18	60	2	62	**2,081**	1,690	16	54	6	60	**1,766**	3,691	34	114	8	122	**3,847**
23:00	1,688	19	50	4	54	**1,761**	1,070	13	55	5	59	**1,143**	2,758	32	105	8	113	**2,904**
TOTAL	**89,584**	**2,669**	**2,595**	**64**	**2,659**	**94,912**	**85,819**	**2,744**	**2,565**	**58**	**2,623**	**91,186**	**175,403**	**5,414**	**5,161**	**122**	**5,282**	**186,099**
Peak	**6,909**	**225**	**214**	**10**	**224**	**7,230**	**6,704**	**306**	**194**	**11**	**195**	**6,864**	**13,613**	**494**	**354**	**12**	**356**	**13,968**

Traffic Data Collection ID 3a (Stations 3993/3992)

Location 1: I-95 NB/SB On/Off Ramps to/from Centerville Road

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	40	1	0	0	0	**40**	95	2	0	0	0	**97**	135	2	0	0	0	**137**
1:00	20	2	0	0	0	**22**	55	1	1	0	1	**57**	75	3	1	0	1	**78**
2:00	10	1	1	0	1	**12**	32	1	1	0	1	**34**	42	3	1	0	1	**46**
3:00	18	2	0	0	0	**20**	20	1	0	0	0	**22**	39	2	0	0	0	**41**
4:00	45	4	0	0	0	**49**	32	2	1	0	1	**35**	76	7	1	0	1	**84**
5:00	121	5	0	0	0	**126**	94	5	1	0	1	**100**	215	10	1	0	1	**226**
6:00	324	15	1	0	1	**339**	268	15	1	0	1	**285**	592	30	2	0	2	**624**
7:00	519	20	2	0	2	**540**	627	31	4	0	4	**662**	1,146	51	6	0	6	**1,202**
8:00	453	15	2	0	2	**470**	892	26	4	0	4	**922**	1,345	41	5	0	5	**1,392**
9:00	363	18	2	0	2	**383**	787	28	3	0	3	**819**	1,150	46	6	0	6	**1,202**
10:00	315	17	3	0	3	**334**	676	23	2	0	2	**701**	991	39	5	0	5	**1,035**
11:00	320	17	2	0	2	**338**	695	23	4	0	4	**721**	1,014	39	6	0	6	**1,060**
12:00	323	18	2	0	2	**343**	759	23	3	0	3	**785**	1,082	41	5	0	5	**1,128**
13:00	336	17	3	0	3	**356**	761	22	4	0	4	**786**	1,097	39	6	0	6	**1,142**
14:00	366	17	4	0	4	**386**	809	22	4	0	4	**835**	1,175	39	8	0	8	**1,221**
15:00	426	17	3	0	3	**446**	865	21	3	0	3	**889**	1,290	38	6	0	6	**1,334**
16:00	475	14	3	0	3	**492**	956	16	3	0	3	**975**	1,431	31	5	0	5	**1,467**
17:00	427	10	1	0	1	**438**	880	13	2	0	2	**895**	1,307	23	3	0	3	**1,332**
18:00	260	9	1	0	1	**269**	785	13	2	0	2	**800**	1,044	22	3	0	3	**1,069**
19:00	210	4	1	0	1	**215**	558	9	1	0	1	**568**	768	13	1	0	1	**783**
20:00	203	4	0	0	0	**207**	399	6	0	0	0	**404**	601	10	1	0	1	**611**
21:00	147	4	1	0	1	**152**	301	3	0	0	0	**305**	448	8	1	0	1	**456**
22:00	121	2	0	0	1	**124**	222	4	0	0	0	**226**	343	6	1	0	1	**350**
23:00	76	1	0	0	0	**77**	183	2	1	0	1	**186**	259	3	1	0	1	**263**
TOTAL	**5,914**	**232**	**29**	**0**	**29**	**6,176**	**11,751**	**312**	**43**	**0**	**44**	**12,107**	**17,666**	**545**	**73**	**1**	**73**	**18,283**
Peak	**519**	**20**	**4**	**0**	**4**	**540**	**956**	**31**	**4**	**0**	**4**	**975**	**1,431**	**51**	**8**	**0**	**8**	**1,467**

Traffic Data Collection ID 4 (Stations 4040/4041)

Location 1: I-95 NB/SB North of Oxford St

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	1,071	21	72	2	73	**1,165**	898	19	55	2	56	**973**	1,969	39	126	3	129	**2,137**
1:00	603	19	67	1	67	**689**	491	17	50	4	54	**561**	1,093	36	116	5	121	**1,250**
2:00	376	19	68	0	68	**462**	316	21	73	0	74	**411**	692	40	141	1	141	**873**
3:00	387	32	89	1	90	**509**	379	35	69	3	72	**486**	766	67	158	4	162	**995**
4:00	785	61	112	1	114	**960**	823	45	72	3	75	**943**	1,608	106	184	4	188	**1,902**
5:00	2,028	124	158	3	161	**2,314**	2,009	84	107	1	108	**2,201**	4,037	208	265	4	269	**4,514**
6:00	4,365	176	209	3	212	**4,753**	4,156	177	113	0	113	**4,447**	8,521	353	322	3	325	**9,199**
7:00	6,416	233	188	2	190	**6,839**	6,076	193	114	0	114	**6,383**	12,492	427	302	2	304	**13,223**
8:00	6,667	246	171	0	172	**7,084**	6,041	236	147	1	147	**6,424**	12,707	482	318	1	319	**13,508**
9:00	5,311	299	169	1	169	**5,779**	5,295	237	184	0	184	**5,716**	10,605	536	353	1	354	**11,495**
10:00	4,901	206	150	0	151	**5,257**	5,264	215	168	0	168	**5,647**	10,165	421	318	1	319	**10,905**
11:00	5,250	205	154	1	155	**5,609**	5,334	193	170	1	171	**5,698**	10,584	398	324	2	326	**11,307**
12:00	5,657	200	144	1	144	**6,002**	5,775	206	181	0	182	**6,163**	11,432	407	325	1	326	**12,165**
13:00	5,342	206	137	1	138	**5,686**	5,616	222	162	1	163	**6,000**	10,958	428	299	2	301	**11,686**
14:00	5,977	224	126	1	127	**6,327**	6,049	217	149	1	150	**6,416**	12,026	441	275	1	277	**12,744**
15:00	5,978	159	95	0	95	**6,232**	6,720	179	101	0	101	**7,000**	12,698	338	196	0	196	**13,233**
16:00	6,222	116	68	0	68	**6,406**	7,121	114	66	0	66	**7,301**	13,343	229	134	0	134	**13,706**
17:00	6,299	79	56	0	56	**6,434**	6,510	92	67	0	67	**6,669**	12,809	171	123	0	123	**13,103**
18:00	5,463	74	60	2	62	**5,599**	5,630	109	67	1	68	**5,806**	11,093	183	127	2	129	**11,405**
19:00	4,471	55	52	1	53	**4,578**	4,428	107	60	1	61	**4,596**	8,899	162	113	1	114	**9,174**
20:00	3,881	42	53	1	54	**3,977**	3,643	57	55	2	57	**3,757**	7,525	98	108	3	111	**7,733**
21:00	3,293	26	50	1	51	**3,370**	2,906	32	42	6	48	**2,986**	6,200	58	92	7	99	**6,356**
22:00	2,522	23	65	2	67	**2,613**	2,311	28	57	5	62	**2,401**	4,833	51	123	7	129	**5,013**
23:00	1,831	21	51	1	52	**1,905**	1,595	21	56	3	60	**1,676**	3,426	42	107	5	112	**3,581**
TOTAL	**95,095**	**2,865**	**2,563**	**25**	**2,588**	**100,548**	**95,384**	**2,856**	**2,386**	**35**	**2,420**	**100,660**	**190,479**	**5,720**	**4,949**	**60**	**5,009**	**201,208**
Peak	**6,667**	**299**	**209**	**3**	**212**	**7,084**	**7,121**	**237**	**184**	**6**	**184**	**7,301**	**13,343**	**536**	**353**	**7**	**354**	**13,706**

Traffic Data Collection ID 5 (Stations 4042/4043)

Location 1: I-95 NB/SB South of Smith Street

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	1,584	24	54	2	56	**1,664**	1,840	28	51	1	51	**1,920**	3,424	52	105	2	107	**3,584**
1:00	1,073	24	57	1	58	**1,155**	983	18	51	2	53	**1,054**	2,056	42	108	3	111	**2,208**
2:00	615	21	56	1	57	**693**	639	20	60	1	62	**720**	1,254	41	116	2	118	**1,413**
3:00	603	31	71	2	72	**706**	565	32	62	1	62	**659**	1,168	63	132	2	134	**1,365**
4:00	1,300	76	98	1	99	**1,475**	905	48	68	2	70	**1,023**	2,205	125	166	3	169	**2,498**
5:00	3,442	172	141	1	142	**3,757**	2,130	82	100	3	103	**2,315**	5,572	254	241	4	245	**6,071**
6:00	5,791	198	156	0	156	**6,145**	4,459	181	110	2	112	**4,751**	10,250	379	266	2	268	**10,896**
7:00	7,060	243	144	1	145	**7,448**	7,432	231	97	1	98	**7,761**	14,492	475	241	2	243	**15,210**
8:00	6,955	272	147	1	149	**7,376**	7,615	258	128	0	128	**8,002**	14,570	531	275	2	277	**15,378**
9:00	6,244	288	141	2	143	**6,675**	6,628	266	155	1	156	**7,050**	12,872	555	296	3	299	**13,725**
10:00	6,050	246	136	0	136	**6,432**	6,354	267	154	1	155	**6,775**	12,404	512	290	1	291	**13,207**
11:00	6,033	227	130	0	130	**6,390**	6,426	244	155	0	155	**6,824**	12,459	471	285	0	285	**13,214**
12:00	6,513	216	117	0	117	**6,846**	6,746	274	135	1	136	**7,155**	13,259	490	252	1	253	**14,002**
13:00	6,431	254	122	1	122	**6,807**	6,799	254	128	0	128	**7,181**	13,230	507	250	1	250	**13,988**
14:00	6,770	241	98	0	98	**7,110**	6,916	245	115	0	115	**7,276**	13,686	486	213	0	213	**14,385**
15:00	6,982	170	85	0	85	**7,236**	7,377	205	86	0	86	**7,667**	14,359	374	171	0	171	**14,903**
16:00	7,425	118	64	0	64	**7,607**	7,307	135	62	0	62	**7,503**	14,731	253	126	0	126	**15,110**
17:00	7,284	97	50	0	50	**7,430**	7,178	100	55	0	56	**7,334**	14,461	197	105	0	105	**14,764**
18:00	6,965	92	48	2	50	**7,107**	7,293	114	59	0	59	**7,465**	14,257	205	107	2	109	**14,571**
19:00	5,879	67	41	0	41	**5,987**	6,453	106	54	0	54	**6,612**	12,332	173	94	0	94	**12,599**
20:00	5,388	45	42	1	42	**5,476**	5,387	62	46	1	47	**5,496**	10,775	107	88	2	89	**10,971**
21:00	4,688	32	35	0	36	**4,755**	4,341	41	28	3	31	**4,412**	9,028	72	63	3	66	**9,167**
22:00	3,692	31	48	2	50	**3,773**	3,707	27	42	1	43	**3,777**	7,399	58	90	3	93	**7,550**
23:00	2,697	28	36	2	38	**2,764**	3,029	24	50	3	52	**3,105**	5,726	52	86	5	90	**5,869**
TOTAL	**117,463**	**3,213**	**2,117**	**21**	**2,137**	**122,813**	**118,505**	**3,260**	**2,048**	**21**	**2,069**	**123,835**	**235,968**	**6,473**	**4,165**	**42**	**4,206**	**246,648**
Peak	**7,425**	**288**	**156**	**2**	**156**	**7,607**	**7,615**	**274**	**155**	**3**	**156**	**8,002**	**14,731**	**555**	**296**	**5**	**299**	**15,378**

Traffic Data Collection ID 6 (Stations 4044/4045)

Location 1: I-95 NB/SB North of East Street

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	392	10	36	0	36	**439**	730	11	31	1	32	**773**	1,123	21	67	1	68	**1,212**
1:00	307	19	42	0	43	**369**	304	9	28	1	29	**342**	611	28	70	1	71	**711**
2:00	185	11	37	0	37	**233**	208	12	43	0	43	**263**	393	23	79	1	80	**496**
3:00	232	15	49	0	49	**296**	173	18	27	1	28	**219**	405	33	76	1	76	**514**
4:00	698	29	65	1	66	**794**	268	24	31	2	33	**324**	966	53	96	2	99	**1,118**
5:00	2,059	69	97	2	99	**2,227**	649	50	56	0	56	**756**	2,708	119	153	2	156	**2,983**
6:00	2,953	90	101	1	102	**3,144**	1,563	83	56	0	56	**1,701**	4,515	173	157	1	158	**4,846**
7:00	3,024	90	110	1	112	**3,226**	2,758	82	57	1	57	**2,897**	5,782	172	167	2	169	**6,123**
8:00	2,526	87	96	0	96	**2,708**	2,580	94	72	0	72	**2,746**	5,105	180	168	0	168	**5,454**
9:00	2,224	94	97	0	98	**2,416**	2,222	87	87	0	88	**2,397**	4,446	181	185	1	185	**4,813**
10:00	2,252	84	84	0	84	**2,421**	2,115	91	94	0	94	**2,300**	4,367	175	178	0	178	**4,720**
11:00	2,242	88	85	0	85	**2,415**	2,195	93	100	0	100	**2,388**	4,437	181	185	0	185	**4,803**
12:00	2,390	89	87	1	87	**2,566**	2,286	96	90	0	91	**2,473**	4,676	185	177	1	178	**5,039**
13:00	2,354	88	67	0	67	**2,509**	2,336	93	82	1	83	**2,512**	4,689	181	149	1	150	**5,020**
14:00	2,682	84	63	0	63	**2,828**	2,664	97	75	0	75	**2,836**	5,346	181	137	0	138	**5,665**
15:00	2,711	72	50	1	51	**2,834**	2,786	69	44	0	44	**2,899**	5,497	141	94	1	95	**5,733**
16:00	2,816	45	35	0	35	**2,896**	2,779	53	29	0	29	**2,861**	5,596	98	64	0	64	**5,757**
17:00	3,110	40	22	0	22	**3,172**	2,970	34	29	0	29	**3,032**	6,080	73	50	0	51	**6,204**
18:00	2,575	31	26	1	27	**2,634**	3,196	44	37	0	37	**3,278**	5,772	75	63	1	65	**5,911**
19:00	1,936	21	24	0	24	**1,982**	2,615	39	36	0	36	**2,690**	4,551	60	60	1	60	**4,672**
20:00	1,569	16	24	1	24	**1,609**	2,037	27	32	0	32	**2,096**	3,606	43	55	1	56	**3,705**
21:00	1,293	11	23	0	24	**1,328**	1,640	16	18	2	20	**1,677**	2,933	28	41	2	44	**3,005**
22:00	1,120	11	28	1	29	**1,160**	1,299	16	30	1	31	**1,347**	2,420	27	58	2	61	**2,507**
23:00	696	12	23	0	23	**731**	1,182	11	32	2	34	**1,227**	1,878	23	55	2	57	**1,958**
TOTAL	**44,348**	**1,205**	**1,372**	**11**	**1,383**	**46,936**	**43,556**	**1,250**	**1,214**	**14**	**1,228**	**46,034**	**87,904**	**2,455**	**2,586**	**25**	**2,611**	**92,970**
Peak	**3,110**	**94**	**110**	**2**	**112**	**3,226**	**3,196**	**97**	**100**	**2**	**100**	**3,278**	**6,080**	**185**	**185**	**2**	**185**	**6,204**

Traffic Data Collection ID 6-a (Stations 3995/3994)

Location 1: I-95 NB/SB On/Off Ramp to/from East Street

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	30	2	1	0	1	**33**	30	0	1	0	1	**31**	60	2	2	0	2	**65**
1:00	32	4	1	0	1	**37**	27	0	0	0	0	**27**	58	4	2	0	2	**64**
2:00	28	4	2	0	2	**33**	15	0	1	0	1	**16**	43	4	2	0	2	**49**
3:00	51	3	2	0	2	**57**	20	2	0	0	0	**22**	72	5	2	0	2	**78**
4:00	132	9	3	0	3	**144**	26	1	1	0	1	**27**	158	10	4	0	4	**171**
5:00	365	19	3	0	3	**387**	44	3	0	0	0	**48**	409	22	3	0	3	**435**
6:00	533	17	3	0	3	**552**	98	3	1	1	2	**102**	630	19	3	1	4	**654**
7:00	350	13	3	0	3	**366**	118	3	2	0	2	**123**	468	16	5	0	5	**488**
8:00	271	12	1	0	1	**284**	105	4	2	0	2	**112**	376	17	3	0	3	**396**
9:00	201	9	3	0	3	**213**	88	4	2	1	3	**95**	288	13	5	1	6	**307**
10:00	170	7	2	0	2	**179**	105	5	3	0	3	**114**	274	12	5	0	6	**292**
11:00	160	6	1	0	1	**167**	129	6	3	0	3	**137**	288	12	4	0	4	**304**
12:00	165	7	3	0	3	**175**	128	6	3	1	4	**138**	292	13	6	1	7	**312**
13:00	169	7	2	0	2	**178**	188	7	3	1	3	**199**	357	14	5	1	5	**377**
14:00	211	9	1	0	1	**221**	258	5	5	2	7	**270**	468	14	6	2	8	**491**
15:00	201	5	1	0	1	**207**	363	7	4	2	6	**375**	563	12	5	2	7	**582**
16:00	218	2	2	0	2	**222**	306	4	5	2	7	**317**	524	6	6	2	8	**539**
17:00	225	3	2	0	2	**229**	293	5	2	2	4	**302**	517	8	4	2	6	**532**
18:00	174	2	1	0	1	**177**	206	2	2	0	3	**211**	379	5	4	0	4	**388**
19:00	136	3	1	0	1	**140**	156	2	3	1	3	**162**	293	5	3	1	4	**302**
20:00	118	1	0	0	1	**120**	138	1	1	1	2	**141**	256	3	1	1	2	**260**
21:00	93	1	2	0	2	**96**	115	1	1	0	1	**117**	208	2	3	0	3	**213**
22:00	77	2	1	0	1	**79**	100	1	1	0	1	**102**	177	3	1	0	1	**181**
23:00	54	2	1	0	1	**57**	58	0	0	1	1	**59**	113	2	1	1	2	**116**
TOTAL	**4,160**	**149**	**41**	**0**	**42**	**4,351**	**3,112**	**73**	**43**	**16**	**58**	**3,244**	**7,272**	**222**	**84**	**16**	**100**	**7,595**
Peak	**533**	**19**	**3**	**0**	**3**	**552**	**363**	**7**	**5**	**2**	**7**	**375**	**630**	**22**	**6**	**2**	**8**	**654**

Traffic Data Collection ID 7 (Stations 4046/4047)

Location 1: I-295 NB/SB North of Plainfield Pike

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	268	4	9	0	9	**281**	196	5	17	0	17	**217**	464	9	26	0	26	**498**
1:00	136	6	9	3	12	**153**	100	5	17	0	17	**121**	235	10	25	3	28	**273**
2:00	76	6	14	1	15	**96**	67	8	14	0	14	**89**	142	14	28	1	29	**185**
3:00	70	7	18	3	20	**96**	85	13	22	0	22	**119**	154	19	39	3	42	**215**
4:00	132	11	20	3	23	**166**	214	16	20	0	20	**249**	346	27	40	3	42	**415**
5:00	419	26	32	2	34	**478**	641	34	19	0	19	**694**	1,060	60	50	2	52	**1,172**
6:00	1,221	66	42	4	46	**1,332**	1,648	97	51	0	51	**1,795**	2,869	162	92	4	96	**3,127**
7:00	2,551	90	53	7	59	**2,699**	2,944	184	67	0	67	**3,194**	5,494	273	119	7	126	**5,893**
8:00	2,404	100	72	2	75	**2,579**	3,326	161	75	0	75	**3,562**	5,730	261	147	2	150	**6,141**
9:00	1,611	90	57	1	58	**1,760**	2,280	119	78	0	78	**2,476**	3,891	209	135	1	136	**4,236**
10:00	1,480	100	47	2	49	**1,629**	2,178	114	71	0	71	**2,363**	3,659	214	117	2	120	**3,992**
11:00	1,585	106	42	0	43	**1,734**	2,172	111	78	1	79	**2,363**	3,758	218	121	1	122	**4,097**
12:00	1,639	103	41	0	42	**1,784**	2,127	112	74	0	74	**2,314**	3,766	216	116	0	116	**4,098**
13:00	1,790	110	51	0	52	**1,952**	2,014	118	50	0	50	**2,182**	3,805	228	102	0	102	**4,135**
14:00	2,324	107	55	0	55	**2,486**	2,338	138	47	0	47	**2,523**	4,662	245	102	0	103	**5,009**
15:00	2,951	102	52	1	52	**3,106**	2,964	114	46	0	46	**3,124**	5,916	216	97	1	98	**6,229**
16:00	3,203	83	40	0	41	**3,327**	3,370	79	35	1	36	**3,484**	6,573	162	75	1	76	**6,811**
17:00	3,094	58	26	1	26	**3,178**	3,631	48	30	0	30	**3,709**	6,725	106	56	1	57	**6,887**
18:00	2,126	30	20	0	20	**2,176**	2,555	40	32	0	32	**2,627**	4,681	70	52	0	52	**4,803**
19:00	1,485	15	17	0	17	**1,517**	1,520	26	26	1	27	**1,572**	3,005	40	43	1	44	**3,089**
20:00	1,189	10	14	0	14	**1,213**	1,134	11	23	1	24	**1,169**	2,323	20	37	1	39	**2,382**
21:00	978	7	6	0	6	**992**	835	6	22	5	27	**868**	1,814	13	28	5	33	**1,860**
22:00	661	4	9	0	9	**674**	642	8	18	1	19	**669**	1,302	13	27	1	28	**1,343**
23:00	465	4	9	2	11	**480**	424	4	18	0	18	**447**	889	8	27	2	29	**927**
TOTAL	**33,858**	**1,244**	**753**	**32**	**785**	**35,887**	**39,403**	**1,567**	**947**	**11**	**958**	**41,928**	**73,261**	**2,811**	**1,700**	**43**	**1,742**	**77,815**
Peak	**3,203**	**110**	**72**	**7**	**75**	**3,327**	**3,631**	**184**	**78**	**5**	**79**	**3,709**	**6,725**	**273**	**147**	**7**	**150**	**6,887**

Traffic Data Collection ID 7-a (Stations 3996)

Location 1: I-295 NB On Ramp from Route 14

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	38	2	1	0	1	**41**	0	0	0	0	0	**0**	38	2	1	0	1	**41**
1:00	29	2	1	0	1	**32**	0	0	0	0	0	**0**	29	2	1	0	1	**32**
2:00	24	2	3	0	3	**28**	0	0	0	0	0	**0**	24	2	3	0	3	**28**
3:00	30	8	6	0	6	**44**	0	0	0	0	0	**0**	30	8	6	0	6	**44**
4:00	49	19	6	0	6	**73**	0	0	0	0	0	**0**	49	19	6	0	6	**73**
5:00	176	41	11	0	11	**228**	0	0	0	0	0	**0**	176	41	11	0	11	**228**
6:00	484	62	17	0	17	**563**	0	0	0	0	0	**0**	484	62	17	0	17	**563**
7:00	868	69	30	1	31	**967**	0	0	0	0	0	**0**	868	69	30	1	31	**967**
8:00	957	74	19	1	20	**1,051**	0	0	0	0	0	**0**	957	74	19	1	20	**1,051**
9:00	634	73	20	0	21	**728**	0	0	0	0	0	**0**	634	73	20	0	21	**728**
10:00	518	61	26	0	26	**605**	0	0	0	0	0	**0**	518	61	26	0	26	**605**
11:00	485	62	29	1	29	**576**	0	0	0	0	0	**0**	485	62	29	1	29	**576**
12:00	509	57	15	0	15	**580**	0	0	0	0	0	**0**	509	57	15	0	15	**580**
13:00	506	58	12	0	13	**577**	0	0	0	0	0	**0**	506	58	12	0	13	**577**
14:00	507	69	12	0	12	**587**	0	0	0	0	0	**0**	507	69	12	0	12	**587**
15:00	648	61	13	0	14	**722**	0	0	0	0	0	**0**	648	61	13	0	14	**722**
16:00	641	46	8	0	9	**696**	0	0	0	0	0	**0**	641	46	8	0	9	**696**
17:00	629	37	8	0	8	**674**	0	0	0	0	0	**0**	629	37	8	0	8	**674**
18:00	484	29	6	0	6	**519**	0	0	0	0	0	**0**	484	29	6	0	6	**519**
19:00	347	15	3	0	3	**365**	0	0	0	0	0	**0**	347	15	3	0	3	**365**
20:00	273	12	3	1	4	**289**	0	0	0	0	0	**0**	273	12	3	1	4	**289**
21:00	195	8	2	1	3	**206**	0	0	0	0	0	**0**	195	8	2	1	3	**206**
22:00	153	4	2	0	2	**159**	0	0	0	0	0	**0**	153	4	2	0	2	**159**
23:00	108	4	2	0	2	**114**	0	0	0	0	0	**0**	108	4	2	0	2	**114**
TOTAL	**9,292**	**872**	**253**	**6**	**259**	**10,423**	**0**	**0**	**0**	**0**	**0**	**0**	**9,292**	**872**	**253**	**6**	**259**	**10,423**
Peak	**957**	**74**	**30**	**1**	**31**	**1,051**	**0**	**0**	**0**	**0**	**0**	**0**	**957**	**74**	**30**	**1**	**31**	**1,051**

Traffic Data Collection ID 7-b (Stations 3997)

Location 1: I-295 NB Off Ramp to Route 14

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	54	6	0	0	0	**60**	0	0	0	0	0	**0**	54	6	0	0	0	**60**
1:00	30	2	1	0	1	**33**	0	0	0	0	0	**0**	30	2	1	0	1	**33**
2:00	19	3	2	0	2	**23**	0	0	0	0	0	**0**	19	3	2	0	2	**23**
3:00	19	8	2	0	2	**28**	0	0	0	0	0	**0**	19	8	2	0	2	**28**
4:00	25	8	1	0	1	**34**	0	0	0	0	0	**0**	25	8	1	0	1	**34**
5:00	68	21	2	0	2	**92**	0	0	0	0	0	**0**	68	21	2	0	2	**92**
6:00	168	31	4	1	5	**204**	0	0	0	0	0	**0**	168	31	4	1	5	**204**
7:00	349	48	10	2	11	**409**	0	0	0	0	0	**0**	349	48	10	2	11	**409**
8:00	313	55	8	3	11	**379**	0	0	0	0	0	**0**	313	55	8	3	11	**379**
9:00	297	61	8	1	10	**367**	0	0	0	0	0	**0**	297	61	8	1	10	**367**
10:00	262	53	6	0	6	**321**	0	0	0	0	0	**0**	262	53	6	0	6	**321**
11:00	293	56	7	0	7	**356**	0	0	0	0	0	**0**	293	56	7	0	7	**356**
12:00	337	56	9	0	9	**402**	0	0	0	0	0	**0**	337	56	9	0	9	**402**
13:00	341	57	8	0	8	**406**	0	0	0	0	0	**0**	341	57	8	0	8	**406**
14:00	384	65	10	0	10	**458**	0	0	0	0	0	**0**	384	65	10	0	10	**458**
15:00	444	71	12	0	12	**527**	0	0	0	0	0	**0**	444	71	12	0	12	**527**
16:00	401	50	9	0	9	**459**	0	0	0	0	0	**0**	401	50	9	0	9	**459**
17:00	387	42	6	0	6	**434**	0	0	0	0	0	**0**	387	42	6	0	6	**434**
18:00	374	29	9	0	9	**412**	0	0	0	0	0	**0**	374	29	9	0	9	**412**
19:00	304	23	3	0	3	**330**	0	0	0	0	0	**0**	304	23	3	0	3	**330**
20:00	261	18	3	0	3	**282**	0	0	0	0	0	**0**	261	18	3	0	3	**282**
21:00	213	17	2	0	2	**232**	0	0	0	0	0	**0**	213	17	2	0	2	**232**
22:00	135	11	1	0	1	**148**	0	0	0	0	0	**0**	135	11	1	0	1	**148**
23:00	92	6	1	0	1	**99**	0	0	0	0	0	**0**	92	6	1	0	1	**99**
TOTAL	**5,569**	**794**	**122**	**7**	**129**	**6,492**	**0**	**0**	**0**	**0**	**0**	**0**	**5,569**	**794**	**122**	**7**	**129**	**6,492**
Peak	**444**	**71**	**12**	**3**	**12**	**527**	**0**	**0**	**0**	**0**	**0**	**0**	**444**	**71**	**12**	**3**	**12**	**527**

Traffic Data Collection ID 8 (Stations 4048/4049)

Location 1: I-295 NB/SB South of Greenville Avenue

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	260	7	15	1	15	**282**	252	7	11	1	13	**271**	512	13	26	2	28	**553**
1:00	137	2	12	3	15	**155**	114	6	10	2	13	**133**	251	9	23	5	28	**287**
2:00	87	4	14	2	16	**107**	93	4	12	2	14	**111**	180	8	26	4	30	**218**
3:00	100	9	19	2	21	**129**	101	10	20	0	20	**131**	201	18	39	2	41	**260**
4:00	212	17	34	7	41	**270**	278	10	26	1	27	**315**	490	27	60	8	68	**585**
5:00	782	39	51	2	53	**874**	754	29	42	2	44	**828**	1,536	68	93	4	97	**1,701**
6:00	1,793	92	67	2	69	**1,954**	1,900	96	55	1	56	**2,051**	3,692	188	123	2	125	**4,005**
7:00	3,170	134	80	5	85	**3,389**	3,387	138	72	0	73	**3,597**	6,556	272	153	5	158	**6,986**
8:00	3,321	144	102	4	106	**3,572**	2,874	116	73	1	74	**3,064**	6,196	261	175	5	180	**6,636**
9:00	2,160	142	87	1	87	**2,390**	1,757	95	68	0	68	**1,919**	3,917	237	155	1	156	**4,309**
10:00	1,882	117	87	0	87	**2,087**	1,716	101	75	1	76	**1,892**	3,598	218	162	1	163	**3,979**
11:00	2,012	127	72	0	72	**2,210**	2,088	114	87	0	88	**2,290**	4,100	241	159	0	159	**4,500**
12:00	2,086	115	68	1	69	**2,270**	2,191	117	84	0	85	**2,393**	4,277	232	153	1	154	**4,663**
13:00	2,113	128	74	0	75	**2,315**	1,969	112	82	1	82	**2,163**	4,082	239	156	1	157	**4,478**
14:00	2,560	130	72	1	73	**2,763**	2,604	131	70	1	70	**2,805**	5,164	261	142	1	143	**5,568**
15:00	3,363	132	68	1	69	**3,564**	3,435	121	68	0	68	**3,624**	6,798	253	136	1	137	**7,188**
16:00	3,967	93	51	0	51	**4,111**	4,402	97	65	1	66	**4,565**	8,369	190	116	1	117	**8,675**
17:00	4,119	64	47	0	47	**4,230**	4,600	74	54	1	55	**4,728**	8,719	138	100	1	101	**8,958**
18:00	2,746	26	36	1	37	**2,810**	2,797	55	53	0	53	**2,905**	5,543	81	89	1	90	**5,714**
19:00	1,765	23	23	1	24	**1,812**	1,593	24	36	0	37	**1,654**	3,358	47	60	1	60	**3,466**
20:00	1,461	11	14	2	16	**1,488**	1,260	17	29	3	32	**1,309**	2,721	28	43	5	48	**2,797**
21:00	1,152	16	13	4	17	**1,184**	932	11	17	12	28	**971**	2,084	27	29	16	45	**2,155**
22:00	827	6	19	4	23	**856**	712	6	15	2	17	**735**	1,540	12	33	6	40	**1,591**
23:00	555	5	16	1	17	**576**	505	6	13	3	16	**527**	1,060	11	29	4	33	**1,103**
TOTAL	**42,631**	**1,583**	**1,140**	**43**	**1,184**	**45,398**	**42,312**	**1,496**	**1,139**	**34**	**1,173**	**44,980**	**84,943**	**3,079**	**2,279**	**78**	**2,357**	**90,379**
Peak	**4,119**	**144**	**102**	**7**	**106**	**4,230**	**4,600**	**138**	**87**	**12**	**88**	**4,728**	**8,719**	**272**	**175**	**16**	**180**	**8,958**

Traffic Data Collection ID 8-1 (Stations 4067 NB)

Location 1: I-295 NB South of Route 6A

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	180	3	11	1	12	**195**	0	0	0	0	0	**0**	180	3	11	1	12	**195**
1:00	71	2	8	2	9	**82**	0	0	0	0	0	**0**	71	2	8	2	9	**82**
2:00	46	1	10	3	13	**60**	0	0	0	0	0	**0**	46	1	10	3	13	**60**
3:00	46	5	12	3	15	**66**	0	0	0	0	0	**0**	46	5	12	3	15	**66**
4:00	120	11	27	3	30	**160**	0	0	0	0	0	**0**	120	11	27	3	30	**160**
5:00	408	24	33	2	35	**466**	0	0	0	0	0	**0**	408	24	33	2	35	**466**
6:00	1,030	56	43	3	46	**1,133**	0	0	0	0	0	**0**	1,030	56	43	3	46	**1,133**
7:00	1,906	90	55	3	59	**2,055**	0	0	0	0	0	**0**	1,906	90	55	3	59	**2,055**
8:00	1,757	80	63	3	66	**1,903**	0	0	0	0	0	**0**	1,757	80	63	3	66	**1,903**
9:00	1,093	85	56	0	57	**1,235**	0	0	0	0	0	**0**	1,093	85	56	0	57	**1,235**
10:00	1,007	75	56	0	56	**1,138**	0	0	0	0	0	**0**	1,007	75	56	0	56	**1,138**
11:00	1,092	72	45	0	46	**1,209**	0	0	0	0	0	**0**	1,092	72	45	0	46	**1,209**
12:00	1,084	68	49	0	49	**1,201**	0	0	0	0	0	**0**	1,084	68	49	0	49	**1,201**
13:00	1,160	70	46	0	46	**1,276**	0	0	0	0	0	**0**	1,160	70	46	0	46	**1,276**
14:00	1,701	87	55	0	55	**1,843**	0	0	0	0	0	**0**	1,701	87	55	0	55	**1,843**
15:00	2,403	87	55	0	55	**2,545**	0	0	0	0	0	**0**	2,403	87	55	0	55	**2,545**
16:00	2,715	64	38	0	38	**2,817**	0	0	0	0	0	**0**	2,715	64	38	0	38	**2,817**
17:00	2,614	37	28	0	28	**2,679**	0	0	0	0	0	**0**	2,614	37	28	0	28	**2,679**
18:00	1,751	18	26	1	27	**1,796**	0	0	0	0	0	**0**	1,751	18	26	1	27	**1,796**
19:00	1,130	14	16	1	17	**1,162**	0	0	0	0	0	**0**	1,130	14	16	1	17	**1,162**
20:00	977	11	10	3	13	**1,002**	0	0	0	0	0	**0**	977	11	10	3	13	**1,002**
21:00	778	7	11	5	16	**801**	0	0	0	0	0	**0**	778	7	11	5	16	**801**
22:00	549	5	12	5	17	**571**	0	0	0	0	0	**0**	549	5	12	5	17	**571**
23:00	359	5	10	2	12	**376**	0	0	0	0	0	**0**	359	5	10	2	12	**376**
TOTAL	**25,977**	**977**	**776**	**42**	**817**	**27,771**	**0**	**0**	**0**	**0**	**0**	**0**	**25,977**	**977**	**776**	**42**	**817**	**27,771**
Peak	**2,715**	**90**	**63**	**5**	**66**	**2,817**	**0**	**0**	**0**	**0**	**0**	**0**	**2,715**	**90**	**63**	**5**	**66**	**2,817**

Traffic Data Collection ID 8-1a (Stations 4067 SV)

Location 1: I-295 NB Service Road South of Route 6A On Ramp

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	50	0	1	0	1	**51**	0	0	0	0	0	**0**	50	0	1	0	1	**51**
1:00	29	1	0	0	0	**30**	0	0	0	0	0	**0**	29	1	0	0	0	**30**
2:00	15	1	2	0	2	**17**	0	0	0	0	0	**0**	15	1	2	0	2	**17**
3:00	12	1	2	0	2	**16**	0	0	0	0	0	**0**	12	1	2	0	2	**16**
4:00	13	1	3	0	3	**17**	0	0	0	0	0	**0**	13	1	3	0	3	**17**
5:00	34	4	3	0	3	**40**	0	0	0	0	0	**0**	34	4	3	0	3	**40**
6:00	114	10	3	0	3	**127**	0	0	0	0	0	**0**	114	10	3	0	3	**127**
7:00	227	13	3	0	3	**243**	0	0	0	0	0	**0**	227	13	3	0	3	**243**
8:00	243	13	3	0	3	**259**	0	0	0	0	0	**0**	243	13	3	0	3	**259**
9:00	213	14	5	0	5	**232**	0	0	0	0	0	**0**	213	14	5	0	5	**232**
10:00	222	11	6	0	6	**239**	0	0	0	0	0	**0**	222	11	6	0	6	**239**
11:00	250	12	4	0	4	**266**	0	0	0	0	0	**0**	250	12	4	0	4	**266**
12:00	253	14	4	0	4	**272**	0	0	0	0	0	**0**	253	14	4	0	4	**272**
13:00	288	15	5	0	5	**308**	0	0	0	0	0	**0**	288	15	5	0	5	**308**
14:00	396	17	8	0	8	**421**	0	0	0	0	0	**0**	396	17	8	0	8	**421**
15:00	524	18	8	0	8	**550**	0	0	0	0	0	**0**	524	18	8	0	8	**550**
16:00	532	13	4	0	4	**548**	0	0	0	0	0	**0**	532	13	4	0	4	**548**
17:00	463	9	3	0	3	**474**	0	0	0	0	0	**0**	463	9	3	0	3	**474**
18:00	358	5	2	0	2	**365**	0	0	0	0	0	**0**	358	5	2	0	2	**365**
19:00	276	3	2	0	2	**281**	0	0	0	0	0	**0**	276	3	2	0	2	**281**
20:00	240	3	3	0	3	**246**	0	0	0	0	0	**0**	240	3	3	0	3	**246**
21:00	186	4	4	0	4	**194**	0	0	0	0	0	**0**	186	4	4	0	4	**194**
22:00	128	1	2	0	3	**131**	0	0	0	0	0	**0**	128	1	2	0	3	**131**
23:00	94	0	3	0	3	**97**	0	0	0	0	0	**0**	94	0	3	0	3	**97**
TOTAL	**5,160**	**182**	**82**	**1**	**82**	**5,424**	**0**	**0**	**0**	**0**	**0**	**0**	**5,160**	**182**	**82**	**1**	**82**	**5,424**
Peak	**532**	**18**	**8**	**0**	**8**	**550**	**0**	**0**	**0**	**0**	**0**	**0**	**532**	**18**	**8**	**0**	**8**	**550**

Traffic Data Collection ID 8-2 (Stations 4066SB)

Location 1: I-295 SB North of Route 6A

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	0	0	0	0	0	**0**	148	3	10	1	10	**161**	148	3	10	1	10	**161**
1:00	0	0	0	0	0	**0**	66	2	9	3	12	**81**	66	2	9	3	12	**81**
2:00	0	0	0	0	0	**0**	59	3	7	2	9	**71**	59	3	7	2	9	**71**
3:00	0	0	0	0	0	**0**	78	5	18	0	18	**101**	78	5	18	0	18	**101**
4:00	0	0	0	0	0	**0**	209	8	15	1	16	**233**	209	8	15	1	16	**233**
5:00	0	0	0	0	0	**0**	600	23	31	3	34	**658**	600	23	31	3	34	**658**
6:00	0	0	0	0	0	**0**	1,367	62	42	3	45	**1,475**	1,367	62	42	3	45	**1,475**
7:00	0	0	0	0	0	**0**	2,273	99	56	2	58	**2,430**	2,273	99	56	2	58	**2,430**
8:00	0	0	0	0	0	**0**	2,163	107	73	2	75	**2,345**	2,163	107	73	2	75	**2,345**
9:00	0	0	0	0	0	**0**	1,411	81	68	0	69	**1,561**	1,411	81	68	0	69	**1,561**
10:00	0	0	0	0	0	**0**	1,449	81	72	1	73	**1,603**	1,449	81	72	1	73	**1,603**
11:00	0	0	0	0	0	**0**	1,411	87	69	0	69	**1,568**	1,411	87	69	0	69	**1,568**
12:00	0	0	0	0	0	**0**	1,435	90	71	0	71	**1,596**	1,435	90	71	0	71	**1,596**
13:00	0	0	0	0	0	**0**	1,378	90	64	1	65	**1,533**	1,378	90	64	1	65	**1,533**
14:00	0	0	0	0	0	**0**	1,737	91	56	1	57	**1,885**	1,737	91	56	1	57	**1,885**
15:00	0	0	0	0	0	**0**	2,281	79	49	0	49	**2,409**	2,281	79	49	0	49	**2,409**
16:00	0	0	0	0	0	**0**	2,841	60	39	1	39	**2,941**	2,841	60	39	1	39	**2,941**
17:00	0	0	0	0	0	**0**	2,490	36	33	0	33	**2,559**	2,490	36	33	0	33	**2,559**
18:00	0	0	0	0	0	**0**	1,660	32	44	0	44	**1,736**	1,660	32	44	0	44	**1,736**
19:00	0	0	0	0	0	**0**	949	16	25	1	27	**992**	949	16	25	1	27	**992**
20:00	0	0	0	0	0	**0**	767	8	22	6	28	**803**	767	8	22	6	28	**803**
21:00	0	0	0	0	0	**0**	552	4	16	7	23	**579**	552	4	16	7	23	**579**
22:00	0	0	0	0	0	**0**	442	3	14	1	15	**460**	442	3	14	1	15	**460**
23:00	0	0	0	0	0	**0**	282	4	10	3	13	**300**	282	4	10	3	13	**300**
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**28,047**	**1,075**	**913**	**41**	**954**	**30,077**	**28,047**	**1,075**	**913**	**41**	**954**	**30,077**
Peak	**0**	**0**	**0**	**0**	**0**	**0**	**2,841**	**107**	**73**	**7**	**75**	**2,941**	**2,841**	**107**	**73**	**7**	**75**	**2,941**

Traffic Data Collection ID 8-2a (Stations 4066SV)

Location 1: I-295 SB Service Road North of Route 6A Off Ramp

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	0	0	0	0	0	**0**	53	1	3	0	3	**57**	53	1	3	0	3	**57**
1:00	0	0	0	0	0	**0**	29	1	3	0	3	**32**	29	1	3	0	3	**32**
2:00	0	0	0	0	0	**0**	21	1	1	0	1	**22**	21	1	1	0	1	**22**
3:00	0	0	0	0	0	**0**	17	3	4	0	4	**23**	17	3	4	0	4	**23**
4:00	0	0	0	0	0	**0**	52	3	3	0	3	**59**	52	3	3	0	3	**59**
5:00	0	0	0	0	0	**0**	194	6	4	0	4	**204**	194	6	4	0	4	**204**
6:00	0	0	0	0	0	**0**	620	20	8	0	8	**648**	620	20	8	0	8	**648**
7:00	0	0	0	0	0	**0**	1,082	40	9	1	10	**1,131**	1,082	40	9	1	10	**1,131**
8:00	0	0	0	0	0	**0**	1,054	46	9	0	9	**1,109**	1,054	46	9	0	9	**1,109**
9:00	0	0	0	0	0	**0**	635	28	11	0	11	**674**	635	28	11	0	11	**674**
10:00	0	0	0	0	0	**0**	604	32	6	0	6	**642**	604	32	6	0	6	**642**
11:00	0	0	0	0	0	**0**	597	28	7	0	7	**632**	597	28	7	0	7	**632**
12:00	0	0	0	0	0	**0**	662	26	9	0	9	**698**	662	26	9	0	9	**698**
13:00	0	0	0	0	0	**0**	610	30	9	0	9	**650**	610	30	9	0	9	**650**
14:00	0	0	0	0	0	**0**	712	36	8	0	8	**756**	712	36	8	0	8	**756**
15:00	0	0	0	0	0	**0**	947	38	7	0	7	**993**	947	38	7	0	7	**993**
16:00	0	0	0	0	0	**0**	1,360	30	13	0	13	**1,403**	1,360	30	13	0	13	**1,403**
17:00	0	0	0	0	0	**0**	1,536	26	12	0	12	**1,573**	1,536	26	12	0	12	**1,573**
18:00	0	0	0	0	0	**0**	765	14	7	0	7	**787**	765	14	7	0	7	**787**
19:00	0	0	0	0	0	**0**	460	3	4	0	4	**467**	460	3	4	0	4	**467**
20:00	0	0	0	0	0	**0**	366	3	2	0	2	**371**	366	3	2	0	2	**371**
21:00	0	0	0	0	0	**0**	252	5	0	0	0	**258**	252	5	0	0	0	**258**
22:00	0	0	0	0	0	**0**	179	1	1	0	1	**182**	179	1	1	0	1	**182**
23:00	0	0	0	0	0	**0**	145	2	1	0	1	**149**	145	2	1	0	1	**149**
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**12,953**	**424**	**140**	**1**	**142**	**13,518**	**12,953**	**424**	**140**	**1**	**142**	**13,518**
Peak	**0**	**0**	**0**	**0**	**0**	**0**	**1,536**	**46**	**13**	**1**	**13**	**1,573**	**1,536**	**46**	**13**	**1**	**13**	**1,573**

Traffic Data Collection ID 8-3 (Stations 4068)

Location 1: I-295 SB South of Route 6

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	0	0	0	0	0	**0**	213	3	13	1	14	**231**	213	3	13	1	14	**231**
1:00	0	0	0	0	0	**0**	116	3	18	1	18	**137**	116	3	18	1	18	**137**
2:00	0	0	0	0	0	**0**	102	3	15	1	15	**120**	102	3	15	1	15	**120**
3:00	0	0	0	0	0	**0**	123	9	20	0	20	**153**	123	9	20	0	20	**153**
4:00	0	0	0	0	0	**0**	260	11	19	0	19	**290**	260	11	19	0	19	**290**
5:00	0	0	0	0	0	**0**	856	38	31	3	34	**928**	856	38	31	3	34	**928**
6:00	0	0	0	0	0	**0**	2,026	103	62	1	64	**2,193**	2,026	103	62	1	64	**2,193**
7:00	0	0	0	0	0	**0**	3,264	176	84	3	87	**3,526**	3,264	176	84	3	87	**3,526**
8:00	0	0	0	0	0	**0**	3,239	193	94	2	96	**3,528**	3,239	193	94	2	96	**3,528**
9:00	0	0	0	0	0	**0**	2,299	162	106	1	107	**2,567**	2,299	162	106	1	107	**2,567**
10:00	0	0	0	0	0	**0**	2,126	166	102	1	102	**2,395**	2,126	166	102	1	102	**2,395**
11:00	0	0	0	0	0	**0**	2,151	172	109	0	109	**2,433**	2,151	172	109	0	109	**2,433**
12:00	0	0	0	0	0	**0**	2,204	168	91	1	92	**2,464**	2,204	168	91	1	92	**2,464**
13:00	0	0	0	0	0	**0**	2,129	159	90	0	90	**2,378**	2,129	159	90	0	90	**2,378**
14:00	0	0	0	0	0	**0**	2,561	181	88	0	89	**2,830**	2,561	181	88	0	89	**2,830**
15:00	0	0	0	0	0	**0**	3,380	167	88	1	88	**3,635**	3,380	167	88	1	88	**3,635**
16:00	0	0	0	0	0	**0**	3,993	121	59	0	59	**4,173**	3,993	121	59	0	59	**4,173**
17:00	0	0	0	0	0	**0**	4,062	78	59	0	59	**4,199**	4,062	78	59	0	59	**4,199**
18:00	0	0	0	0	0	**0**	2,671	58	59	0	59	**2,787**	2,671	58	59	0	59	**2,787**
19:00	0	0	0	0	0	**0**	1,657	29	44	2	45	**1,732**	1,657	29	44	2	45	**1,732**
20:00	0	0	0	0	0	**0**	1,274	14	29	5	34	**1,322**	1,274	14	29	5	34	**1,322**
21:00	0	0	0	0	0	**0**	913	9	18	7	24	**946**	913	9	18	7	24	**946**
22:00	0	0	0	0	0	**0**	672	5	19	1	20	**697**	672	5	19	1	20	**697**
23:00	0	0	0	0	0	**0**	434	4	14	2	16	**455**	434	4	14	2	16	**455**
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**42,724**	**2,031**	**1,331**	**31**	**1,362**	**46,117**	**42,724**	**2,031**	**1,331**	**31**	**1,362**	**46,117**
Peak	**0**	**0**	**0**	**0**	**0**	**0**	**4,062**	**193**	**109**	**7**	**109**	**4,199**	**4,062**	**193**	**109**	**7**	**109**	**4,199**

Traffic Data Collection ID 8-a (Stations 4065)

Location 1: Route 6 NB Off Ramp to I-295 NB

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	100	1	4	0	4	**105**	0	0	0	0	0	**0**	100	1	4	0	4	**105**
1:00	67	1	3	0	4	**72**	0	0	0	0	0	**0**	67	1	3	0	4	**72**
2:00	35	1	2	1	3	**39**	0	0	0	0	0	**0**	35	1	2	1	3	**39**
3:00	37	4	3	1	4	**44**	0	0	0	0	0	**0**	37	4	3	1	4	**44**
4:00	72	6	6	0	6	**84**	0	0	0	0	0	**0**	72	6	6	0	6	**84**
5:00	305	11	8	0	8	**325**	0	0	0	0	0	**0**	305	11	8	0	8	**325**
6:00	599	27	10	0	10	**635**	0	0	0	0	0	**0**	599	27	10	0	10	**635**
7:00	823	33	12	0	12	**868**	0	0	0	0	0	**0**	823	33	12	0	12	**868**
8:00	804	36	13	0	13	**854**	0	0	0	0	0	**0**	804	36	13	0	13	**854**
9:00	622	30	20	0	20	**672**	0	0	0	0	0	**0**	622	30	20	0	20	**672**
10:00	647	34	22	0	22	**703**	0	0	0	0	0	**0**	647	34	22	0	22	**703**
11:00	713	39	12	0	12	**765**	0	0	0	0	0	**0**	713	39	12	0	12	**765**
12:00	778	31	13	0	13	**823**	0	0	0	0	0	**0**	778	31	13	0	13	**823**
13:00	780	38	18	0	18	**836**	0	0	0	0	0	**0**	780	38	18	0	18	**836**
14:00	975	35	18	0	18	**1,028**	0	0	0	0	0	**0**	975	35	18	0	18	**1,028**
15:00	1,342	34	12	0	12	**1,388**	0	0	0	0	0	**0**	1,342	34	12	0	12	**1,388**
16:00	1,582	24	6	0	6	**1,612**	0	0	0	0	0	**0**	1,582	24	6	0	6	**1,612**
17:00	1,498	20	5	0	5	**1,523**	0	0	0	0	0	**0**	1,498	20	5	0	5	**1,523**
18:00	932	13	5	0	5	**950**	0	0	0	0	0	**0**	932	13	5	0	5	**950**
19:00	661	8	3	0	3	**672**	0	0	0	0	0	**0**	661	8	3	0	3	**672**
20:00	540	4	4	0	4	**547**	0	0	0	0	0	**0**	540	4	4	0	4	**547**
21:00	423	5	3	0	3	**432**	0	0	0	0	0	**0**	423	5	3	0	3	**432**
22:00	315	4	3	0	3	**322**	0	0	0	0	0	**0**	315	4	3	0	3	**322**
23:00	207	2	4	0	4	**213**	0	0	0	0	0	**0**	207	2	4	0	4	**213**
TOTAL	**14,857**	**443**	**209**	**2**	**211**	**15,511**	**0**	**0**	**0**	**0**	**0**	**0**	**14,857**	**443**	**209**	**2**	**211**	**15,511**
Peak	**1,582**	**39**	**22**	**1**	**22**	**1,612**	**0**	**0**	**0**	**0**	**0**	**0**	**1,582**	**39**	**22**	**1**	**22**	**1,612**

Traffic Data Collection ID 9 (Stations 4053/4054)

Location 1: I-295 NB/SB South of Leigh Road

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	198	4	12	1	13	**215**	262	3	14	0	14	**280**	460	8	26	1	27	**495**
1:00	129	3	10	3	13	**145**	116	5	13	2	15	**135**	245	8	23	5	28	**281**
2:00	106	4	15	3	18	**127**	70	3	9	3	12	**84**	175	7	24	6	30	**212**
3:00	125	9	23	2	25	**159**	70	4	11	0	12	**85**	194	13	34	2	36	**244**
4:00	325	20	42	2	44	**388**	125	7	19	3	22	**155**	450	27	61	5	66	**543**
5:00	964	44	50	7	57	**1,065**	382	22	30	2	32	**437**	1,347	66	80	8	89	**1,501**
6:00	1,633	65	64	6	70	**1,768**	1,091	53	43	1	44	**1,188**	2,724	118	107	7	114	**2,956**
7:00	2,175	89	69	6	75	**2,339**	2,492	77	58	1	59	**2,628**	4,668	166	127	6	133	**4,967**
8:00	1,955	101	75	4	79	**2,135**	2,710	90	76	1	77	**2,876**	4,665	190	151	5	156	**5,011**
9:00	1,440	87	78	1	78	**1,606**	1,610	93	82	1	84	**1,787**	3,050	180	160	2	162	**3,393**
10:00	1,356	67	78	1	79	**1,502**	1,299	97	87	1	88	**1,484**	2,655	164	165	2	167	**2,986**
11:00	1,394	72	67	0	67	**1,533**	1,372	91	80	0	81	**1,544**	2,766	162	147	1	148	**3,077**
12:00	1,457	73	53	0	53	**1,583**	1,503	86	80	1	81	**1,670**	2,960	160	133	1	134	**3,253**
13:00	1,512	66	51	0	51	**1,629**	1,585	86	77	0	78	**1,749**	3,097	152	128	1	129	**3,378**
14:00	1,800	68	45	1	46	**1,914**	1,908	90	74	0	74	**2,073**	3,708	159	119	1	120	**3,987**
15:00	2,150	67	44	0	45	**2,261**	2,577	91	59	0	59	**2,727**	4,727	158	103	1	104	**4,988**
16:00	2,774	48	44	0	44	**2,866**	2,960	75	47	0	47	**3,082**	5,734	123	91	1	91	**5,947**
17:00	3,187	36	40	0	40	**3,263**	3,154	58	46	0	46	**3,258**	6,341	94	85	0	86	**6,521**
18:00	1,979	21	43	0	43	**2,042**	2,316	41	44	0	44	**2,401**	4,295	61	87	0	87	**4,443**
19:00	1,255	15	25	0	25	**1,295**	1,595	20	27	1	29	**1,643**	2,850	35	52	1	54	**2,939**
20:00	898	11	18	1	19	**928**	1,201	12	26	6	32	**1,246**	2,099	24	44	7	51	**2,173**
21:00	665	6	12	1	13	**684**	915	7	20	4	24	**946**	1,580	14	32	4	36	**1,630**
22:00	509	5	12	1	13	**527**	603	5	17	2	18	**626**	1,112	10	28	3	31	**1,153**
23:00	361	5	11	1	13	**378**	464	6	22	3	25	**495**	825	10	33	4	37	**873**
TOTAL	**30,347**	**987**	**979**	**39**	**1,018**	**32,352**	**32,381**	**1,122**	**1,062**	**33**	**1,095**	**34,598**	**62,728**	**2,109**	**2,041**	**72**	**2,114**	**66,950**
Peak	**3,187**	**101**	**78**	**7**	**79**	**3,263**	**3,154**	**97**	**87**	**6**	**88**	**3,258**	**6,341**	**190**	**165**	**8**	**167**	**6,521**

Traffic Data Collection ID 10-1 (Stations 4056)

Location 1: I-195 WB East of Taunton Ave Ramps

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	485	11	25	1	26	**522**	0	0	0	0	0	**0**	485	11	25	1	26	**522**
1:00	248	11	26	1	28	**287**	0	0	0	0	0	**0**	248	11	26	1	28	**287**
2:00	180	18	23	0	23	**221**	0	0	0	0	0	**0**	180	18	23	0	23	**221**
3:00	216	27	35	0	35	**278**	0	0	0	0	0	**0**	216	27	35	0	35	**278**
4:00	505	47	36	0	36	**587**	0	0	0	0	0	**0**	505	47	36	0	36	**587**
5:00	1,545	89	58	0	59	**1,693**	0	0	0	0	0	**0**	1,545	89	58	0	59	**1,693**
6:00	3,536	151	77	1	78	**3,765**	0	0	0	0	0	**0**	3,536	151	77	1	78	**3,765**
7:00	5,127	151	77	1	78	**5,355**	0	0	0	0	0	**0**	5,127	151	77	1	78	**5,355**
8:00	4,790	176	93	0	93	**5,059**	0	0	0	0	0	**0**	4,790	176	93	0	93	**5,059**
9:00	4,060	173	125	0	125	**4,359**	0	0	0	0	0	**0**	4,060	173	125	0	125	**4,359**
10:00	3,837	176	120	1	121	**4,134**	0	0	0	0	0	**0**	3,837	176	120	1	121	**4,134**
11:00	3,751	163	123	0	123	**4,038**	0	0	0	0	0	**0**	3,751	163	123	0	123	**4,038**
12:00	3,919	173	115	0	115	**4,207**	0	0	0	0	0	**0**	3,919	173	115	0	115	**4,207**
13:00	3,820	179	106	0	106	**4,104**	0	0	0	0	0	**0**	3,820	179	106	0	106	**4,104**
14:00	4,113	192	99	1	100	**4,404**	0	0	0	0	0	**0**	4,113	192	99	1	100	**4,404**
15:00	4,440	149	96	0	96	**4,685**	0	0	0	0	0	**0**	4,440	149	96	0	96	**4,685**
16:00	4,319	113	60	0	60	**4,491**	0	0	0	0	0	**0**	4,319	113	60	0	60	**4,491**
17:00	4,134	69	57	1	58	**4,261**	0	0	0	0	0	**0**	4,134	69	57	1	58	**4,261**
18:00	3,826	67	50	2	51	**3,944**	0	0	0	0	0	**0**	3,826	67	50	2	51	**3,944**
19:00	3,051	54	41	0	42	**3,147**	0	0	0	0	0	**0**	3,051	54	41	0	42	**3,147**
20:00	2,541	29	38	1	39	**2,609**	0	0	0	0	0	**0**	2,541	29	38	1	39	**2,609**
21:00	2,051	21	29	4	33	**2,105**	0	0	0	0	0	**0**	2,051	21	29	4	33	**2,105**
22:00	1,575	14	31	4	35	**1,624**	0	0	0	0	0	**0**	1,575	14	31	4	35	**1,624**
23:00	1,083	15	28	2	30	**1,129**	0	0	0	0	0	**0**	1,083	15	28	2	30	**1,129**
TOTAL	**67,154**	**2,267**	**1,568**	**21**	**1,589**	**71,009**	**0**	**0**	**0**	**0**	**0**	**0**	**67,154**	**2,267**	**1,568**	**21**	**1,589**	**71,009**
Peak	**5,127**	**192**	**125**	**4**	**125**	**5,355**	**0**	**0**	**0**	**0**	**0**	**0**	**5,127**	**192**	**125**	**4**	**125**	**5,355**

Traffic Data Collection ID 10-2 (Stations 4055)

Location 1: I-195 EB West of Gano Street

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	0	0	0	0	0	**0**	1,002	18	36	1	38	**1,058**	1,002	18	36	1	38	**1,058**
1:00	0	0	0	0	0	**0**	577	12	37	1	38	**627**	577	12	37	1	38	**627**
2:00	0	0	0	0	0	**0**	313	20	33	1	33	**367**	313	20	33	1	33	**367**
3:00	0	0	0	0	0	**0**	310	34	48	0	48	**391**	310	34	48	0	48	**391**
4:00	0	0	0	0	0	**0**	456	40	65	0	66	**563**	456	40	65	0	66	**563**
5:00	0	0	0	0	0	**0**	1,309	84	83	2	86	**1,479**	1,309	84	83	2	86	**1,479**
6:00	0	0	0	0	0	**0**	3,349	164	124	2	126	**3,639**	3,349	164	124	2	126	**3,639**
7:00	0	0	0	0	0	**0**	5,135	215	112	1	112	**5,463**	5,135	215	112	1	112	**5,463**
8:00	0	0	0	0	0	**0**	5,164	215	115	0	116	**5,495**	5,164	215	115	0	116	**5,495**
9:00	0	0	0	0	0	**0**	4,307	251	128	0	128	**4,686**	4,307	251	128	0	128	**4,686**
10:00	0	0	0	0	0	**0**	4,155	196	122	1	122	**4,473**	4,155	196	122	1	122	**4,473**
11:00	0	0	0	0	0	**0**	4,524	210	105	0	105	**4,839**	4,524	210	105	0	105	**4,839**
12:00	0	0	0	0	0	**0**	4,892	216	102	0	102	**5,210**	4,892	216	102	0	102	**5,210**
13:00	0	0	0	0	0	**0**	4,993	208	90	0	91	**5,292**	4,993	208	90	0	91	**5,292**
14:00	0	0	0	0	0	**0**	5,778	227	92	1	92	**6,098**	5,778	227	92	1	92	**6,098**
15:00	0	0	0	0	0	**0**	6,862	210	61	1	62	**7,133**	6,862	210	61	1	62	**7,133**
16:00	0	0	0	0	0	**0**	7,544	142	48	0	48	**7,733**	7,544	142	48	0	48	**7,733**
17:00	0	0	0	0	0	**0**	7,481	84	52	0	52	**7,617**	7,481	84	52	0	52	**7,617**
18:00	0	0	0	0	0	**0**	5,489	75	45	1	45	**5,610**	5,489	75	45	1	45	**5,610**
19:00	0	0	0	0	0	**0**	4,213	49	41	0	41	**4,303**	4,213	49	41	0	41	**4,303**
20:00	0	0	0	0	0	**0**	3,458	38	36	1	37	**3,534**	3,458	38	36	1	37	**3,534**
21:00	0	0	0	0	0	**0**	2,883	26	32	0	33	**2,941**	2,883	26	32	0	33	**2,941**
22:00	0	0	0	0	0	**0**	2,228	19	44	0	44	**2,291**	2,228	19	44	0	44	**2,291**
23:00	0	0	0	0	0	**0**	1,724	16	33	0	33	**1,773**	1,724	16	33	0	33	**1,773**
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**88,147**	**2,769**	**1,682**	**15**	**1,697**	**92,613**	**88,147**	**2,769**	**1,682**	**15**	**1,697**	**92,613**
Peak	**0**	**0**	**0**	**0**	**0**	**0**	**7,544**	**251**	**128**	**2**	**128**	**7,733**	**7,544**	**251**	**128**	**2**	**128**	**7,733**

Traffic Data Collection ID 10-a (Stations 3998)

Location 1: Taunton Ave WB On Ramp to I-195 WB

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	157	9	1	0	1	**167**	0	0	0	0	0	**0**	157	9	1	0	1	**167**
1:00	95	4	1	0	1	**100**	0	0	0	0	0	**0**	95	4	1	0	1	**100**
2:00	58	6	1	0	1	**65**	0	0	0	0	0	**0**	58	6	1	0	1	**65**
3:00	59	12	1	0	1	**72**	0	0	0	0	0	**0**	59	12	1	0	1	**72**
4:00	132	23	2	0	2	**157**	0	0	0	0	0	**0**	132	23	2	0	2	**157**
5:00	418	70	5	0	5	**494**	0	0	0	0	0	**0**	418	70	5	0	5	**494**
6:00	1,061	120	18	1	19	**1,200**	0	0	0	0	0	**0**	1,061	120	18	1	19	**1,200**
7:00	1,742	113	27	4	30	**1,884**	0	0	0	0	0	**0**	1,742	113	27	4	30	**1,884**
8:00	1,863	88	31	4	35	**1,986**	0	0	0	0	0	**0**	1,863	88	31	4	35	**1,986**
9:00	1,339	77	19	1	19	**1,436**	0	0	0	0	0	**0**	1,339	77	19	1	19	**1,436**
10:00	1,127	78	18	0	19	**1,224**	0	0	0	0	0	**0**	1,127	78	18	0	19	**1,224**
11:00	1,042	64	12	1	13	**1,119**	0	0	0	0	0	**0**	1,042	64	12	1	13	**1,119**
12:00	1,156	67	14	1	15	**1,237**	0	0	0	0	0	**0**	1,156	67	14	1	15	**1,237**
13:00	1,186	65	17	1	18	**1,269**	0	0	0	0	0	**0**	1,186	65	17	1	18	**1,269**
14:00	1,245	65	20	2	22	**1,331**	0	0	0	0	0	**0**	1,245	65	20	2	22	**1,331**
15:00	1,381	66	18	1	19	**1,466**	0	0	0	0	0	**0**	1,381	66	18	1	19	**1,466**
16:00	1,555	71	19	2	21	**1,646**	0	0	0	0	0	**0**	1,555	71	19	2	21	**1,646**
17:00	1,641	55	17	4	21	**1,717**	0	0	0	0	0	**0**	1,641	55	17	4	21	**1,717**
18:00	1,323	49	8	0	8	**1,380**	0	0	0	0	0	**0**	1,323	49	8	0	8	**1,380**
19:00	1,014	40	6	0	6	**1,060**	0	0	0	0	0	**0**	1,014	40	6	0	6	**1,060**
20:00	849	32	5	0	5	**886**	0	0	0	0	0	**0**	849	32	5	0	5	**886**
21:00	644	24	4	0	4	**672**	0	0	0	0	0	**0**	644	24	4	0	4	**672**
22:00	490	16	2	0	2	**509**	0	0	0	0	0	**0**	490	16	2	0	2	**509**
23:00	327	12	2	0	2	**341**	0	0	0	0	0	**0**	327	12	2	0	2	**341**
TOTAL	**21,903**	**1,225**	**266**	**21**	**287**	**23,415**	**0**	**0**	**0**	**0**	**0**	**0**	**21,903**	**1,225**	**266**	**21**	**287**	**23,415**
Peak	**1,863**	**120**	**31**	**4**	**35**	**1,986**	**0**	**0**	**0**	**0**	**0**	**0**	**1,863**	**120**	**31**	**4**	**35**	**1,986**

Traffic Data Collection ID 11 (Stations 4057 NB/SB)

Location 1: Route 146 NB/SB North of Route 116 SB On Ramp

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	348	4	8	1	9	**361**	317	6	11	0	12	**334**	665	9	20	1	21	**695**
1:00	265	6	12	1	12	**283**	154	3	11	1	12	**168**	418	9	23	1	24	**451**
2:00	191	3	8	1	9	**202**	109	4	7	4	11	**124**	300	6	15	5	20	**326**
3:00	184	5	13	1	14	**202**	89	8	14	1	15	**112**	273	12	27	1	29	**314**
4:00	298	16	16	0	16	**330**	185	11	22	1	23	**218**	483	27	37	1	39	**548**
5:00	949	36	23	1	24	**1,009**	572	20	33	2	35	**627**	1,522	56	56	3	59	**1,636**
6:00	1,546	50	38	0	38	**1,633**	1,523	52	44	0	44	**1,619**	3,069	101	81	0	82	**3,252**
7:00	1,813	55	32	0	33	**1,901**	2,471	64	34	0	34	**2,570**	4,285	120	66	0	67	**4,471**
8:00	1,727	57	36	0	36	**1,821**	2,357	63	44	0	44	**2,464**	4,085	120	80	0	80	**4,285**
9:00	1,285	62	43	0	43	**1,390**	1,765	71	49	0	49	**1,885**	3,049	133	93	0	93	**3,275**
10:00	1,234	65	45	0	45	**1,343**	1,603	69	43	0	43	**1,715**	2,837	134	88	0	88	**3,058**
11:00	1,268	50	41	0	41	**1,359**	1,639	69	41	0	41	**1,749**	2,907	119	82	0	82	**3,108**
12:00	1,397	54	40	0	40	**1,491**	1,638	64	44	0	44	**1,746**	3,035	118	84	0	85	**3,237**
13:00	1,378	48	37	0	37	**1,462**	1,620	59	36	0	36	**1,715**	2,998	107	73	0	73	**3,177**
14:00	1,773	59	28	0	28	**1,860**	1,944	64	37	0	37	**2,045**	3,717	124	65	0	65	**3,906**
15:00	1,958	48	22	0	22	**2,028**	2,225	53	22	0	22	**2,301**	4,184	101	44	0	44	**4,329**
16:00	2,233	32	24	0	25	**2,290**	2,321	42	20	0	20	**2,383**	4,554	74	45	0	45	**4,673**
17:00	2,048	22	19	0	20	**2,089**	2,516	28	21	0	21	**2,564**	4,564	49	40	0	40	**4,653**
18:00	1,554	18	15	1	16	**1,587**	1,891	29	17	0	17	**1,936**	3,445	46	31	1	33	**3,523**
19:00	1,276	10	14	0	14	**1,300**	1,398	18	14	0	14	**1,430**	2,674	28	28	0	28	**2,730**
20:00	1,121	9	11	2	14	**1,143**	1,128	13	11	0	12	**1,153**	2,249	22	23	3	25	**2,296**
21:00	977	5	11	0	11	**992**	944	8	10	0	10	**963**	1,921	13	21	0	21	**1,955**
22:00	801	5	9	2	11	**817**	777	6	12	1	13	**795**	1,578	10	21	3	24	**1,612**
23:00	567	7	14	1	15	**589**	698	4	10	1	11	**714**	1,265	11	24	2	26	**1,302**
TOTAL	**28,189**	**723**	**560**	**12**	**572**	**29,484**	**31,886**	**826**	**606**	**13**	**619**	**33,331**	**60,075**	**1,548**	**1,166**	**25**	**1,191**	**62,814**
Peak	**2,233**	**65**	**45**	**2**	**45**	**2,290**	**2,516**	**71**	**49**	**4**	**49**	**2,570**	**4,564**	**134**	**93**	**5**	**93**	**4,673**

Traffic Data Collection ID 11-a (Stations 3999)

Location 1: Route 146 SB On Ramp from Route 116

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	0	0	0	0	0	**0**	22	1	0	0	0	**23**	22	1	0	0	0	**23**
1:00	0	0	0	0	0	**0**	8	3	0	0	0	**11**	8	3	0	0	0	**11**
2:00	0	0	0	0	0	**0**	4	1	0	0	0	**5**	4	1	0	0	0	**5**
3:00	0	0	0	0	0	**0**	5	2	0	0	0	**7**	5	2	0	0	0	**7**
4:00	0	0	0	0	0	**0**	5	1	0	0	0	**6**	5	1	0	0	0	**6**
5:00	0	0	0	0	0	**0**	16	2	0	0	0	**18**	16	2	0	0	0	**18**
6:00	0	0	0	0	0	**0**	61	17	0	0	0	**79**	61	17	0	0	0	**79**
7:00	0	0	0	0	0	**0**	120	8	1	0	1	**128**	120	8	1	0	1	**128**
8:00	0	0	0	0	0	**0**	130	10	0	0	0	**141**	130	10	0	0	0	**141**
9:00	0	0	0	0	0	**0**	133	12	1	0	1	**146**	133	12	1	0	1	**146**
10:00	0	0	0	0	0	**0**	125	13	1	0	1	**139**	125	13	1	0	1	**139**
11:00	0	0	0	0	0	**0**	139	16	1	0	1	**155**	139	16	1	0	1	**155**
12:00	0	0	0	0	0	**0**	139	11	1	0	1	**151**	139	11	1	0	1	**151**
13:00	0	0	0	0	0	**0**	127	11	1	0	1	**139**	127	11	1	0	1	**139**
14:00	0	0	0	0	0	**0**	131	15	1	0	1	**147**	131	15	1	0	1	**147**
15:00	0	0	0	0	0	**0**	157	17	1	0	1	**175**	157	17	1	0	1	**175**
16:00	0	0	0	0	0	**0**	265	7	1	0	1	**274**	265	7	1	0	1	**274**
17:00	0	0	0	0	0	**0**	316	7	1	0	1	**323**	316	7	1	0	1	**323**
18:00	0	0	0	0	0	**0**	183	7	0	0	0	**190**	183	7	0	0	0	**190**
19:00	0	0	0	0	0	**0**	118	8	1	0	1	**126**	118	8	1	0	1	**126**
20:00	0	0	0	0	0	**0**	96	5	1	0	1	**102**	96	5	1	0	1	**102**
21:00	0	0	0	0	0	**0**	63	5	0	0	0	**67**	63	5	0	0	0	**67**
22:00	0	0	0	0	0	**0**	53	3	0	0	0	**56**	53	3	0	0	0	**56**
23:00	0	0	0	0	0	**0**	54	2	0	0	0	**57**	54	2	0	0	0	**57**
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**2,468**	**181**	**12**	**0**	**12**	**2,661**	**2,468**	**181**	**12**	**0**	**12**	**2,661**
Peak	**0**	**0**	**0**	**0**	**0**	**0**	**316**	**17**	**1**	**0**	**1**	**323**	**316**	**17**	**1**	**0**	**1**	**323**

Traffic Data Collection ID 12 (Stations 4058/4059)

Location 1: Route 146 NB/SB at Route 104 Crossing

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	165	10	14	0	15	**190**	163	4	18	1	19	**186**	328	14	33	1	34	**376**
1:00	105	9	13	1	14	**128**	75	5	15	2	17	**97**	180	14	28	3	31	**225**
2:00	70	5	12	2	14	**89**	57	3	24	1	24	**84**	127	8	36	3	38	**174**
3:00	82	7	17	1	18	**108**	69	7	31	0	31	**107**	151	14	48	1	49	**215**
4:00	180	9	23	1	24	**214**	199	13	49	1	50	**262**	379	22	73	2	75	**476**
5:00	523	24	50	0	50	**597**	610	24	49	4	52	**686**	1,132	48	98	4	102	**1,283**
6:00	1,130	57	60	0	61	**1,248**	1,384	43	64	6	70	**1,497**	2,514	100	125	6	131	**2,744**
7:00	1,301	58	60	0	60	**1,419**	1,944	70	64	1	64	**2,078**	3,245	128	123	1	124	**3,498**
8:00	1,059	65	67	1	68	**1,192**	1,520	50	71	2	73	**1,643**	2,579	115	139	2	141	**2,835**
9:00	876	60	88	0	88	**1,024**	1,132	53	85	3	88	**1,273**	2,008	113	173	3	176	**2,297**
10:00	860	65	100	0	100	**1,025**	1,031	54	78	0	78	**1,163**	1,891	119	178	1	179	**2,189**
11:00	845	54	84	0	84	**984**	982	63	67	1	68	**1,113**	1,827	117	152	1	152	**2,097**
12:00	910	68	80	0	80	**1,058**	925	64	69	0	69	**1,058**	1,834	133	149	0	149	**2,116**
13:00	902	62	66	0	66	**1,030**	953	77	63	0	63	**1,093**	1,856	139	128	0	129	**2,123**
14:00	1,192	63	63	1	64	**1,319**	1,261	67	53	1	54	**1,382**	2,453	131	116	1	117	**2,701**
15:00	1,372	55	62	0	63	**1,489**	1,534	65	45	1	45	**1,644**	2,907	119	107	1	108	**3,133**
16:00	1,611	37	44	0	44	**1,691**	1,578	44	35	1	36	**1,658**	3,188	81	79	1	80	**3,349**
17:00	1,754	25	36	0	36	**1,815**	1,561	33	35	0	35	**1,629**	3,315	58	71	0	71	**3,444**
18:00	1,286	20	26	1	27	**1,333**	1,201	23	33	1	33	**1,257**	2,487	43	59	2	60	**2,590**
19:00	959	13	22	2	25	**997**	865	15	23	1	24	**903**	1,824	28	45	3	48	**1,900**
20:00	845	8	20	3	23	**876**	645	10	27	1	27	**683**	1,491	18	47	4	50	**1,559**
21:00	633	8	24	9	33	**674**	497	8	19	1	20	**525**	1,130	16	43	10	53	**1,199**
22:00	458	4	25	3	28	**491**	372	8	19	0	20	**399**	830	12	44	3	48	**890**
23:00	313	6	26	3	28	**347**	349	4	19	0	19	**372**	662	9	45	3	47	**718**
TOTAL	**19,433**	**791**	**1,083**	**30**	**1,113**	**21,337**	**20,905**	**806**	**1,054**	**26**	**1,080**	**22,791**	**40,338**	**1,597**	**2,137**	**56**	**2,193**	**44,128**
Peak	**1,754**	**68**	**100**	**9**	**100**	**1,815**	**1,944**	**77**	**85**	**6**	**88**	**2,078**	**3,315**	**139**	**178**	**10**	**179**	**3,498**

Traffic Data Collection ID 13 (Stations 4060/4061)

Location 1: Route 6 WB/EB at Woonasquatucket River Crossing

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	262	4	3	0	3	**269**	190	6	4	1	5	**200**	452	10	7	1	7	**468**
1:00	203	3	7	0	7	**213**	122	1	5	1	6	**129**	325	4	12	1	13	**341**
2:00	121	3	5	0	5	**129**	80	5	6	0	6	**90**	201	8	10	0	10	**218**
3:00	102	7	6	0	6	**115**	93	17	11	0	11	**120**	195	24	16	0	16	**235**
4:00	149	8	6	0	6	**162**	215	19	7	0	7	**240**	363	26	13	0	13	**402**
5:00	497	38	11	0	11	**546**	682	35	24	0	24	**740**	1,179	73	35	0	35	**1,286**
6:00	1,114	61	17	0	17	**1,192**	1,876	73	26	0	26	**1,974**	2,990	133	43	0	43	**3,165**
7:00	1,502	78	24	0	24	**1,604**	2,745	125	26	0	26	**2,895**	4,247	202	50	0	50	**4,499**
8:00	1,375	99	22	0	22	**1,495**	2,754	120	36	0	36	**2,910**	4,128	219	58	0	58	**4,405**
9:00	1,244	98	23	0	23	**1,365**	1,915	118	29	0	29	**2,062**	3,159	216	52	0	52	**3,427**
10:00	1,291	85	28	0	28	**1,403**	1,828	111	28	0	28	**1,967**	3,119	196	56	0	56	**3,370**
11:00	1,474	96	28	0	28	**1,597**	1,727	95	27	0	27	**1,848**	3,200	191	54	0	54	**3,445**
12:00	1,557	96	28	0	28	**1,681**	1,809	89	24	1	25	**1,923**	3,365	185	52	1	53	**3,603**
13:00	1,633	92	31	0	31	**1,756**	1,773	86	23	0	23	**1,882**	3,405	178	54	0	54	**3,637**
14:00	1,886	95	26	1	26	**2,006**	1,779	81	26	0	26	**1,886**	3,664	176	52	1	52	**3,892**
15:00	2,384	86	29	0	29	**2,498**	2,065	83	16	0	16	**2,164**	4,449	168	45	0	45	**4,662**
16:00	2,634	57	16	0	16	**2,706**	2,239	41	10	1	10	**2,289**	4,873	97	25	1	26	**4,995**
17:00	2,329	42	20	0	20	**2,391**	2,268	32	11	0	11	**2,310**	4,596	74	31	0	31	**4,701**
18:00	1,591	23	14	0	14	**1,628**	1,797	35	7	0	7	**1,839**	3,388	58	21	0	21	**3,467**
19:00	1,312	19	7	0	7	**1,338**	1,396	19	5	0	5	**1,420**	2,708	37	13	0	13	**2,758**
20:00	1,127	7	6	0	6	**1,140**	1,088	11	3	0	4	**1,102**	2,214	18	9	0	10	**2,242**
21:00	922	7	6	0	6	**935**	871	6	3	0	3	**880**	1,793	12	9	0	9	**1,815**
22:00	743	7	5	0	5	**755**	669	7	6	0	6	**682**	1,412	14	11	0	11	**1,437**
23:00	533	5	4	0	4	**542**	458	6	4	0	5	**469**	992	11	8	0	8	**1,011**
TOTAL	**27,981**	**1,111**	**367**	**1**	**368**	**29,460**	**32,433**	**1,215**	**364**	**4**	**368**	**34,016**	**60,414**	**2,326**	**731**	**5**	**736**	**63,476**
Peak	**2,634**	**99**	**31**	**1**	**31**	**2,706**	**2,754**	**125**	**36**	**1**	**36**	**2,910**	**4,873**	**219**	**58**	**1**	**58**	**4,995**

Traffic Data Collection ID 14-1 (Stations 4064)

Location 1: Route 10 SB North of Route 6

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	0	0	0	0	0	**0**	851	8	4	0	4	**863**	851	8	4	0	4	**863**
1:00	0	0	0	0	0	**0**	527	8	7	0	7	**543**	527	8	7	0	7	**543**
2:00	0	0	0	0	0	**0**	334	3	5	0	5	**343**	334	3	5	0	5	**343**
3:00	0	0	0	0	0	**0**	255	9	5	1	6	**270**	255	9	5	1	6	**270**
4:00	0	0	0	0	0	**0**	389	16	9	0	9	**414**	389	16	9	0	9	**414**
5:00	0	0	0	0	0	**0**	965	46	23	1	24	**1,035**	965	46	23	1	24	**1,035**
6:00	0	0	0	0	0	**0**	2,182	89	24	0	24	**2,295**	2,182	89	24	0	24	**2,295**
7:00	0	0	0	0	0	**0**	3,129	122	34	0	34	**3,285**	3,129	122	34	0	34	**3,285**
8:00	0	0	0	0	0	**0**	2,986	158	42	1	43	**3,187**	2,986	158	42	1	43	**3,187**
9:00	0	0	0	0	0	**0**	2,668	138	41	0	41	**2,847**	2,668	138	41	0	41	**2,847**
10:00	0	0	0	0	0	**0**	2,938	153	43	0	43	**3,134**	2,938	153	43	0	43	**3,134**
11:00	0	0	0	0	0	**0**	3,468	160	49	0	49	**3,677**	3,468	160	49	0	49	**3,677**
12:00	0	0	0	0	0	**0**	3,517	152	45	0	45	**3,714**	3,517	152	45	0	45	**3,714**
13:00	0	0	0	0	0	**0**	3,484	151	48	0	48	**3,683**	3,484	151	48	0	48	**3,683**
14:00	0	0	0	0	0	**0**	3,958	145	47	0	47	**4,151**	3,958	145	47	0	47	**4,151**
15:00	0	0	0	0	0	**0**	5,036	141	40	0	40	**5,218**	5,036	141	40	0	40	**5,218**
16:00	0	0	0	0	0	**0**	5,714	97	19	0	19	**5,830**	5,714	97	19	0	19	**5,830**
17:00	0	0	0	0	0	**0**	5,224	67	20	0	20	**5,311**	5,224	67	20	0	20	**5,311**
18:00	0	0	0	0	0	**0**	3,900	52	19	0	19	**3,972**	3,900	52	19	0	19	**3,972**
19:00	0	0	0	0	0	**0**	3,244	43	10	0	10	**3,297**	3,244	43	10	0	10	**3,297**
20:00	0	0	0	0	0	**0**	2,912	21	9	0	9	**2,942**	2,912	21	9	0	9	**2,942**
21:00	0	0	0	0	0	**0**	2,360	19	8	1	8	**2,387**	2,360	19	8	1	8	**2,387**
22:00	0	0	0	0	0	**0**	1,882	12	7	1	8	**1,902**	1,882	12	7	1	8	**1,902**
23:00	0	0	0	0	0	**0**	1,598	10	8	0	8	**1,616**	1,598	10	8	0	8	**1,616**
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**63,523**	**1,821**	**565**	**6**	**571**	**65,914**	**63,523**	**1,821**	**565**	**6**	**571**	**65,914**
Peak	**0**	**0**	**0**	**0**	**0**	**0**	**5,714**	**160**	**49**	**1**	**49**	**5,830**	**5,714**	**160**	**49**	**1**	**49**	**5,830**

Traffic Data Collection ID 14-2 (Stations 4062)

Location 1: Route 6 EB West of Route 10

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	0	0	0	0	0	**0**	363	5	5	0	5	**373**	363	5	5	0	5	**373**
1:00	0	0	0	0	0	**0**	258	7	7	0	7	**272**	258	7	7	0	7	**272**
2:00	0	0	0	0	0	**0**	174	7	7	0	7	**187**	174	7	7	0	7	**187**
3:00	0	0	0	0	0	**0**	189	15	11	0	11	**215**	189	15	11	0	11	**215**
4:00	0	0	0	0	0	**0**	379	25	17	0	17	**421**	379	25	17	0	17	**421**
5:00	0	0	0	0	0	**0**	1,183	42	28	0	28	**1,254**	1,183	42	28	0	28	**1,254**
6:00	0	0	0	0	0	**0**	2,660	102	32	0	32	**2,793**	2,660	102	32	0	32	**2,793**
7:00	0	0	0	0	0	**0**	3,658	153	33	0	33	**3,844**	3,658	153	33	0	33	**3,844**
8:00	0	0	0	0	0	**0**	3,550	141	35	0	35	**3,726**	3,550	141	35	0	35	**3,726**
9:00	0	0	0	0	0	**0**	2,590	124	43	0	43	**2,756**	2,590	124	43	0	43	**2,756**
10:00	0	0	0	0	0	**0**	2,409	130	39	0	39	**2,577**	2,409	130	39	0	39	**2,577**
11:00	0	0	0	0	0	**0**	2,476	121	42	0	42	**2,639**	2,476	121	42	0	42	**2,639**
12:00	0	0	0	0	0	**0**	2,576	113	42	0	42	**2,731**	2,576	113	42	0	42	**2,731**
13:00	0	0	0	0	0	**0**	2,558	121	40	0	40	**2,719**	2,558	121	40	0	40	**2,719**
14:00	0	0	0	0	0	**0**	2,551	102	33	0	33	**2,685**	2,551	102	33	0	33	**2,685**
15:00	0	0	0	0	0	**0**	2,750	95	23	0	23	**2,868**	2,750	95	23	0	23	**2,868**
16:00	0	0	0	0	0	**0**	2,982	60	13	0	13	**3,055**	2,982	60	13	0	13	**3,055**
17:00	0	0	0	0	0	**0**	3,061	39	11	0	11	**3,111**	3,061	39	11	0	11	**3,111**
18:00	0	0	0	0	0	**0**	2,610	42	10	0	10	**2,663**	2,610	42	10	0	10	**2,663**
19:00	0	0	0	0	0	**0**	2,134	28	7	0	7	**2,170**	2,134	28	7	0	7	**2,170**
20:00	0	0	0	0	0	**0**	1,728	19	6	0	6	**1,753**	1,728	19	6	0	6	**1,753**
21:00	0	0	0	0	0	**0**	1,461	9	6	0	6	**1,476**	1,461	9	6	0	6	**1,476**
22:00	0	0	0	0	0	**0**	1,118	9	4	0	4	**1,131**	1,118	9	4	0	4	**1,131**
23:00	0	0	0	0	0	**0**	807	8	4	0	4	**819**	807	8	4	0	4	**819**
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**46,225**	**1,513**	**498**	**1**	**499**	**48,236**	**46,225**	**1,513**	**498**	**1**	**499**	**48,236**
Peak	**0**	**0**	**0**	**0**	**0**	**0**	**3,658**	**153**	**43**	**0**	**43**	**3,844**	**3,658**	**153**	**43**	**0**	**43**	**3,844**

Traffic Data Collection ID 14-3 (Stations 4063)

Location 1: Route 10 NB South of Route 6

Time of Day	Northbound/Westbound						Southbound/Eastbound						TOTAL					
	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL	Cars	Single Unit Trucks	Tractor Trailers			TOTAL
			Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal				Single Trailer	Tandem Trailer	Subtotal	
0:00	456	3	2	0	2	**461**	0	0	0	0	0	**0**	456	3	2	0	2	**461**
1:00	316	5	2	0	2	**322**	0	0	0	0	0	**0**	316	5	2	0	2	**322**
2:00	187	7	1	0	1	**195**	0	0	0	0	0	**0**	187	7	1	0	1	**195**
3:00	170	8	1	0	1	**179**	0	0	0	0	0	**0**	170	8	1	0	1	**179**
4:00	331	21	6	0	7	**359**	0	0	0	0	0	**0**	331	21	6	0	7	**359**
5:00	935	49	9	0	9	**993**	0	0	0	0	0	**0**	935	49	9	0	9	**993**
6:00	1,691	45	8	0	8	**1,744**	0	0	0	0	0	**0**	1,691	45	8	0	8	**1,744**
7:00	2,324	84	8	0	8	**2,416**	0	0	0	0	0	**0**	2,324	84	8	0	8	**2,416**
8:00	2,461	83	9	0	9	**2,553**	0	0	0	0	0	**0**	2,461	83	9	0	9	**2,553**
9:00	2,020	72	12	0	12	**2,104**	0	0	0	0	0	**0**	2,020	72	12	0	12	**2,104**
10:00	2,146	76	11	0	11	**2,233**	0	0	0	0	0	**0**	2,146	76	11	0	11	**2,233**
11:00	2,221	78	12	0	12	**2,311**	0	0	0	0	0	**0**	2,221	78	12	0	12	**2,311**
12:00	2,316	69	8	0	8	**2,392**	0	0	0	0	0	**0**	2,316	69	8	0	8	**2,392**
13:00	2,260	74	12	0	12	**2,346**	0	0	0	0	0	**0**	2,260	74	12	0	12	**2,346**
14:00	2,326	62	7	0	7	**2,396**	0	0	0	0	0	**0**	2,326	62	7	0	7	**2,396**
15:00	2,607	53	5	0	5	**2,665**	0	0	0	0	0	**0**	2,607	53	5	0	5	**2,665**
16:00	2,750	42	3	0	3	**2,795**	0	0	0	0	0	**0**	2,750	42	3	0	3	**2,795**
17:00	2,755	27	2	1	2	**2,785**	0	0	0	0	0	**0**	2,755	27	2	1	2	**2,785**
18:00	2,276	19	2	0	2	**2,298**	0	0	0	0	0	**0**	2,276	19	2	0	2	**2,298**
19:00	1,958	10	3	0	3	**1,972**	0	0	0	0	0	**0**	1,958	10	3	0	3	**1,972**
20:00	1,790	13	1	0	1	**1,804**	0	0	0	0	0	**0**	1,790	13	1	0	1	**1,804**
21:00	1,602	8	2	0	2	**1,612**	0	0	0	0	0	**0**	1,602	8	2	0	2	**1,612**
22:00	1,223	9	2	1	2	**1,235**	0	0	0	0	0	**0**	1,223	9	2	1	2	**1,235**
23:00	839	6	2	1	2	**847**	0	0	0	0	0	**0**	839	6	2	1	2	**847**
TOTAL	**39,960**	**924**	**130**	**3**	**133**	**41,016**	**0**	**0**	**0**	**0**	**0**	**0**	**39,960**	**924**	**130**	**3**	**133**	**41,016**
Peak	**2,755**	**84**	**12**	**1**	**12**	**2,795**	**0**	**0**	**0**	**0**	**0**	**0**	**2,755**	**84**	**12**	**1**	**12**	**2,795**

APPENDIX B – STATED PREFERENCE SURVEY QUESTIONNAIRE

Transcript of Electronic Questionnaire

Welcome Screen

RIDOT is conducting a study to better understand trucking industry needs in the state. The survey will take about 5 to 10 minutes to complete. The survey is anonymous: you will not be asked to give your name or contact information.

Screen 1

Are you the driver of a tractor-trailer truck?

1 Yes, single trailer

2 Yes, multi trailer

3 No [Disqualified]

Screen 2

What best describes your trucking service? Check all that apply.

1 Self-employed Owner-Operator

2 For hire truckload

3 For hire less than truck load (parcel, express)

4 Specialized Trucking

5 Local Delivery

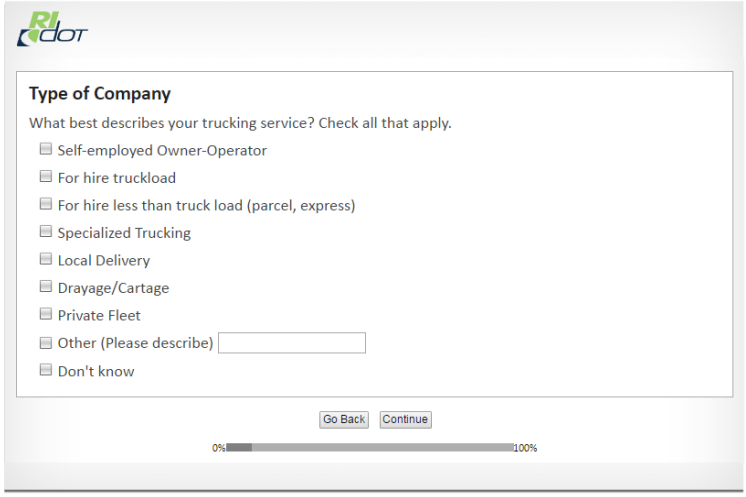
6 Drayage/Cartage

7 Private Fleet

8 Other (Please describe)

9 Don't know

Example Screen



Screen 3

How many trucks are in your company's fleet?

1 1 truck

2 2 to 5 trucks

3 6 to 20 trucks

4 21 to 50 trucks

5 51 to 100 trucks

6 101 to 200 trucks

7 200 to 500 trucks

8 501 to 1000 trucks

9 more than 1000 trucks

10 Don't know

Screen 4

Why are you making this trip? Please think about the trip in one direction.

1 Pick-up load

2 Drop-off load

3 Going to terminal/depot

4 Other (Please describe)

Screen 5

Where did you start your trip? Please provide the type of location, city and state.

Location type:

1 Truck Terminal

2 Rail Terminal

3 Marine Terminal

4 Air Terminal

5 Factory

6 Warehouse/Distribution Center

7 Farm

8 Point of Sale/Consumption

9 Other [Respondent Specify]

City:

State:

[all states]

Screen 6

Where did your trip end? Please provide the type of location, city and state.

Location type:

1 Truck Terminal

2 Rail Terminal

3 Marine Terminal

4 Air Terminal

5 Factory

6 Warehouse/Distribution Center

7 Farm

8 Point of Sale/Consumption

9 Other [Respondent Specify]

City:

State:

[all states]

Check if at destination

Screen 7

Did/Will your trip include any of these highways in Rhode Island? Please check all that apply.

1 I-95

2 I-195

3 I-295

4 US Rte 6

5 RI 146

6 RI 10

Screen 8

At about what time did you start your trip?

1 12:00MIDNIGHT

2 12:30 AM

3 1:00 AM

[…]

48 11:30 PM

At about what time did you/do you expect to arrive at your destination?

1 12:00 MIDNIGHT

2 12:30 AM

3 1:00 AM

[…]

48 11:30 PM

Check if arrival was not on the same day as departure.

Screen 9

Were/are you required to be at your destination at a specific time?

1 Yes, specific arrival time

2 Yes, arrival within window of less than 1 hour

3 Yes, arrival within window of 1 to 2 hours

4 Yes, window of more than 2 hours

5 No, specific time but specific date

6 No

7 Other Please explain [Respondent Specify]

Screen 10

Does the truck have an E-ZPass tag?

1 Yes, issued in Rhode Island

2 Yes, issued in Massachusetts

3 Yes, issued elsewhere

4 No

Screen 9

We understand that drivers cannot always use travel time savings productively because of scheduling requirements. Assume that roadway improvements would have made your trip [x minutes] shorter, would your schedule have allowed you to use the freed up time to earn more revenue for the company?

1 Yes

2 No, I would have more dead time

3 No, I would have had more free/personal time

4 Don't know

Screen 10

Before the trip started, who planned your route (which roads to take, where to stop)?

1 Me

2 Dispatcher/Fleet Manager

3 Other (Please describe) [Respondent Specify]

4 Don't know

Screen 11

Are you/Were you allowed to choose an alternative route in case of, for instance, an accident or a traffic jam?

1 Yes

2 Yes, with approval of dispatcher or fleet manager

3 No, dispatcher, fleet manager or other decides

4 Other (Please describe)

5 Don't know

Screen 12

Does/Did your trip include tolled roads or crossings?

1 Yes, in Massachusetts

2 Yes, in New York

3 Yes, in New Jersey

4 Yes, in other state

5 No

6 Don't know

Screen 13

How are you compensated for this trip?

1 By the book mile

2 By the actual mile

3 Salary

4 By the hour

5 Load percentage

6 Other (Please explain) [Respondent Specify]

7 Don't know

Screen 14

Will you be reimbursed for the toll?/ If there would be a toll on this trip, do you think that you would be reimbursed for it?

1 Yes, fully reimbursed

2 Yes, partly reimbursed

3 Maybe reimbursed

4 No, not reimbursed

5 Don't know

Screen 15 [shown only to drivers who do not make the route choice decision]

Which of the following describe your company's attitude towards tolls? Check all that apply.

1 Avoid toll roads as much as possible

2 Use toll road only if part of assigned route

3 Use toll road only if necessary to stay on schedule

4 Use toll road if travel time savings are worthwhile given the cost of the toll

5 Use of toll road needs to be preapproved to get reimbursed for tolls

6 Use fastest route, regardless of tolls

7 No opinion on tolls (Completely up to the driver whether to use tolled roads)

8 Depends on the client or contract

9 Other (Please explain)

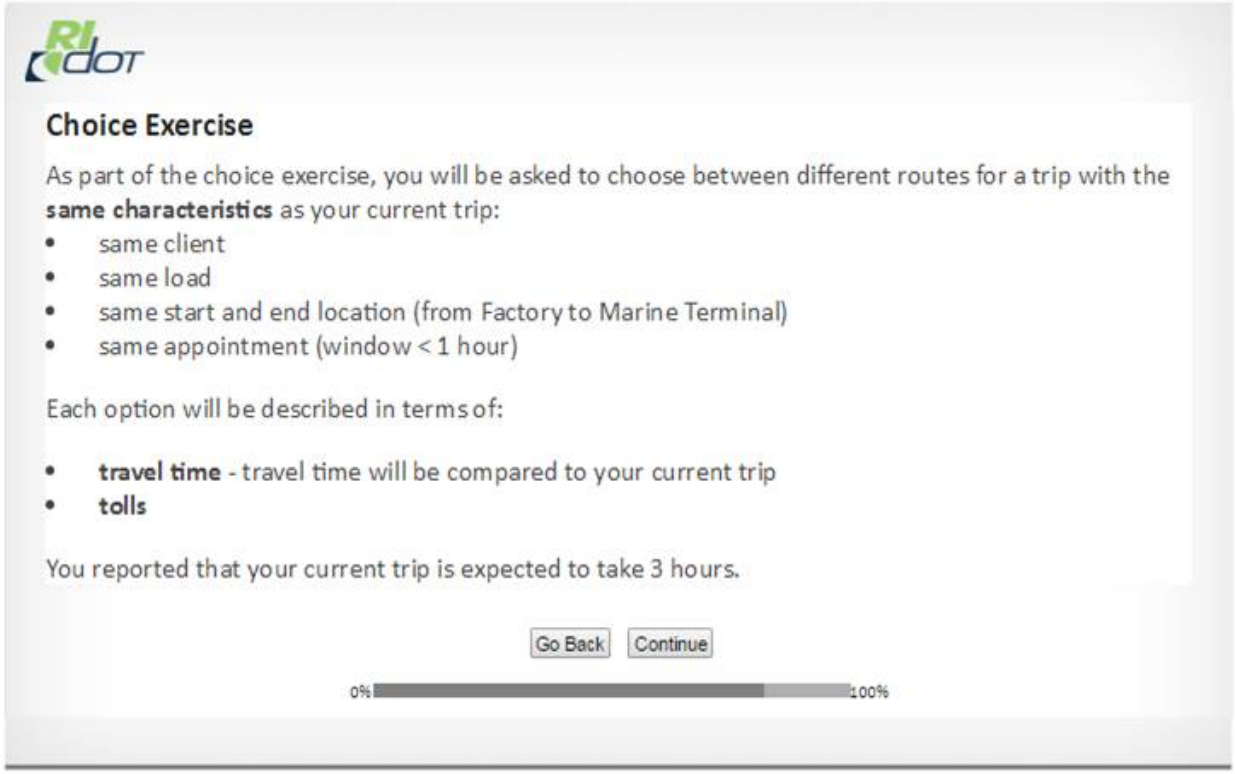
10 Don't know

Screen 16 [shown only to drivers who do make the route choice decision]

Choice Exercise

As part of the choice exercise, you will be asked to choose between different routes for a trip with the **same characteristics** as the trip that you just made:

- same client
- same load
- same start and end location
- same appointment



Each option will be described in terms of:

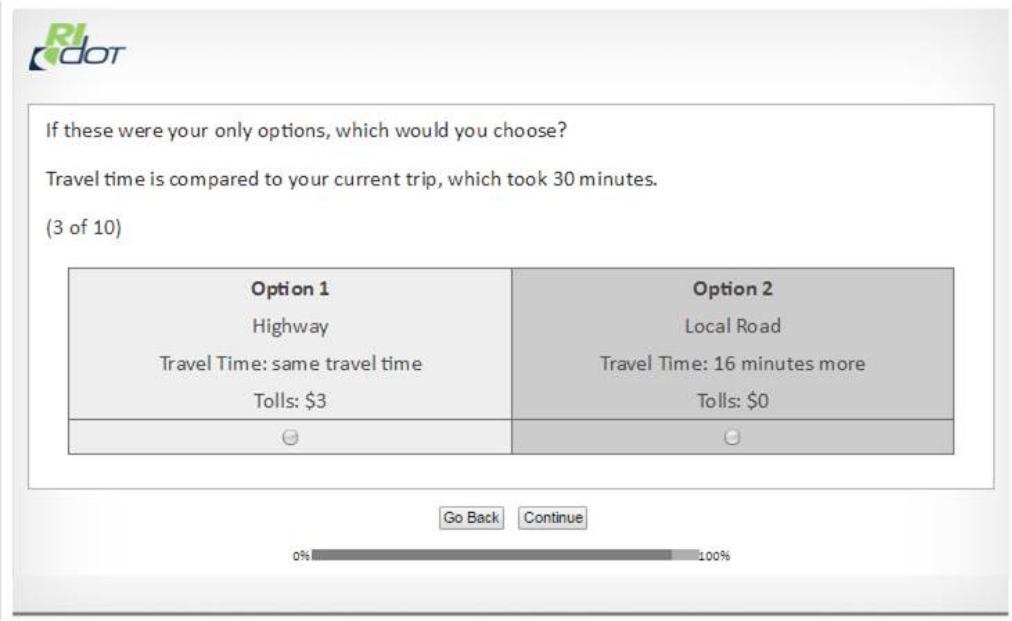
- travel time savings- travel time will be compared to your current trip.
- tolls

Your current trip took [x] hours/is expected to take [x] hours

Screen 17-25 [shown only to drivers who do make the route choice decision]

If these were your only options, which would you choose? Travel time is compared to the trip you just made, which took [x].

Example of choice exercise screen:



Travel time savings and tolls will be different in each screen. Toll will vary as follows:

- For trips of 30 minutes or less, tolls will range from $1.5 to $5.5
- For trips between 30 minutes and 1 hour, tolls wills range from $2 to $9
- For trips of 1 hour or more, tolls will range from $3 to $20

Screen 26

In which state is your truck registered?

[all states]

Screen 27

What is your annual income?

1 Less than $10,000

2 $10,000 to $14,999

3 $15,000 to $24,999

4 $25,000 to $34,999

5 $35,000 to $49,999

6 $50,000 to $74,999

7 $75,000 to $99,999

8 $100,000 to $149,999

9 $150,000 to $199,999

10 $200,000 or more

11 Prefer not to disclose

Screen 28

Feel free to use this space to add any comments.

Screen 29

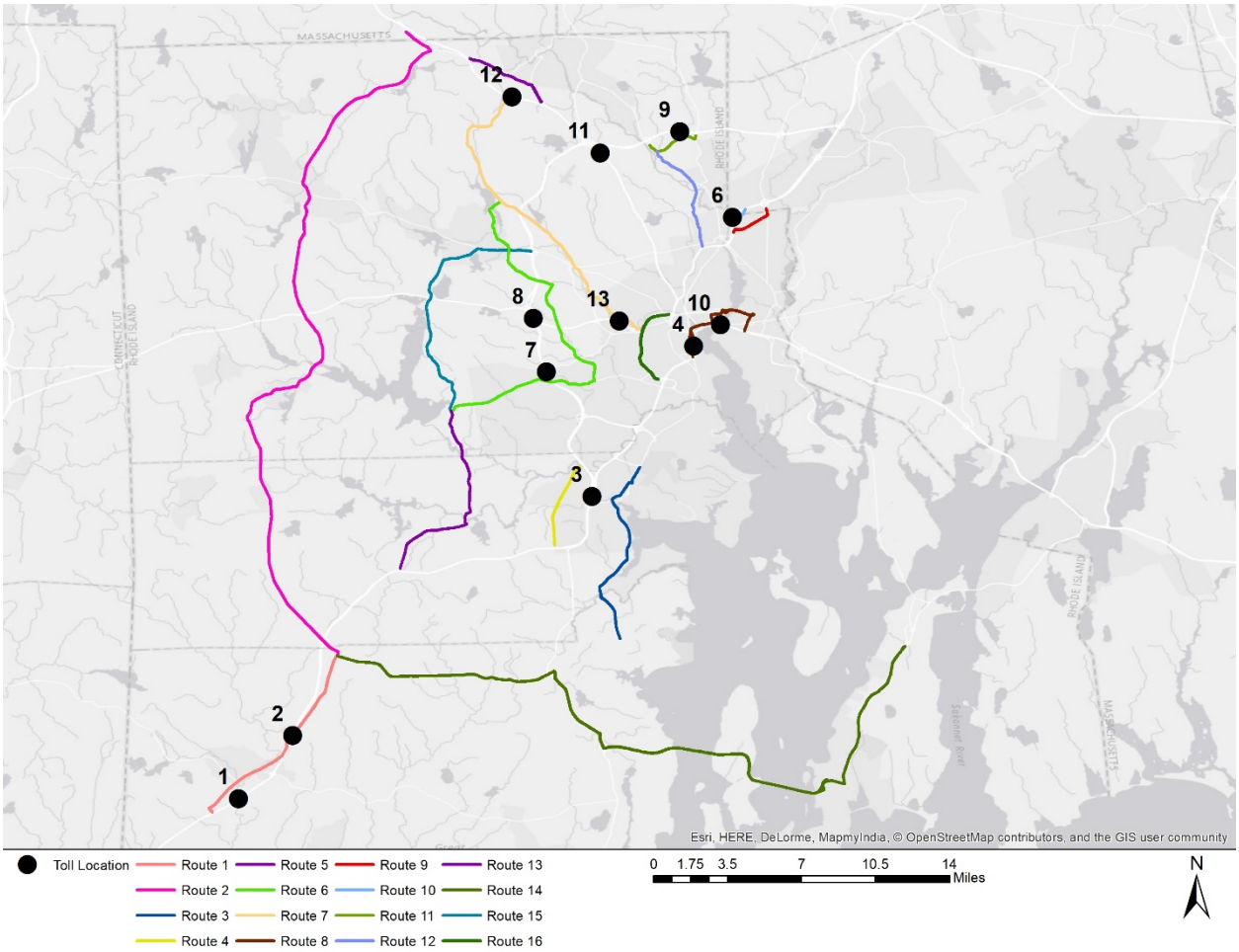
The survey is complete. Thank you for your time.

APPENDIX C – BASE CASE TOLL FORECAST DIVERSION IMPACTS

The analysis of traffic impacts proceeded by first identifying the potential primary diversion routes used by tractor trailers as shown in Figure C-1. The travel demand model's network assignment outputs from both the no toll and tolled conditions provided an indication of the anticipated tractor trailer traffic flows away from the tolled corridors. The Louis Berger Team defined primary diversion routes by first identifying roadway links that were projected to have their tractor trailer volume increase by more than 150 vehicles on daily basis under the tolled scenario. The Louis Berger Team selected this threshold based on the generally observed daily pattern of tractor trailer traffic. Applying the hourly distribution of tractor trailer volumes displayed in Figure 3-4 to the 150 daily diversion threshold results in a peak hourly volume of approximately 10 vehicles per hour. Any increase in tractor trailer traffic below this cutoff was deemed to be negligible given the typical statistical noise of route choice models.

These impacted roadway links were then used to map coherent and contiguous travel paths. A total of 16 primary diversion routes were identified as shown in Figure C-1 with each individual route identified often covering diversions away from multiple toll locations. Each diversion route is briefly described in the following sections of this appendix.

FIGURE C-1 TOLL DIVERSIONS: STATEWIDE PERSPECTIVE



Diversion Route Descriptions

Diversion Route 1

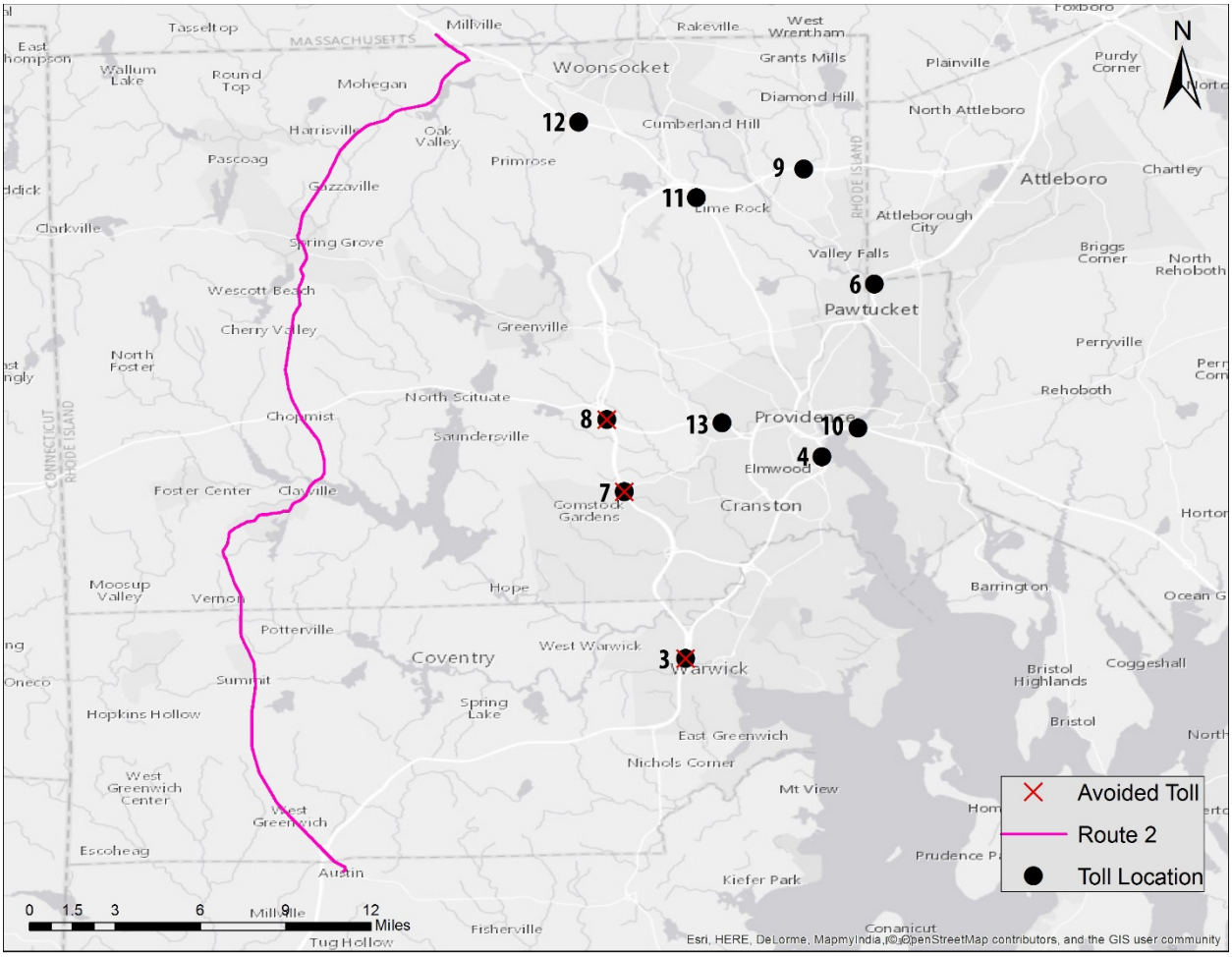
As shown in Figure C-2, diversion route 1 avoids toll locations 1 and 2 by exiting I-95 at exit 2 and re-connecting back at exit 5 using Nooseneck Hill Rd. Differences in travel time using this route to avoid tolls on I-95 is approximately 6 minutes.

FIGURE C-2 DIVERSION ROUTE 1

Diversion Route 2

As shown in Figure C-3, diversion route 2 avoids toll locations 3, 7, 8 and 12 by exiting I-95 at exit 5 and re-connecting back on Route 146 at exit 1 in Massachusetts using State Route 102 comprising Victory Highway, Plainfield Pike, Chopmist Hill Rd, and Broncos Highway. Differences in travel time using this route to avoid tolls on I-95, I-295 and Route 146 ranges between five and ten minutes depending on the time of day.

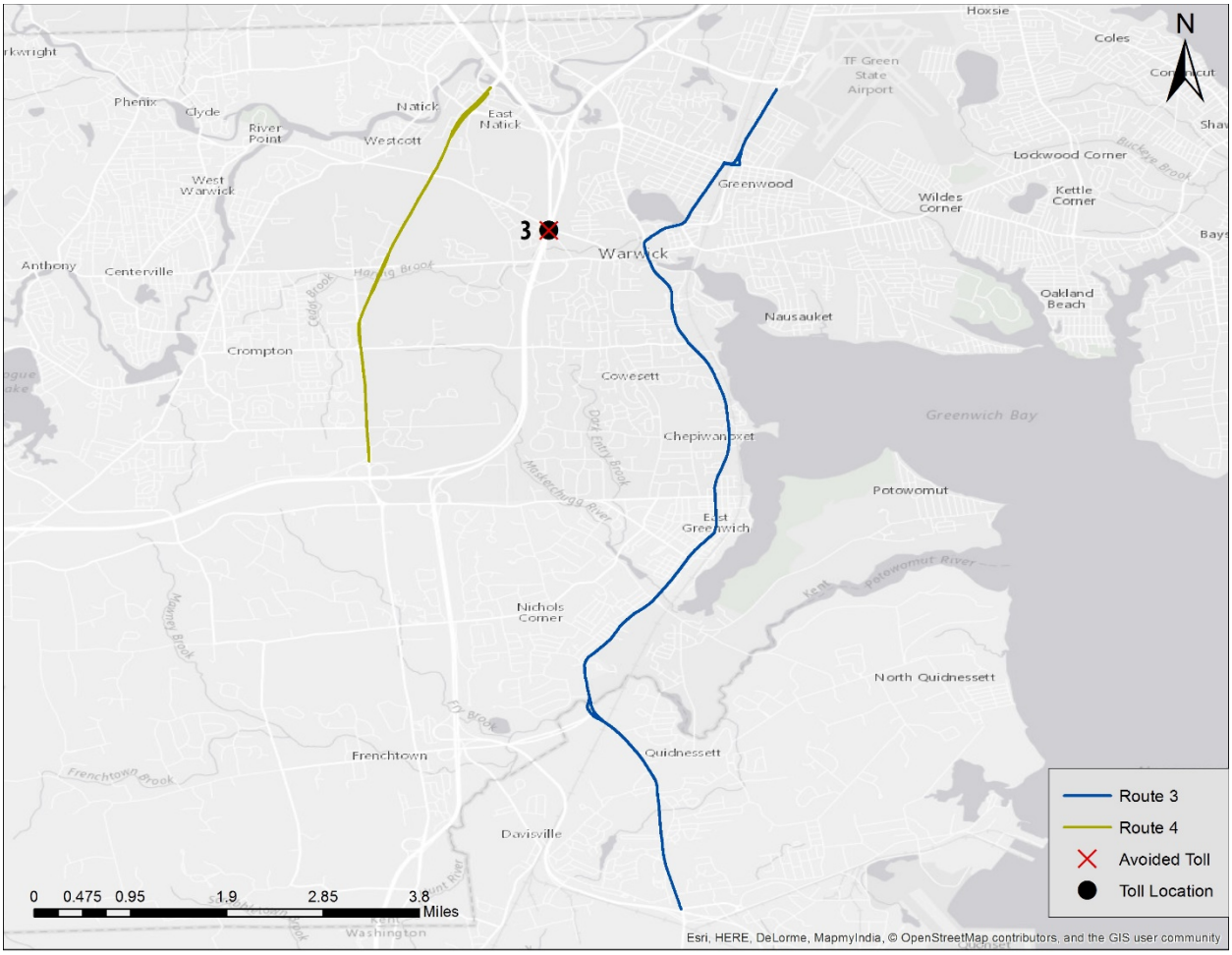
FIGURE C-3 DIVERSION ROUTE 2



Diversion Routes 3 & 4

As shown in Figure C-4, diversion routes 3 and 4 avoid toll location 3. Diversion Route 3 allows tractor trailer traffic coming from or going to the Port of Davisville, to bypass the toll location 3 by using Route 1 (Post Rd), while Diversion Route 4 allows tractor trailers to by toll location 3 by exiting I-95 and using RI Route 2 (Quaker Ln and Bald Hill Rd) and reconnecting back onto I-295 at exit 2. Differences in travel time using diversion route 3 to avoid tolls on I-95 ranges between five and fifteen minutes depending on the time of day.

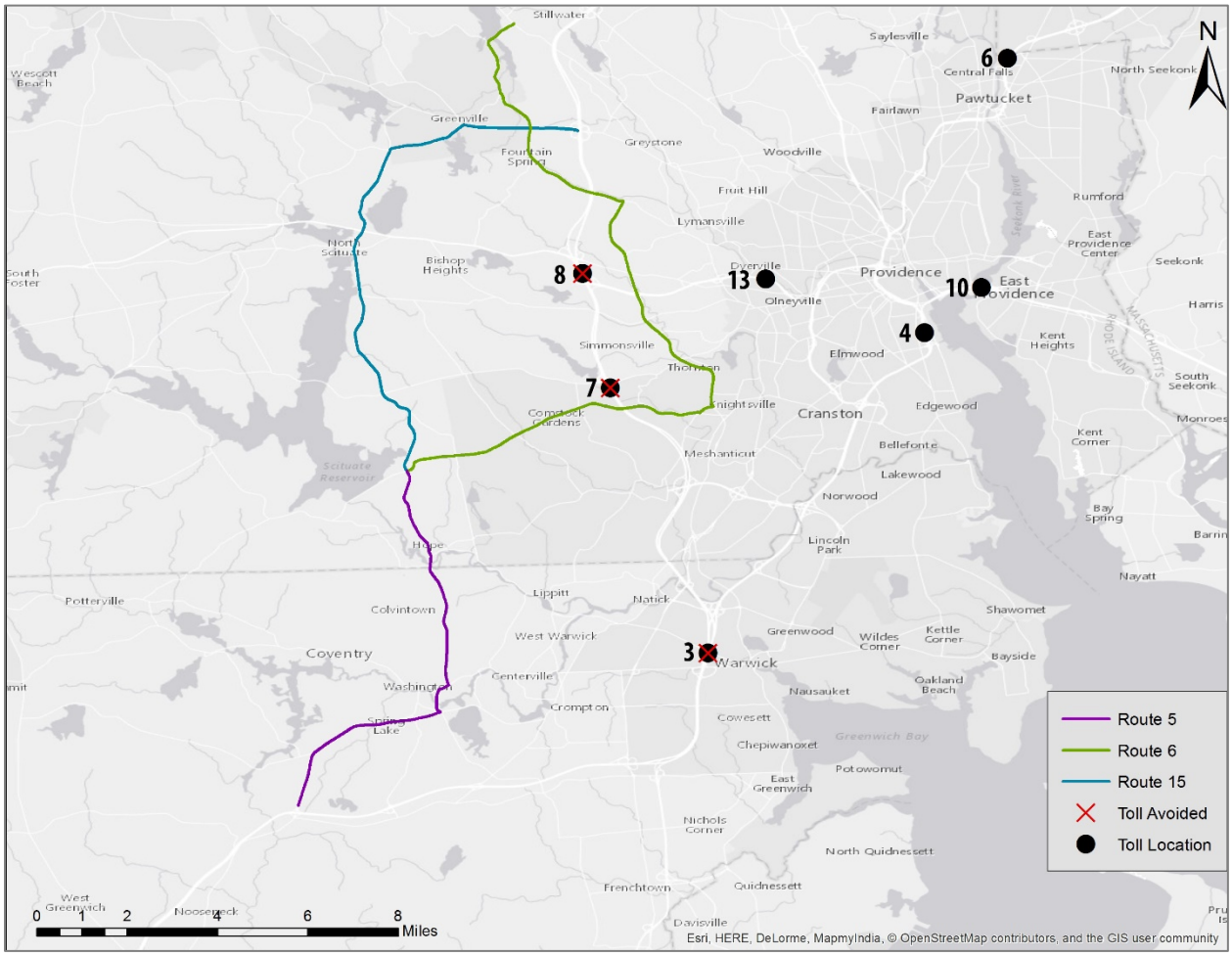
FIGURE C-4 DIVERSION ROUTES 3 & 4



Diversion Routes 5, 6 & 15

As shown in Figure C-5, diversion routes 5, 6 and 15 avoid toll locations 3, 7, and 8. Diversion Route 5 branches off I-95 at exit 6 (via Nooseneck Hill Rd, Tiogue Ave, Knotty Oak Rd, and North Rd) before splitting up into Diversion Route 6 (Scituate Ave, Atwood Ave, Greenville Ave, Cedar Swamp Rd and Pleasant View Ave) and Diversion Route 15 (East Rd, W. Greenville Rd, Smith Ave and Putnam Pike). Differences in travel time using either diversion route to avoid tolls on I-95 and 1-295 ranges between 13 and 20 minutes depending on the time of day.

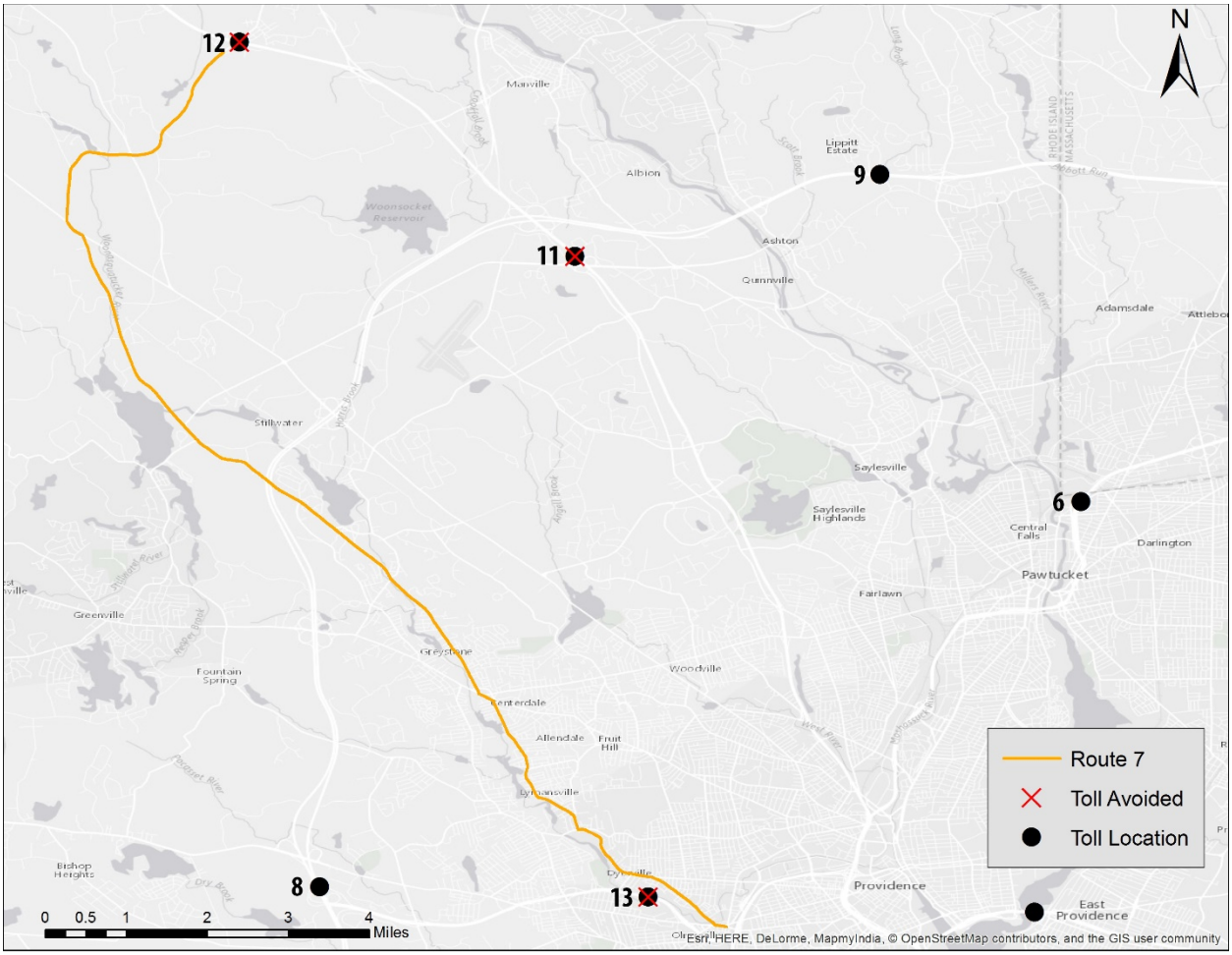
FIGURE C-5 DIVERSION ROUTES 5, 6 & 15



Diversion Route 7

As shown in Figure C-6, diversion route 7 encompasses tractor trailer movements avoiding toll locations 12, 11, and 13 by branching away from Route 146 (using Farnum Pike, Greenville Rd, Waterman Ave, Woonasquatucket Ave, and Manton Ave) and terminating close to Route 10. Differences in travel time using either diversion route to avoid tolls on I-95 and 1-295 ranges between 13 and 20 minutes depending on the time of day. Differences in travel time using this diversion route to avoid tolls ranges between 17 and 21 minutes depending on the time of day.

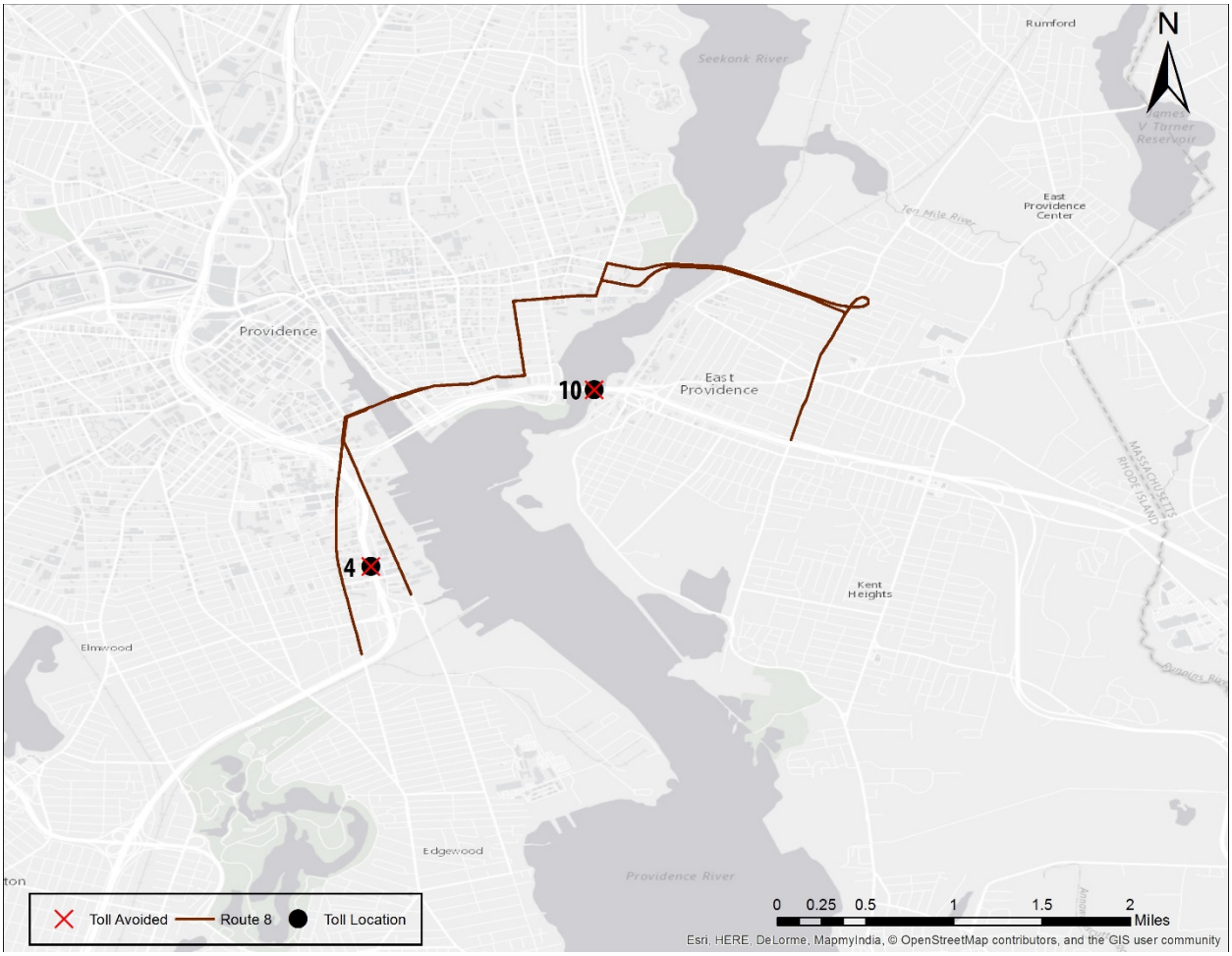
FIGURE C-6 DIVERSION ROUTE 7



Diversion Route 8

As shown in Figure C-7, diversion route 8 consists of a slightly more complex system of alternate travel paths that avoid some combination of toll locations 4 and 10. Eastbound movements could avoid toll location 10 be merging back onto I-195 after exit 6. The main roadways associated with this axis of movements are Eddy St, Allens Ave, Wickenden St, and Henderson Bridge. Differences in travel time using this route to avoid tolls at locations 4 and 10 could range between 7 and 16 minutes depending on the time of day.

FIGURE C-7 DIVERSION ROUTE 8



Diversion Routes 9, 10, 11 and 12

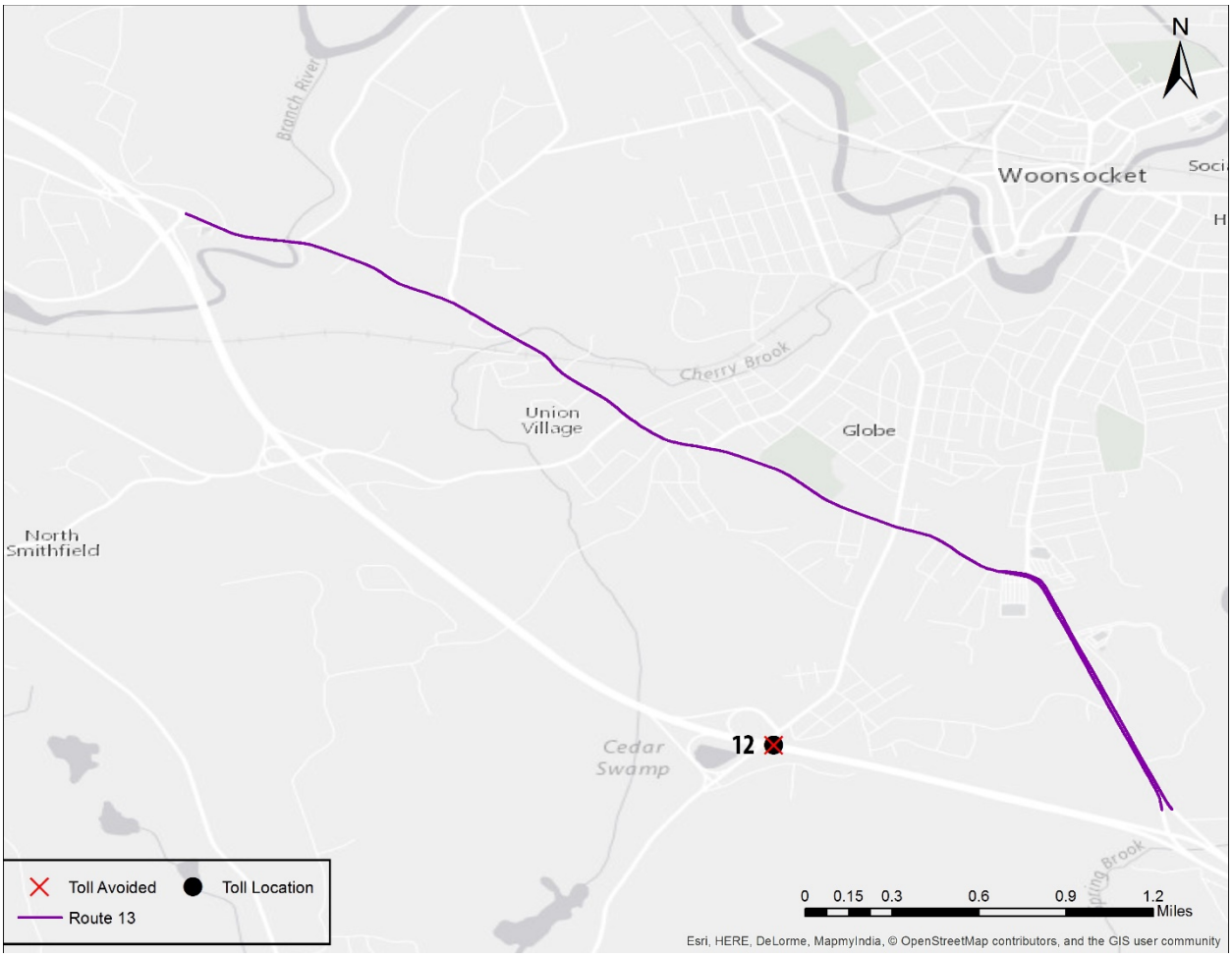
As shown in Figure C-8, diversion routes 9 (Cottage St) and 10 (Washington and S. Washington St) avoid toll locations 6. While diversion route 11 (Angell Rd) avoids toll location 9, and diversion route 12 (Mendon Rd and Lonsdale Ave) avoids toll location 11. The difference in travel time to avoid toll location 6 would range between 4 and 7 minutes using diversion route 9, and between 8 and 14 minutes using diversion route 10. The difference in travel time to avoid toll location 9 using diversion route 11 is estimated at approximately 7 minutes, while using diversion route 12 to avoid toll location 11 would take an additional 6 minutes.

FIGURE C-8 DIVERSION ROUTES 9, 10, 11 & 12

Diversion Route 13

As shown in Figure C-9, diversion route 13 bypasses toll location 12 by utilizing the old Route 146 highway (Great Rd, Smithfield Rd, and Eddie Dowling Hwy). The difference in travel time to avoid toll location 12 using diversion route 13 is estimated at approximately 5 minutes.

FIGURE C-9 DIVERSION ROUTE 13



Diversion Route 14

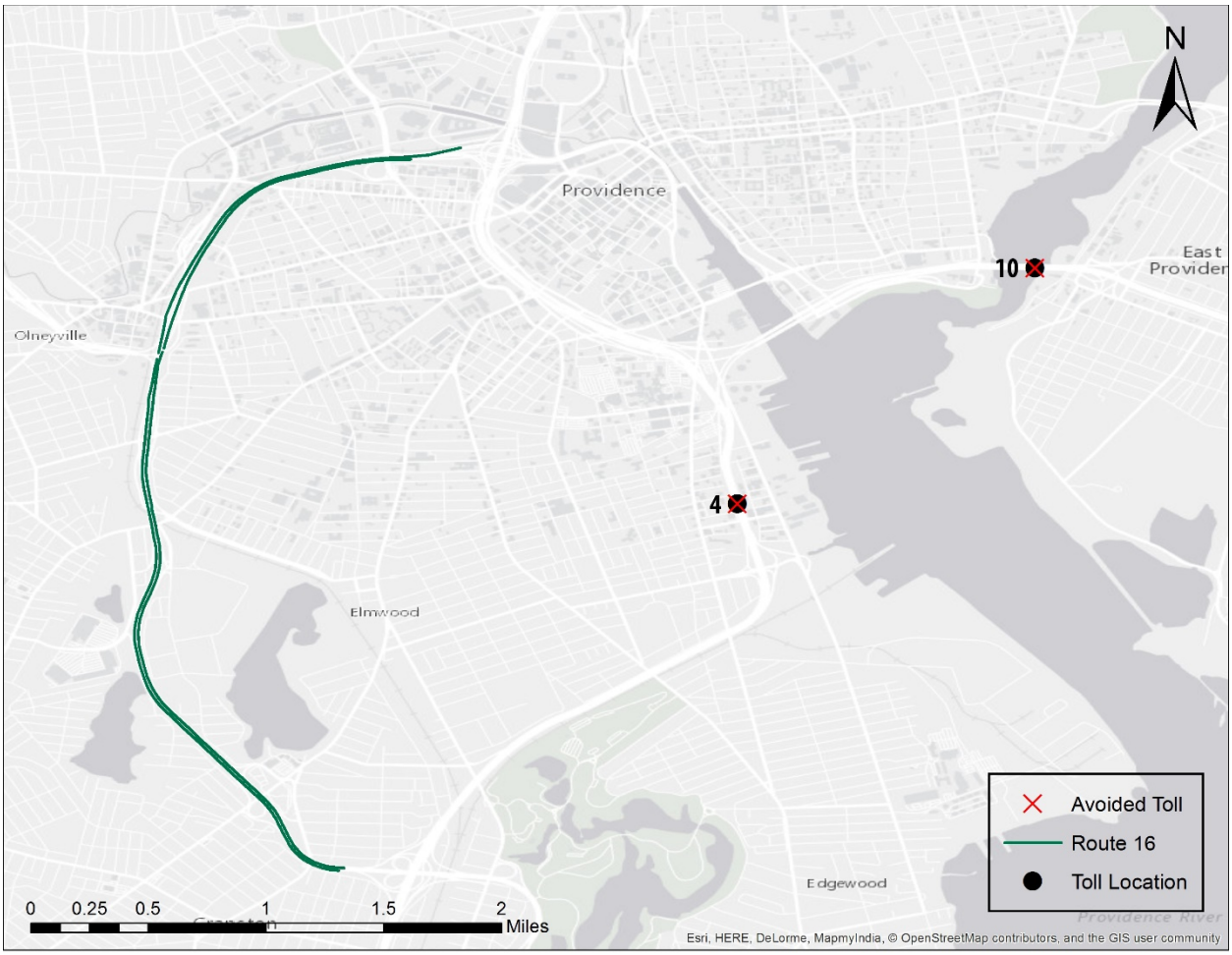
As shown in Figure C-10, diversion route 14 bypasses toll locations 3, 4 and 10 by utilizing the Route 102 (Victory Highway, and Ten Rod Rd), Route 4 (State Highway 4), State Highway 138, Pell Bridge (Newport Bridge), Route 114 (W. Main Rd) where it ties into State Highway 24, a four-lane divided highway that connects with I-95 (exit 8A) in Massachusetts. The difference in travel time to avoid toll locations 3, 4 and 10 using diversion route 14 is estimated at approximately 15 minutes and also includes a 10 dollar toll for most tractor trailers on the Newport Bridge.

FIGURE C-10 DIVERSION ROUTE 14

Diversion Route 16

As shown in Figure C-11, diversion route 16 (Route 10) avoids toll locations 4 and 10. The difference in travel time to avoid toll location 4 would range between 1 and 4 minutes using diversion route 16.

FIGURE C-11 DIVERSION ROUTE 16



Diversion Impact Analysis

As previously discussed, diversions observed at any given toll location reflect complex combinations of tractor trailer movements away from other toll locations. Tables C-1 and C-2 provide the estimates of total diversions and diversions at each toll location by time-of-day for both base case scenarios.

Table C-1 Base Case Diversions by Toll Location (2016 Base Year)

Toll Loc	No Toll Traffic	Diversion Rate	Diversion by Time-of-Day					
			Total	12AM-6AM	6AM-9AM	9AM-3PM	3PM-6PM	6PM-12AM
1	3,971	10.1%	400	44	63	198	66	29
2	4,055	9.7%	394	17	91	177	68	40
3	5,502	16.1%	887	70	202	418	88	109
4	4,628	14.5%	672	151	125	200	58	138
5	0	0.0%	0	0	0	0	0	0
6	2,640	2.4%	63	-20	26	40	21	-4
7	1,964	34.7%	681	95	133	276	85	93
8	3,283	34.0%	1,118	168	217	467	128	138
9	2,212	31.8%	703	99	131	284	81	108
10	3,659	13.9%	507	45	116	221	67	59
11	1,225	26.0%	319	4	60	180	44	30
12	2,112	24.0%	507	72	85	196	59	94
13	922	29.6%	273	2	55	160	27	29
14	0	0.0%	0	0	0	0	0	0
Total	**36,173**	**18.0%**	**6,524**	**747**	**1,303**	**2,817**	**792**	**864**

Table C-2 Base Case Diversions by Toll Location (2040)

Toll Loc	No Toll Traffic	Diversion Rate	Diversion by Time-of-Day					
			Total	12AM-6AM	6AM-9AM	9AM-3PM	3PM-6PM	6PM-12AM
1	4,048	6.1%	245	39	62	89	32	23
2	4,288	5.0%	216	13	75	71	32	25
3	5,798	7.8%	450	43	105	183	46	74
4	4,861	6.4%	313	39	60	99	23	92
5	0	0.0%	0	0	0	0	0	0
6	2,730	0.1%	4	-17	0	13	12	-5
7	2,110	22.8%	482	78	102	186	43	73
8	3,633	26.6%	966	149	206	379	113	119
9	2,217	22.4%	496	75	86	191	58	85
10	3,958	9.2%	366	26	79	173	41	47
11	1,266	16.7%	211	5	43	116	27	20
12	2,305	15.2%	351	60	75	107	34	75
13	1,039	22.4%	232	2	64	128	14	24
14	0	0.0%	0	0	0	0	0	0
Total	**38,254**	**11.3%**	**4,332**	**512**	**958**	**1,736**	**474**	**652**

To facilitate the evaluation of potential impacts arising from the application of base case tolls, the Louis Berger Team estimated the volume of tractor trailers diverted on each route by first taking the diversions presented in Tables C-1 through C-2 and assuming that 20 percent of diversions recorded at each location used other alternate routes outside of the 16 diversion described above. Other assumptions applied in estimating potential traffic impacts are then listed in Table C-3 that shows what combinations of toll locations contributed to the volume of diverted tractor trailers at each location.

Table C–3 Tractor Trailer Diversion Calculation Assumptions

Diversion Route	Leakage Adj. %	Toll Diversion Combinations
1	80%	Toll Location 1 & 2
2	80%	15% of 3, 20% of 7, 20% of 8, 15% of 12
3	80%	20% of 3
4	80%	30% of 3
5	80%	20% of 3, 80% of 7, 80% of 8
6	80%	Half of Diversion Route 5
7	80%	25% of 11 and 12, 100% of 13
8	80%	40% of 4, 30% of 10
9	80%	35% of 6
10	80%	65% of 6
11	80%	100% of '9
12	80%	75% of 11
13	80%	60% of 12
14	80%	15% of 3, 10% of 4, 20% of 10
15	80%	Half of Diversion Route 5
16	80%	50% of 4, 50% of 10

Because a single tractor trailer could divert away from a number of toll locations in one trip, the maximum of value from each element of the combination in Table C-3 was used to calculate the diverted tractor trailer volume for impact analysis. For instance, Table C-1 shows that the 400 and 394 tractor trailers diverted at toll locations 1 and 2 respectively. To analyze the impact on diversion route 1 that covers movements away from both those toll locations, 400 (the maximum value) was carried forward into the analysis and further factored down by 80 percent to account for leakage to other roadways.

Tables C-4 and C-5 present the tractor trailer traffic volumes assumed to flow through each diversion route identified under both scenarios, while Tables C-6 through C-9 present the anticipated impacts on each of the roadway links comprising each diversion route under both scenarios.

Because each diversion route is comprised by a number of different roads with varying functional classifications etc. the level of service calculations included in the following tables were generated in accordance with the methods outlined in the Florida Department of Transportation's 2012 FDOT Quality/Level of Service Handbook Tables. These guidelines provide a high-level method for calculating level of service for a road. The inputs into the calculation consider the AADT, whether the road is urban or rural, the posted speed limit, the number of lanes, whether the road is divided, whether it's one-way, whether it's a state route, and whether the road has exclusive left- and right- turn lanes. For non-highway

roads, the FDOT methodology does not allow for the assigning of level of service B, regardless of traffic volumes seen.

Table C-4 2016 Base Case Diverted Tractor Trailer Traffic by Diversion Route

Diversion Route	Diversion Traffic					
	Total	12AM-6AM	6AM-9AM	9AM-3PM	3PM-6PM	6PM-12AM
1	354	35	73	159	55	32
2	179	27	35	75	20	22
3	142	11	32	67	14	18
4	213	17	48	100	21	26
5	715	107	139	299	82	89
6	358	54	69	149	41	44
7	231	14	44	128	21	23
8	215	48	40	64	19	44
9	18	-6	7	11	6	-1
10	33	-11	13	21	11	-2
11	563	79	105	227	65	87
12	191	3	36	108	27	18
13	243	35	41	94	28	45
14	110	12	24	50	11	13
15	358	54	69	149	41	44
16	281	60	50	88	27	55

Table C-5 2040 Base Case Diverted Tractor Trailer Traffic by Diversion Route

Diversion Route	Diversion Traffic					
	Total	12AM-6AM	6AM-9AM	9AM-3PM	3PM-6PM	6PM-12AM
1	208	32	60	71	25	20
2	155	24	33	61	18	19
3	72	7	17	29	7	12
4	108	10	25	44	11	18
5	618	96	132	243	72	76
6	309	48	66	121	36	38
7	197	12	51	103	11	19
8	113	12	19	42	10	30
9	1	-5	0	4	3	-1
10	2	-9	0	7	6	-2
11	396	60	69	153	47	68
12	127	3	26	70	16	12
13	168	29	36	51	16	36
14	61	5	13	28	7	9
15	309	48	66	121	36	38
16	201	30	34	76	23	37

Table C-6 2016 Base Case Average Weekday Diversion Impacts

						No Toll					Toll		
Route	Name	Length (miles)	% Total Length	Functional Class	Setting	Auto	SU Truck	Tractor Trailer	AADT	VMT	Tractor Trailer	AADT	VMT
1	NOOSENECK HILL RD	8.9	98%	Rural Major Collector	Rural	4,420	160	405	5,794	44,367	681	6,623	46,825
1	WOODVILLE ALTON RD	0.2	2%	Rural Major Collector	Rural	1,778	64	145	2,277	447	421	3,106	509
	Summary / Wgt Avg	**9.1**	**100%**			**4,355**	**158**	**398**	**5,707**	**43,284**	**674**	**6,536**	**45,683**
2	VICTORY HWY	13.7	40%	Rural Principal Arterial - Other	Rural	18,096	656	1,252	22,509	274,360	1,428	23,035	276,767
2	CHOPMIST HILL RD	8.2	24%	Rural Principal Arterial - Other	Rural	13,754	499	1,315	18,198	127,968	1,491	18,724	129,410
2	BRONCOS HWY	5.4	16%	Urban Principal Arterial - Other	Urban	13,689	496	583	15,936	80,049	759	16,463	81,000
2	PLAINFIELD PIKE	5.2	15%	Rural Principal Arterial - Other	Rural	24,868	902	1,673	30,788	142,152	1,848	31,314	143,061
2	QUAKER HIGHWAY	0.6	2%	Urban Minor Arterial	Urban	9,748	354	1,490	14,571	6,491	1,665	15,097	6,589
2	PUTNAM PIKE	0.6	2%	Rural Principal Arterial - Other	Rural	21,911	795	1,611	27,538	13,374	1,786	28,065	13,471
2	QUAKER HWY	0.5	2%	Urban Minor Arterial	Urban	9,776	355	1,478	14,564	6,036	1,653	15,090	6,128
2	N MAIN ST	0.2	1%	Urban Minor Arterial	Urban	19,388	703	1,848	25,636	3,949	2,024	26,162	3,981
2	NOOSENECK HILL RD	0.1	0%	Rural Principal Arterial - Other	Rural	25,121	911	1,299	29,930	2,733	1,475	30,457	2,751
	Summary / Wgt Avg	**34.4**	**100%**			**17,211**	**624**	**1,241**	**21,560**	**174,193**	**1,417**	**22,087**	**175,786**
3	POST RD	7.4	83%	Urban Principal Arterial - Other	Urban	26,813	972	510	29,316	209,954	632	29,681	210,856
3	MAIN ST	1.2	13%	Urban Principal Arterial - Other	Urban	26,245	952	435	28,501	32,881	556	28,866	33,026
3	VETERANS MEMORIAL DR	0.2	2%	Urban Principal Arterial - Other	Urban	26,960	978	359	29,013	5,801	480	29,378	5,826
3	MAIN AVE	0.1	1%	Urban Principal Arterial - Other	Urban	18,461	670	302	20,036	1,555	423	20,401	1,564
3	GREENWICH AVE	0.0	1%	Urban Principal Arterial - Other	Urban	42,803	1,552	551	46,008	2,021	673	46,373	2,026
	Summary / Wgt Avg	**8.9**	**100%**			**26,746**	**970**	**495**	**29,202**	**178,791**	**617**	**29,566**	**179,559**
4	BALD HILL RD	2.5	65%	Urban Principal Arterial - Other	Urban	29,440	1,068	483	31,956	77,630	665	32,503	78,087
4	QUAKER LN	1.4	35%	Urban Principal Arterial - Other	Urban	30,013	1,089	734	33,304	43,615	916	33,851	43,865
	Summary / Wgt Avg	**3.9**	**100%**			**29,642**	**1,075**	**572**	**32,432**	**65,604**	**754**	**32,979**	**65,988**
5	KNOTTY OAK RD	2.7	29%	Urban Principal Arterial - Other	Urban	24,042	872	526	26,492	68,435	1,228	28,598	70,323
5	NORTH RD	2.2	24%	Urban Principal Arterial - Other	Urban	31,686	1,149	586	34,594	74,530	1,288	36,700	76,096
5	NOOSENECK HILL RD	2.0	22%	Urban Principal Arterial - Other	Urban	23,090	837	949	26,775	49,504	1,651	28,881	50,902
5	TIOGUE AVE	1.6	17%	Urban Principal Arterial - Other	Urban	17,658	640	601	20,101	29,294	1,303	22,207	30,382
5	SANDY BOTTOM RD	0.5	5%	Urban Principal Arterial - Other	Urban	23,625	857	659	26,459	11,565	1,361	28,565	11,888
5	MAIN ST	0.1	1%	Urban Principal Arterial - Other	Urban	36,353	1,319	855	40,237	3,853	1,557	42,343	3,923
5	WASHINGTON ST	0.1	1%	Urban Principal Arterial - Other	Urban	36,353	1,319	855	40,237	3,082	1,557	42,343	3,138
5	WOOD ST	0.1	1%	Urban Principal Arterial - Other	Urban	23,625	857	659	26,459	1,760	1,361	28,565	1,809
	Summary / Wgt Avg	**9.2**	**100%**			**24,833**	**901**	**659**	**27,711**	**54,557**	**1,361**	**29,818**	**55,997**
6	ATWOOD AVE	5.5	33%	Urban Principal Arterial - Other	Urban	20,910	758	318	22,623	120,817	669	23,677	122,746
6	SCITUATE AVE	5.4	33%	Urban Minor Arterial	Rural	19,081	692	586	21,531	110,141	937	22,584	112,040
6	GREENVILLE AVE	1.9	12%	Urban Principal Arterial - Other	Urban	15,866	575	295	17,328	32,302	647	18,381	32,980
6	PLEASANT VIEW AVE	1.8	11%	Urban Principal Arterial - Other	Urban	19,233	698	621	21,792	36,580	972	22,845	37,205
6	CEDAR SWAMP RD	1.0	6%	Urban Principal Arterial - Other	Urban	10,070	365	226	11,115	10,555	578	12,168	10,903
6	SANDERSON RD	0.6	4%	Urban Principal Arterial - Other	Urban	16,779	609	493	18,867	10,371	844	19,920	10,574
6	PHENIX AVE	0.3	2%	Urban Minor Arterial	Urban	16,591	602	359	18,271	4,388	710	19,324	4,476
	Summary / Wgt Avg	**16.4**	**100%**			**18,669**	**677**	**438**	**20,660**	**85,474**	**789**	**21,713**	**86,921**

						No Toll					Toll		
Route	Name	Length (miles)	% Total Length	Functional Class	Setting	Auto	SU Truck	Tractor Trailer	AADT	VMT	Tractor Trailer	AADT	VMT
7	FARNUM PIKE	5.3	38%	Urban Minor Arterial	Urban	14,720	534	405	16,468	82,990	644	17,186	84,260
7	GREENVILLE RD	3.0	21%	Urban Minor Arterial	Urban	7,483	271	312	8,689	23,917	551	9,408	24,627
7	MANTON AVE	1.8	13%	Urban Minor Arterial	Urban	14,579	529	148	15,551	27,918	387	16,270	28,357
7	WOONASQUATUCKET AVE	1.8	12%	Urban Major Collectors	Urban	8,934	324	105	9,574	16,387	345	10,293	16,806
7	WATERMAN AVE	1.6	11%	Urban Minor Arterial	Urban	17,841	647	333	19,488	30,114	573	20,207	30,497
7	DOUGLAS PIKE	0.2	1%	Urban Principal Arterial - Other	Urban	19,708	715	601	22,225	4,415	840	22,943	4,465
7	SMITH ST	0.2	1%	Urban Principal Arterial - Other	Urban	26,340	955	354	28,356	4,700	593	29,075	4,741
7	FRUIT HILL AVE	0.2	1%	Urban Minor Arterial	Urban	19,602	711	214	20,954	3,079	453	21,673	3,115
7	WESTMINSTER ST	0.1	1%	Urban Minor Arterial	Urban	32,185	1,167	359	34,429	3,371	599	35,148	3,395
	Summary / Wgt Avg	**14.1**	**100%**			**13,204**	**479**	**306**	**14,601**	**45,558**	**546**	**15,320**	**46,341**
8	EDDY ST	1.3	22%	Urban Principal Arterial - Other	Urban	32,124	1,165	586	35,048	44,715	802	35,696	45,001
8	ALLENS AVE	0.9	15%	Urban Principal Arterial - Other	Urban	29,376	1,065	984	33,394	29,540	1,200	34,042	29,743
8	HENDERSON BRIDGE	0.8	14%	Urban Minor Arterial	Urban	5,952	216	77	6,399	5,184	293	7,047	5,363
8	N BROADWAY	0.6	10%	Urban Minor Arterial	Urban	16,682	605	296	18,175	10,726	512	18,823	10,857
8	WICKENDEN ST	0.5	9%	Urban Principal Arterial - Other	Urban	15,744	571	263	17,104	8,869	479	17,752	8,985
8	IVES ST	0.5	7%	Urban Major Collectors	Urban	9,345	339	145	10,118	4,423	361	10,765	4,520
8	PITMAN ST	0.4	6%	Urban Major Collectors	Urban	9,332	338	163	10,160	3,442	379	10,808	3,517
8	POINT ST	0.3	4%	Urban Principal Arterial - Other	Urban	20,815	755	356	22,639	5,920	572	23,287	5,978
8	BROADWAY	0.2	4%	Urban Minor Arterial	Urban	17,165	623	332	18,783	3,986	548	19,431	4,034
8	BUTLER AVE	0.2	3%	Urban Major Collectors	Urban	12,525	454	200	13,579	2,504	416	14,227	2,545
8	HENDERSON EXPY	0.2	3%	Urban Non Classified	Urban	2,365	86	37	2,563	398	253	3,211	433
8	S ANGELL ST	0.1	2%	Urban Minor Arterial	Urban	7,984	290	102	8,579	1,173	318	9,227	1,203
8	WATERMAN ST	0.1	1%	Urban Minor Arterial	Urban	9,549	346	115	10,241	701	331	10,889	716
	Summary / Wgt Avg	**6.1**	**100%**			**18,894**	**685**	**401**	**20,783**	**17,881**	**617**	**21,431**	**18,041**
9	COTTAGE ST	1.1	60%	Urban Minor Arterial	Urban	12,299	446	332	13,740	14,122	365	13,838	14,158
9	CENTRAL AVE	0.3	16%	Urban Principal Arterial - Other	Urban	15,893	576	259	17,247	4,768	292	17,346	4,777
9	NEWPORT AVE	0.2	10%	Urban Principal Arterial - Other	Urban	32,880	1,193	1,282	37,919	6,364	1,315	38,017	6,370
9	BROADWAY	0.2	8%	Urban Principal Arterial - Other	Urban	13,304	483	215	14,433	2,100	248	14,531	2,105
9	NEWPORT AVENUE	0.1	7%	Urban Principal Arterial - Other	Urban	33,298	1,208	1,284	38,358	4,295	1,317	38,457	4,299
	Summary / Wgt Avg	**1.8**	**100%**			**16,376**	**594**	**468**	**18,373**	**10,241**	**501**	**18,472**	**10,265**
10	ROOSEVELT AVE	0.3	41%	Urban Major Collectors	Urban	10,654	386	334	12,043	3,185	395	12,226	3,202
10	WASHINGTON STREET	0.3	38%	Urban Minor Arterial	Urban	20,674	750	834	23,925	5,787	895	24,108	5,803
10	FOUNTAIN ST	0.1	18%	Urban Major Collectors	Urban	6,239	226	282	7,312	810	343	7,495	817
10	BROADWAY	0.0	3%	Urban Principal Arterial - Other	Urban	24,887	903	1,226	29,469	540	1,287	29,652	542
	Summary / Wgt Avg	**0.4**	**59%**			**14,124**	**512**	**542**	**16,263**	**3,683**	**603**	**16,446**	**3,697**
11	ANGELL RD	1.6	73%	Urban Minor Arterial	Urban	4,397	159	240	5,275	7,865	801	6,960	8,786
11	MENDON RD	0.4	19%	Urban Principal Arterial - Other	Urban	28,717	1,042	685	31,813	12,786	1,246	33,498	13,022
11	DIAMOND HILL RD	0.2	8%	Urban Principal Arterial - Other	Urban	18,124	657	683	20,832	3,504	1,245	22,516	3,605
	Summary / Wgt Avg	**2.2**	**100%**			**10,060**	**365**	**359**	**11,501**	**8,437**	**920**	**13,186**	**9,164**

						No Toll					Toll		
Route	Name	Length (miles)	% Total Length	Functional Class	Setting	Auto	SU Truck	Tractor Trailer	AADT	VMT	Tractor Trailer	AADT	VMT
12	LONSDALE AVE	2.7	54%	Urban Principal Arterial - Other	Urban	22,441	814	326	24,234	64,614	513	24,795	65,126
12	MENDON RD	2.4	46%	Urban Principal Arterial - Other	Urban	23,011	835	479	25,283	57,893	666	25,844	58,338
	Summary / Wgt Avg	**7.4**	**100%**			**22,706**	**824**	**397**	**24,722**	**61,490**	**584**	**25,282**	**61,970**
13	GREAT RD	1.6	46%	Urban Minor Arterial	Urban	14,940	542	726	17,661	25,771	967	18,382	26,153
13	SMITHFIELD RD	0.9	28%	Urban Minor Arterial	Urban	7,269	264	162	8,019	7,271	403	8,740	7,498
13	EDDIE DOWLING HWY	0.8	25%	Urban Principal Arterial - Other	Urban	7,964	289	65	8,447	7,028	305	9,168	7,232
13	OLD LOUISQUISSET PIKE	0.0	1%	Urban Principal Arterial - Other	Urban	7,544	274	36	7,926	353	277	8,647	364
	Summary / Wgt Avg	**3.4**	**100%**			**11,005**	**399**	**398**	**12,599**	**15,708**	**639**	**13,321**	**15,999**
14	W MAIN RD	6.9	23%	Urban Principal Arterial - Other	Urban	29,656	1,076	834	33,234	219,066	928	33,514	219,715
14	TEN ROD RD	6.0	20%	Rural Principal Arterial - Other	Rural	20,224	734	749	23,205	129,372	843	23,486	129,929
14	STATE HWY 138 E	3.6	12%	Urban Principal Arterial - Expressway	Urban	13,024	472	531	15,090	50,009	625	15,370	50,343
14	STATE HWY 138 W	3.3	11%	Urban Principal Arterial - Expressway	Urban	16,376	594	648	18,914	58,404	741	19,194	58,714
14	VICTORY HWY	2.3	8%	Rural Principal Arterial - Other	Rural	17,770	644	706	20,533	43,977	800	20,813	44,192
14	PELL BRIDGE	2.1	7%	Urban Principal Arterial - Expressway	Urban	33,511	1,215	1,376	38,853	74,731	1,469	39,134	74,925
14	STATE HWY 4 S	1.6	6%	Urban Principal Arterial - Expressway	Urban	20,891	758	629	23,535	36,201	722	23,816	36,353
14	STATE HWY 4 N	1.6	5%	Urban Principal Arterial - Expressway	Urban	22,632	821	556	25,121	37,454	650	25,402	37,600
14	ADMIRAL KALBFUS RD	0.7	2%	Urban Principal Arterial - Other	Urban	12,941	469	566	15,108	9,364	659	15,389	9,427
14	TOWER HILL RD	0.6	2%	Urban Principal Arterial - Expressway	Urban	25,170	913	679	28,119	16,860	772	28,400	16,919
14	JOHN C ELDRED PKWY	0.5	2%	Urban Principal Arterial - Expressway	Urban	17,733	643	728	20,560	9,075	821	20,841	9,119
14	EXIT 5	0.2	1%	Urban Major Collectors	Urban	5,678	206	206	6,502	1,340	300	6,783	1,360
14	STATE HWY 24 N	0.1	0%	Urban Principal Arterial - Expressway	Urban	18,445	669	540	20,734	2,358	633	21,014	2,370
14	ON RAMP RI-138 W	0.1	0%	Urban Major Collectors	Urban	10,381	377	500	12,259	1,013	594	12,539	1,022
	Summary / Wgt Avg	**29.5**	**100%**			**21,798**	**791**	**743**	**24,819**	**103,529**	**837**	**25,099**	**103,919**
15	EAST RD	4.7	43%	Rural Principal Arterial - Other	Rural	25,609	929	449	27,885	127,646	800	28,938	129,307
15	W GREENVILLE RD	3.0	27%	Urban Principal Arterial - Other	Urban	19,487	707	617	22,045	61,599	968	23,098	62,638
15	PUTNAM PIKE	1.9	17%	Urban Principal Arterial - Other	Urban	21,784	790	699	24,671	44,336	1,050	25,724	45,005
15	SMITH AVE	1.4	13%	Urban Principal Arterial - Other	Urban	20,654	749	790	23,772	30,626	1,141	24,825	31,111
	Summary / Wgt Avg	**11.0**	**100%**			**22,671**	**822**	**581**	**25,235**	**83,173**	**932**	**26,288**	**84,346**
16	STATE HWY 10 N	2.7	36%	Urban Principal Arterial - Expressway	Urban	31,755	1,152	223	33,576	88,126	501	34,410	88,865
16	STATE HWY 10 S	2.6	35%	Urban Principal Arterial - Expressway	Urban	36,598	1,327	370	39,035	98,802	648	39,869	99,519
16	US HWY 6 W	1.1	15%	Urban Principal Arterial - Expressway	Urban	53,271	1,932	571	56,915	61,351	849	57,749	61,656
16	US HWY 6 E	1.0	14%	Urban Principal Arterial - Expressway	Urban	47,662	1,729	378	50,524	51,261	656	51,358	51,547
	Summary / Wgt Avg	**7.4**	**100%**			**38,885**	**1,410**	**348**	**41,339**	**82,715**	**626**	**42,173**	**83,318**

Table C-7 2040 Base Case Average Weekday Diversion Impacts

						No-Toll					Toll		
Route	Name	Length (miles)	% Total Length	Functional Class	Setting	Auto	SU Truck	Tractor Trailer	AADT	VMT	Tractor Trailer	AADT	VMT
1	NOOSENECK HILL RD	8.9	98%	Rural Major Collector	Rural	5,316	193	525	7,085	77,055	699	7,605	55,247
1	WOODVILLE ALTON RD	0.2	2%	Rural Major Collector	Rural	2,027	74	179	2,636	1,003	352	3,157	552
	Summary / Wgt Avg	**9.1**	**100%**			**5,235**	**190**	**517**	**6,975**	**75,179**	**690**	**7,495**	**53,898**
2	VICTORY HWY	13.7	40%	Rural Principal Arterial - Other	Rural	19,446	705	1,417	24,401	310,147	1,568	24,855	297,880
2	CHOPMIST HILL RD	8.2	24%	Rural Principal Arterial - Other	Rural	14,841	538	1,471	19,793	138,512	1,623	20,247	139,756
2	BRONCOS HWY	5.4	16%	Urban Principal Arterial - Other	Urban	14,801	537	681	17,380	86,823	832	17,835	87,643
2	PLAINFIELD PIKE	5.2	15%	Rural Principal Arterial - Other	Rural	26,304	954	1,890	32,929	150,988	2,042	33,383	151,772
2	QUAKER HIGHWAY	0.6	2%	Urban Minor Arterial	Urban	10,015	363	1,688	15,442	6,757	1,839	15,896	6,842
2	PUTNAM PIKE	0.6	2%	Rural Principal Arterial - Other	Rural	23,581	855	1,812	29,872	14,437	1,963	30,326	14,520
2	QUAKER HWY	0.5	2%	Urban Minor Arterial	Urban	10,052	365	1,674	15,438	6,287	1,825	15,893	6,366
2	N MAIN ST	0.2	1%	Urban Minor Arterial	Urban	20,523	744	2,113	27,606	4,208	2,264	28,060	4,236
2	NOOSENECK HILL RD	0.1	0%	Rural Principal Arterial - Other	Rural	30,554	1,108	1,634	36,562	3,330	1,785	37,017	3,345
	Summary / Wgt Avg	**34.4**	**100%**			**18,456**	**669**	**1,404**	**23,338**	**193,381**	**1,555**	**23,792**	**189,045**
3	POST RD	7.4	83%	Urban Principal Arterial - Other	Urban	26,962	978	538	29,555	222,130	614	29,781	211,869
3	MAIN ST	1.2	13%	Urban Principal Arterial - Other	Urban	26,647	966	465	29,008	35,659	541	29,235	33,503
3	VETERANS MEMORIAL DR	0.2	2%	Urban Principal Arterial - Other	Urban	27,625	1,002	373	29,747	11,890	449	29,973	5,961
3	MAIN AVE	0.1	1%	Urban Principal Arterial - Other	Urban	18,684	678	330	20,352	3,151	406	20,579	1,581
3	GREENWICH AVE	0.0	1%	Urban Principal Arterial - Other	Urban	43,226	1,568	544	46,428	4,080	620	46,654	2,044
	Summary / Wgt Avg	**8.9**	**100%**			**26,943**	**977**	**523**	**29,489**	**189,431**	**598**	**29,716**	**180,467**
4	BALD HILL RD	2.5	65%	Urban Principal Arterial - Other	Urban	30,618	1,111	517	33,279	112,860	630	33,620	81,059
4	QUAKER LN	1.4	35%	Urban Principal Arterial - Other	Urban	33,266	1,207	760	36,754	55,316	874	37,094	48,425
	Summary / Wgt Avg	**3.9**	**100%**			**31,554**	**1,144**	**603**	**34,508**	**92,515**	**716**	**34,848**	**69,521**
5	KNOTTY OAK RD	2.7	29%	Urban Principal Arterial - Other	Urban	26,815	973	624	29,659	76,426	1,229	31,475	78,055
5	NORTH RD	2.2	24%	Urban Principal Arterial - Other	Urban	33,784	1,225	668	37,015	79,562	1,274	38,831	80,912
5	NOOSENECK HILL RD	2.0	22%	Urban Principal Arterial - Other	Urban	27,051	981	1,103	31,340	57,978	1,708	33,156	59,183
5	TIOGUE AVE	1.6	17%	Urban Principal Arterial - Other	Urban	21,278	772	765	24,343	35,361	1,370	26,159	36,300
5	SANDY BOTTOM RD	0.5	5%	Urban Principal Arterial - Other	Urban	25,937	941	722	29,045	12,696	1,328	30,861	12,974
5	MAIN ST	0.1	1%	Urban Principal Arterial - Other	Urban	41,570	1,508	1,040	46,196	4,412	1,645	48,013	4,472
5	WASHINGTON ST	0.1	1%	Urban Principal Arterial - Other	Urban	41,570	1,508	1,040	46,196	3,529	1,645	48,013	3,578
5	WOOD ST	0.1	1%	Urban Principal Arterial - Other	Urban	25,937	941	722	29,045	1,932	1,328	30,861	1,974
	Summary / Wgt Avg	**9.2**	**100%**			**27,864**	**1,011**	**776**	**31,203**	**61,057**	**1,382**	**33,019**	**62,299**
6	ATWOOD AVE	5.5	33%	Urban Principal Arterial - Other	Urban	20,752	753	338	22,519	123,193	641	23,427	121,689
6	SCITUATE AVE	5.4	33%	Urban Minor Arterial	Rural	20,332	737	696	23,158	117,753	999	24,066	119,391
6	GREENVILLE AVE	1.9	12%	Urban Principal Arterial - Other	Urban	18,066	655	344	19,751	36,794	646	20,660	37,378
6	PLEASANT VIEW AVE	1.8	11%	Urban Principal Arterial - Other	Urban	20,561	746	666	23,304	39,111	969	24,212	39,650
6	CEDAR SWAMP RD	1.0	6%	Urban Principal Arterial - Other	Urban	11,268	409	267	12,479	11,825	570	13,387	12,125
6	SANDERSON RD	0.6	4%	Urban Principal Arterial - Other	Urban	17,938	651	572	20,306	11,114	875	21,214	11,289
6	PHENIX AVE	0.3	2%	Urban Minor Arterial	Urban	17,179	623	399	18,999	4,550	702	19,907	4,626
	Summary / Wgt Avg	**16.4**	**100%**			**19,553**	**709**	**497**	**21,753**	**89,681**	**800**	**22,661**	**89,870**

						No-Toll					Toll		
Route	Name	Length (miles)	% Total Length	Functional Class	Setting	Auto	SU Truck	Tractor Trailer	AADT	VMT	Tractor Trailer	AADT	VMT
7	FARNUM PIKE	5.3	38%	Urban Minor Arterial	Urban	15,161	550	439	17,027	85,592	642	17,637	86,670
7	GREENVILLE RD	3.0	21%	Urban Minor Arterial	Urban	7,782	282	370	9,175	25,472	574	9,785	25,611
7	MANTON AVE	1.8	13%	Urban Minor Arterial	Urban	15,107	548	159	16,131	28,938	362	16,741	29,311
7	WOONASQUATUCKET AVE	1.8	12%	Urban Major Collectors	Urban	9,077	329	112	9,743	16,657	315	10,353	17,013
7	WATERMAN AVE	1.6	11%	Urban Minor Arterial	Urban	18,892	685	375	20,702	31,924	578	21,312	32,249
7	DOUGLAS PIKE	0.2	1%	Urban Principal Arterial - Other	Urban	21,621	784	662	24,390	4,844	865	25,000	4,887
7	SMITH ST	0.2	1%	Urban Principal Arterial - Other	Urban	26,446	959	378	28,539	4,723	581	29,149	4,758
7	FRUIT HILL AVE	0.2	1%	Urban Minor Arterial	Urban	20,031	727	233	21,456	3,149	436	22,066	3,179
7	WESTMINSTER ST	0.1	1%	Urban Minor Arterial	Urban	34,442	1,249	401	36,893	3,609	604	37,503	3,630
	Summary / Wgt Avg	**14.1**	**100%**			**13,689**	**496**	**340**	**15,206**	**47,247**	**544**	**15,816**	**47,813**
8	EDDY ST	1.3	22%	Urban Principal Arterial - Other	Urban	34,940	1,267	601	38,010	52,636	705	38,322	48,724
8	ALLENS AVE	0.9	15%	Urban Principal Arterial - Other	Urban	29,760	1,079	984	33,793	30,869	1,088	34,104	30,012
8	HENDERSON BRIDGE	0.8	14%	Urban Minor Arterial	Urban	5,687	206	79	6,129	9,913	182	6,440	5,043
8	N BROADWAY	0.6	10%	Urban Minor Arterial	Urban	18,006	653	328	19,643	11,582	432	19,954	11,645
8	WICKENDEN ST	0.5	9%	Urban Principal Arterial - Other	Urban	14,778	536	251	16,067	10,117	355	16,378	8,383
8	IVES ST	0.5	7%	Urban Major Collectors	Urban	8,817	320	138	9,550	4,174	242	9,862	4,220
8	PITMAN ST	0.4	6%	Urban Major Collectors	Urban	7,673	278	113	8,290	2,822	217	8,601	2,859
8	POINT ST	0.3	4%	Urban Principal Arterial - Other	Urban	20,691	750	356	22,510	10,463	460	22,821	5,913
8	BROADWAY	0.2	4%	Urban Minor Arterial	Urban	17,117	621	335	18,743	3,976	439	19,055	3,999
8	BUTLER AVE	0.2	3%	Urban Major Collectors	Urban	11,275	409	158	12,159	2,250	262	12,470	2,270
8	HENDERSON EXPY	0.2	3%	Urban Non Classified	Urban	2,238	81	38	2,432	754	141	2,744	394
8	S ANGELL ST	0.1	2%	Urban Minor Arterial	Urban	7,549	274	107	8,144	2,220	211	8,456	1,125
8	WATERMAN ST	0.1	1%	Urban Minor Arterial	Urban	9,238	335	116	9,922	1,357	220	10,234	686
	Summary / Wgt Avg	**6.1**	**100%**			**19,378**	**703**	**402**	**21,288**	**20,825**	**506**	**21,600**	**18,797**
9	COTTAGE ST	1.1	60%	Urban Minor Arterial	Urban	12,756	463	352	14,275	15,335	366	14,318	14,671
9	CENTRAL AVE	0.3	16%	Urban Principal Arterial - Other	Urban	14,861	539	276	16,228	5,330	290	16,271	4,472
9	NEWPORT AVE	0.2	10%	Urban Principal Arterial - Other	Urban	32,523	1,180	1,317	37,654	6,303	1,331	37,696	6,306
9	BROADWAY	0.2	8%	Urban Principal Arterial - Other	Urban	13,180	478	236	14,366	2,084	250	14,408	2,086
9	NEWPORT AVENUE	0.1	7%	Urban Principal Arterial - Other	Urban	32,913	1,194	1,319	38,064	4,251	1,333	38,106	4,253
	Summary / Wgt Avg	**1.8**	**100%**			**16,414**	**595**	**490**	**18,480**	**11,040**	**504**	**18,523**	**10,511**
10	ROOSEVELT AVE	0.3	41%	Urban Major Collectors	Urban	11,137	404	353	12,600	3,330	380	12,680	3,338
10	WASHINGTON STREET	0.3	38%	Urban Minor Arterial	Urban	21,974	797	879	25,410	6,149	906	25,489	6,156
10	FOUNTAIN ST	0.1	18%	Urban Major Collectors	Urban	6,449	234	293	7,561	1,674	319	7,641	840
10	BROADWAY	0.0	3%	Urban Principal Arterial - Other	Urban	26,441	959	1,299	31,296	574	1,325	31,375	575
	Summary / Wgt Avg	**0.4**	**100%**			**14,904**	**541**	**571**	**17,158**	**4,035**	**598**	**17,238**	**3,893**
11	ANGELL RD	1.6	73%	Urban Minor Arterial	Urban	5,341	194	321	6,497	9,603	706	7,652	10,235
11	MENDON RD	0.4	19%	Urban Principal Arterial - Other	Urban	30,471	1,105	803	33,983	13,599	1,188	35,138	13,761
11	DIAMOND HILL RD	0.2	8%	Urban Principal Arterial - Other	Urban	19,620	712	835	22,836	3,810	1,220	23,991	3,879
	Summary / Wgt Avg	**2.2**	**100%**			**11,200**	**406**	**452**	**12,964**	**9,887**	**837**	**14,119**	**10,385**

						No-Toll					Toll		
Route	Name	Length (miles)	% Total Length	Functional Class	Setting	Auto	SU Truck	Tractor Trailer	AADT	VMT	Tractor Trailer	AADT	VMT
12	LONSDALE AVE	2.7	54%	Urban Principal Arterial - Other	Urban	23,347	847	356	25,261	67,264	493	25,674	67,642
12	MENDON RD	2.4	46%	Urban Principal Arterial - Other	Urban	23,934	868	554	26,464	60,347	692	26,877	60,674
	Summary / Wgt Avg	**7.4**	**100%**			**23,619**	**857**	**448**	**25,820**	**64,049**	**586**	**26,233**	**64,403**
13	GREAT RD	1.6	46%	Urban Minor Arterial	Urban	16,697	606	820	19,763	28,816	996	20,291	29,095
13	SMITHFIELD RD	0.9	28%	Urban Minor Arterial	Urban	8,622	313	241	9,656	9,359	416	10,184	8,837
13	EDDIE DOWLING HWY	0.8	25%	Urban Principal Arterial - Other	Urban	8,292	301	86	8,849	14,666	262	9,377	7,482
13	OLD LOUISQUISSET PIKE	0.0	1%	Urban Principal Arterial - Other	Urban	7,817	284	52	8,258	734	228	8,786	375
	Summary / Wgt Avg	**3.4**	**100%**			**12,279**	**445**	**469**	**14,131**	**19,587**	**645**	**14,659**	**17,796**
14	W MAIN RD	6.9	23%	Urban Principal Arterial - Other	Urban	30,913	1,121	883	34,682	231,074	942	34,860	228,853
14	TEN ROD RD	6.0	20%	Rural Principal Arterial - Other	Rural	23,421	849	812	26,706	149,493	871	26,885	149,847
14	STATE HWY 138 E	3.6	12%	Urban Principal Arterial - Expressway	Urban	14,021	509	583	16,279	107,754	643	16,458	54,089
14	STATE HWY 138 W	3.3	11%	Urban Principal Arterial - Expressway	Urban	16,710	606	671	19,330	119,256	731	19,508	59,825
14	VICTORY HWY	2.3	8%	Rural Principal Arterial - Other	Rural	22,150	803	838	25,468	54,721	898	25,647	54,858
14	PELL BRIDGE	2.1	7%	Urban Principal Arterial - Expressway	Urban	35,045	1,271	1,465	40,712	78,208	1,525	40,891	78,331
14	STATE HWY 4 S	1.6	6%	Urban Principal Arterial - Expressway	Urban	22,268	808	674	25,100	77,189	734	25,278	38,691
14	STATE HWY 4 N	1.6	5%	Urban Principal Arterial - Expressway	Urban	23,289	845	566	25,833	77,065	626	26,012	38,626
14	ADMIRAL KALBFUS RD	0.7	2%	Urban Principal Arterial - Other	Urban	12,922	469	584	15,143	11,319	644	15,321	9,403
14	TOWER HILL RD	0.6	2%	Urban Principal Arterial - Expressway	Urban	26,450	959	727	29,590	35,452	786	29,768	17,763
14	JOHN C ELDRED PKWY	0.5	2%	Urban Principal Arterial - Expressway	Urban	18,708	679	783	21,735	16,337	842	21,914	9,609
14	EXIT 5	0.2	1%	Urban Major Collectors	Urban	5,779	210	212	6,624	2,728	271	6,802	1,377
14	STATE HWY 24 N	0.1	0%	Urban Principal Arterial - Expressway	Urban	19,608	711	569	22,027	5,013	629	22,206	2,514
14	ON RAMP RI-138 W	0.1	0%	Urban Major Collectors	Urban	10,221	371	491	12,065	1,995	550	12,243	1,003
	Summary / Wgt Avg	**29.5**	**100%**			**23,502**	**852**	**799**	**26,751**	**130,216**	**858**	**26,929**	**111,939**
15	EAST RD	4.7	43%	Rural Principal Arterial - Other	Rural	26,802	972	523	29,344	133,845	826	30,252	135,277
15	W GREENVILLE RD	3.0	27%	Urban Principal Arterial - Other	Urban	20,579	746	669	23,332	65,103	972	24,240	65,999
15	PUTNAM PIKE	1.9	17%	Urban Principal Arterial - Other	Urban	23,270	844	760	26,393	56,711	1,062	27,301	47,961
15	SMITH AVE	1.4	13%	Urban Principal Arterial - Other	Urban	22,079	801	826	25,358	32,714	1,129	26,266	33,132
	Summary / Wgt Avg	**11.0**	**100%**			**23,916**	**867**	**642**	**26,709**	**89,200**	**944**	**27,617**	**88,593**
16	STATE HWY 10 N	2.7	36%	Urban Principal Arterial - Expressway	Urban	31,980	1,160	237	33,851	88,783	430	34,430	89,297
16	STATE HWY 10 S	2.6	35%	Urban Principal Arterial - Expressway	Urban	36,116	1,310	373	38,545	97,520	566	39,124	98,018
16	US HWY 6 W	1.1	15%	Urban Principal Arterial - Expressway	Urban	53,828	1,952	644	57,712	62,067	837	58,291	62,279
16	US HWY 6 E	1.0	14%	Urban Principal Arterial - Expressway	Urban	48,655	1,765	443	51,749	52,389	636	52,328	52,588
	Summary / Wgt Avg	**7.4**	**100%**			**39,019**	**1,415**	**374**	**41,557**	**82,768**	**567**	**42,136**	**83,187**

Table C-8 2016 Base Case Average Weekday Diversion Impacts by Time-of-Day

						12AM-6AM				6AM-9AM				9AM-3PM				3PM-6PM				6PM-12AM			
						No Toll			Toll	No Toll			Toll	No Toll			Toll	No Toll			Toll	No Toll			Toll
Route	Name	Length (miles)	% Total Length	Functional Class	Setting	Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer	
1	NOOSENECK HILL RD	8.9	98%	Rural Major Collector	Rural	104	4	28	63	707	26	67	140	1,742	63	215	374	1,065	39	63	118	802	29	31	64
1	WOODVILLE ALTON RD	0.2	2%	Rural Major Collector	Rural	55	2	9	44	272	10	12	85	534	19	81	240	415	15	28	82	503	18	14	46
	Summary / Wgt Avg	**9.1**	**100%**			**103**	**4**	**28**	**60**	**697**	**25**	**65**	**128**	**1,712**	**62**	**212**	**329**	**1,049**	**38**	**63**	**100**	**795**	**29**	**31**	**57**
2	VICTORY HWY	13.7	40%	Rural Principal Arterial - Other	Rural	189	7	52	78	3,946	143	320	355	6,392	232	564	638	5,595	203	244	264	1,974	72	72	94
2	CHOPMIST HILL RD	8.2	24%	Rural Principal Arterial - Other	Rural	81	3	24	51	3,464	126	350	385	3,484	126	473	548	5,611	204	367	387	1,113	40	100	123
2	BRONCOS HWY	5.4	16%	Urban Principal Arterial - Other	Urban	227	8	12	39	3,217	117	173	208	3,465	126	231	306	4,454	162	139	159	2,326	84	28	50
2	PLAINFIELD PIKE	5.2	15%	Rural Principal Arterial - Other	Rural	146	5	136	163	5,905	214	424	459	9,311	338	770	844	8,048	292	302	322	1,458	53	41	63
2	QUAKER HIGHWAY	0.6	2%	Urban Minor Arterial	Urban	89	3	111	137	2,810	102	362	397	2,863	104	605	680	2,783	101	256	277	1,203	44	156	178
2	PUTNAM PIKE	0.6	2%	Rural Principal Arterial - Other	Rural	454	16	86	113	5,146	187	402	436	5,505	200	554	629	7,169	260	424	445	3,638	132	145	167
2	QUAKER HWY	0.5	2%	Urban Minor Arterial	Urban	90	3	109	136	2,814	102	358	393	2,869	104	604	679	2,778	101	250	271	1,224	44	156	178
2	N MAIN ST	0.2	1%	Urban Minor Arterial	Urban	333	12	153	180	4,961	180	449	484	5,981	217	722	797	5,545	201	337	357	2,569	93	187	209
2	NOOSENECK HILL RD	0.1	0%	Rural Principal Arterial - Other	Rural	235	9	78	105	5,708	207	330	365	10,261	372	573	648	6,333	230	230	251	2,583	94	87	110
	Summary / Wgt Avg	**34.4**	**100%**			**165**	**6**	**55**	**80**	**4,005**	**145**	**323**	**358**	**5,561**	**202**	**523**	**596**	**5,727**	**208**	**269**	**290**	**1,754**	**64**	**72**	**94**
3	POST RD	7.4	83%	Urban Principal Arterial - Other	Urban	211	8	20	31	5,667	206	92	124	11,626	422	295	362	6,354	230	78	93	2,956	107	26	43
3	MAIN ST	1.2	13%	Urban Principal Arterial - Other	Urban	162	6	2	14	5,634	204	78	111	12,249	444	278	344	5,720	207	63	77	2,480	90	14	31
3	VETERANS MEMORIAL DR	0.2	2%	Urban Principal Arterial - Other	Urban	276	10	8	20	5,685	206	51	83	9,200	334	236	303	7,086	257	52	66	4,713	171	11	28
3	MAIN AVE	0.1	1%	Urban Principal Arterial - Other	Urban	267	10	7	19	3,460	125	65	97	5,820	211	155	221	5,735	208	54	68	3,179	115	21	39
3	GREENWICH AVE	0.0	1%	Urban Principal Arterial - Other	Urban	354	13	10	21	8,540	310	72	105	15,455	561	372	439	11,352	412	80	94	7,102	258	17	34
	Summary / Wgt Avg	**8.9**	**100%**			**207**	**8**	**17**	**27**	**5,657**	**205**	**89**	**113**	**11,620**	**421**	**290**	**349**	**6,306**	**229**	**75**	**89**	**2,955**	**107**	**24**	**39**
4	BALD HILL RD	2.5	65%	Urban Principal Arterial - Other	Urban	265	10	16	33	6,004	218	137	185	10,218	371	240	340	8,027	291	64	86	4,926	179	26	52
4	QUAKER LN	1.4	35%	Urban Principal Arterial - Other	Urban	330	12	24	40	6,137	223	181	229	11,062	401	372	472	7,770	282	110	131	4,715	171	48	74
	Summary / Wgt Avg	**3.9**	**100%**			**288**	**10**	**19**	**34**	**6,051**	**219**	**152**	**188**	**10,516**	**381**	**287**	**375**	**7,936**	**288**	**80**	**100**	**4,851**	**176**	**34**	**57**
5	KNOTTY OAK RD	2.7	29%	Urban Principal Arterial - Other	Urban	119	4	6	113	5,409	196	123	262	9,531	346	286	585	7,053	256	92	174	1,930	70	19	108
5	NORTH RD	2.2	24%	Urban Principal Arterial - Other	Urban	168	6	4	111	7,400	268	141	279	12,208	443	318	617	9,693	352	104	186	2,217	80	20	109
5	NOOSENECK HILL RD	2.0	22%	Urban Principal Arterial - Other	Urban	451	16	55	162	4,509	164	258	397	8,930	324	482	781	6,226	226	119	201	2,974	108	36	124
5	TIOGUE AVE	1.6	17%	Urban Principal Arterial - Other	Urban	138	5	9	116	3,656	133	177	315	7,209	261	338	637	4,262	155	68	150	2,393	87	10	98
5	SANDY BOTTOM RD	0.5	5%	Urban Principal Arterial - Other	Urban	181	7	18	125	5,303	192	184	323	9,106	330	328	627	6,408	232	112	194	2,628	95	17	105
5	MAIN ST	0.1	1%	Urban Principal Arterial - Other	Urban	466	17	25	133	7,370	267	220	359	14,689	533	454	753	8,497	308	131	213	5,331	193	25	113
5	WASHINGTON ST	0.1	1%	Urban Principal Arterial - Other	Urban	466	17	25	133	7,370	267	220	359	14,689	533	454	753	8,497	308	131	213	5,331	193	25	113
5	WOOD ST	0.1	1%	Urban Principal Arterial - Other	Urban	181	7	18	125	5,303	192	184	323	9,106	330	328	627	6,408	232	112	194	2,628	95	17	105
	Summary / Wgt Avg	**9.2**	**100%**			**217**	**8**	**18**	**121**	**5,434**	**197**	**171**	**309**	**9,736**	**353**	**351**	**643**	**7,035**	**255**	**99**	**181**	**2,412**	**87**	**21**	**108**
6	ATWOOD AVE	5.5	33%	Urban Principal Arterial - Other	Urban	174	6	12	65	4,637	168	84	153	7,476	271	144	293	6,668	242	61	102	1,955	71	17	62
6	SCITUATE AVE	5.4	33%	Urban Minor Arterial	Rural	199	7	14	67	4,604	167	184	253	6,485	235	272	421	5,560	202	92	133	2,232	81	25	69
6	GREENVILLE AVE	1.9	12%	Urban Principal Arterial - Other	Urban	57	2	4	58	4,262	155	88	157	4,409	160	107	257	5,934	215	87	128	1,205	44	9	53
6	PLEASANT VIEW AVE	1.8	11%	Urban Principal Arterial - Other	Urban	150	5	5	59	4,717	171	135	205	6,011	218	314	463	6,854	249	154	195	1,501	54	11	56
6	CEDAR SWAMP RD	1.0	6%	Urban Principal Arterial - Other	Urban	231	8	6	60	2,338	85	42	111	2,504	91	99	248	3,362	122	65	106	1,635	59	14	59
6	SANDERSON RD	0.6	4%	Urban Principal Arterial - Other	Urban	119	4	11	64	4,039	146	117	186	4,622	168	220	370	6,541	237	128	169	1,458	53	17	61
6	PHENIX AVE	0.3	2%	Urban Minor Arterial	Urban	293	11	10	63	3,505	127	82	152	5,314	193	193	343	4,209	153	52	93	3,271	119	22	66
	Summary / Wgt Avg	**16.4**	**100%**			**169**	**6**	**10**	**62**	**4,414**	**160**	**122**	**190**	**6,198**	**225**	**201**	**347**	**5,996**	**217**	**87**	**128**	**1,892**	**69**	**18**	**61**

						12AM-6AM				6AM-9AM				9AM-3PM				3PM-6PM				6PM-12AM			
						No Toll			Toll	No Toll			Toll	No Toll			Toll	No Toll			Toll	No Toll			Toll
Route	Name	Length (miles)	% Total Length	Functional Class	Setting	Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer	
7	FARNUM PIKE	5.3	38%	Urban Minor Arterial	Urban	47	2	2	17	3,786	137	123	167	5,290	192	185	313	4,792	174	88	109	805	29	6	29
7	GREENVILLE RD	3.0	21%	Urban Minor Arterial	Urban	112	4	24	39	2,068	75	86	131	2,185	79	107	235	2,512	91	65	86	606	22	30	53
7	MANTON AVE	1.8	13%	Urban Minor Arterial	Urban	385	14	7	21	2,757	100	36	81	4,810	174	68	197	3,388	123	28	49	3,240	118	9	32
7	WOONASQUATUCKET AVE	1.8	12%	Urban Major Collectors	Urban	155	6	7	22	2,010	73	33	78	2,700	98	37	165	2,438	88	21	43	1,632	59	6	29
7	WATERMAN AVE	1.6	11%	Urban Minor Arterial	Urban	80	3	2	17	4,234	154	99	143	6,404	232	168	296	5,120	186	54	76	2,004	73	10	33
7	DOUGLAS PIKE	0.2	1%	Urban Principal Arterial - Other	Urban	125	5	6	20	5,609	203	213	258	5,678	206	213	341	6,920	251	157	179	1,376	50	11	34
7	SMITH ST	0.2	1%	Urban Principal Arterial - Other	Urban	659	24	38	53	5,228	190	85	130	8,152	296	128	256	6,076	220	51	73	6,225	226	51	74
7	FRUIT HILL AVE	0.2	1%	Urban Minor Arterial	Urban	234	8	16	31	3,957	144	61	106	7,137	259	93	221	4,971	180	33	54	3,304	120	10	33
7	WESTMINSTER ST	0.1	1%	Urban Minor Arterial	Urban	686	25	12	26	5,986	217	90	134	12,157	441	187	315	8,051	292	51	72	5,305	192	20	43
	Summary / Wgt Avg	**14.1**	**100%**			**137**	**5**	**9**	**23**	**3,182**	**115**	**90**	**133**	**4,487**	**163**	**132**	**267**	**3,946**	**143**	**63**	**87**	**1,451**	**53**	**13**	**36**
8	EDDY ST	1.3	22%	Urban Principal Arterial - Other	Urban	37	1	2	50	1,236	45	20	60	2,188	79	37	101	1,469	53	11	30	1,022	37	6	50
8	ALLENS AVE	0.9	15%	Urban Principal Arterial - Other	Urban	424	15	69	117	6,469	235	125	165	12,264	445	295	359	6,976	253	51	69	5,991	217	46	90
8	HENDERSON BRIDGE	0.8	14%	Urban Minor Arterial	Urban	117	4	33	82	5,899	214	214	254	11,326	411	539	603	7,195	261	96	114	4,839	176	102	146
8	N BROADWAY	0.6	10%	Urban Minor Arterial	Urban	123	4	9	57	2,929	106	67	107	6,501	236	141	205	3,487	126	24	43	2,702	98	22	66
8	WICKENDEN ST	0.5	9%	Urban Principal Arterial - Other	Urban	542	20	20	69	2,720	99	63	103	5,089	185	133	197	3,337	121	42	61	4,994	181	37	81
8	IVES ST	0.5	7%	Urban Major Collectors	Urban	123	4	10	58	4,144	150	97	137	8,260	300	185	249	4,674	170	32	50	3,614	131	32	77
8	PITMAN ST	0.4	6%	Urban Major Collectors	Urban	38	1	1	49	1,386	50	28	68	4,921	178	92	156	1,836	67	15	34	1,164	42	8	52
8	POINT ST	0.3	4%	Urban Principal Arterial - Other	Urban	71	3	2	50	1,602	58	27	67	4,718	171	112	176	1,760	64	14	33	1,181	43	8	52
8	BROADWAY	0.2	4%	Urban Minor Arterial	Urban	15	1	1	50	498	18	11	51	892	32	17	81	651	24	5	24	310	11	3	47
8	BUTLER AVE	0.2	3%	Urban Major Collectors	Urban	37	1	2	50	2,085	76	33	73	2,708	98	37	101	1,825	66	24	42	1,329	48	6	50
8	HENDERSON EXPY	0.2	3%	Urban Non Classified	Urban	704	26	42	90	2,839	103	66	106	4,844	176	133	197	3,252	118	47	65	5,526	200	45	89
8	S ANGELL ST	0.1	2%	Urban Minor Arterial	Urban	153	6	4	53	1,976	72	32	72	5,691	206	131	195	2,187	79	16	34	2,518	91	17	61
8	WATERMAN ST	0.1	1%	Urban Minor Arterial	Urban	68	2	4	52	1,602	58	22	62	3,630	132	67	131	2,410	87	10	29	1,839	67	12	56
	Summary / Wgt Avg	**6.1**	**100%**			**225**	**8**	**26**	**60**	**3,636**	**132**	**88**	**120**	**7,272**	**264**	**211**	**292**	**4,183**	**152**	**40**	**57**	**3,577**	**130**	**37**	**87**
9	COTTAGE ST	1.1	60%	Urban Minor Arterial	Urban	263	10	51	45	2,444	89	75	82	3,939	143	126	138	2,772	101	37	43	2,880	104	42	41
9	CENTRAL AVE	0.3	16%	Urban Principal Arterial - Other	Urban	407	15	16	11	3,308	120	66	73	4,707	171	118	129	3,560	129	42	47	3,911	142	17	16
9	NEWPORT AVE	0.2	10%	Urban Principal Arterial - Other	Urban	781	28	94	88	6,523	237	293	300	10,103	366	579	591	7,779	282	180	186	7,694	279	136	135
9	BROADWAY	0.2	8%	Urban Principal Arterial - Other	Urban	374	14	14	9	3,014	109	63	70	4,280	155	82	93	2,665	97	24	30	2,970	108	32	31
9	NEWPORT AVENUE	0.1	7%	Urban Principal Arterial - Other	Urban	803	29	94	88	6,584	239	294	301	10,232	371	580	591	7,877	286	180	186	7,803	283	136	135
	Summary / Wgt Avg	**1.8**	**100%**			**382**	**14**	**50**	**47**	**3,305**	**120**	**109**	**117**	**5,115**	**186**	**196**	**215**	**3,721**	**135**	**61**	**67**	**3,852**	**140**	**53**	**54**
10	ROOSEVELT AVE	0.3	41%	Urban Major Collectors	Urban	445	16	117	113	1,950	71	62	77	3,044	110	76	110	2,128	77	31	43	3,086	112	49	52
10	WASHINGTON STREET	0.3	38%	Urban Minor Arterial	Urban	329	12	42	37	4,696	170	188	204	7,208	261	417	452	5,132	186	136	149	3,309	120	50	53
10	FOUNTAIN ST	0.1	18%	Urban Major Collectors	Urban	416	15	129	124	1,221	44	32	47	1,697	62	60	94	1,209	44	19	32	1,696	62	43	45
10	BROADWAY	0.0	3%	Urban Principal Arterial - Other	Urban	434	16	148	143	5,517	200	261	277	8,522	309	517	552	5,840	212	184	197	4,573	166	116	118
	Summary / Wgt Avg	**0.4**	**100%**			**212**	**8**	**91**	**87**	**2,976**	**108**	**110**	**126**	**4,560**	**165**	**217**	**251**	**3,224**	**117**	**74**	**86**	**2,969**	**108**	**50**	**53**
11	ANGELL RD	1.6	73%	Urban Minor Arterial	Urban	38	1	12	91	1,203	44	58	163	775	28	52	278	1,965	71	98	163	416	15	21	107
11	MENDON RD	0.4	19%	Urban Principal Arterial - Other	Urban	502	18	22	101	6,385	232	123	228	9,086	330	301	528	7,178	260	169	234	5,567	202	70	156
11	DIAMOND HILL RD	0.2	8%	Urban Principal Arterial - Other	Urban	296	11	38	117	4,004	145	152	257	5,784	210	259	486	4,988	181	150	215	3,052	111	84	171
	Summary / Wgt Avg	**2.2**	**100%**			**146**	**5**	**16**	**90**	**2,400**	**87**	**78**	**188**	**2,736**	**99**	**115**	**342**	**3,185**	**116**	**115**	**180**	**1,593**	**58**	**35**	**120**
12	LONSDALE AVE	2.7	54%	Urban Principal Arterial - Other	Urban	1,068	39	36	39	4,088	148	58	94	7,113	258	151	259	4,708	171	52	79	5,465	198	29	48
12	MENDON RD	2.4	46%	Urban Principal Arterial - Other	Urban	454	16	23	26	4,506	163	76	112	7,509	272	245	353	5,259	191	87	114	5,284	192	48	67
	Summary / Wgt Avg	**7.4**	**100%**			**783**	**28**	**30**	**33**	**4,282**	**155**	**66**	**104**	**7,297**	**265**	**195**	**297**	**4,964**	**180**	**68**	**93**	**5,381**	**195**	**38**	**57**

						12AM-6AM				6AM-9AM				9AM-3PM				3PM-6PM				6PM-12AM			
						No Toll			Toll	No Toll			Toll	No Toll			Toll	No Toll			Toll	No Toll			Toll
Route	Name	Length (miles)	% Total Length	Functional Class	Setting	Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer	
13	GREAT RD	1.6	46%	Urban Minor Arterial	Urban	239	9	37	71	3,818	138	156	197	3,622	131	303	394	4,730	172	156	183	2,531	92	76	121
13	SMITHFIELD RD	0.9	28%	Urban Minor Arterial	Urban	72	3	4	38	1,895	69	58	100	1,791	65	46	137	2,330	85	40	67	1,181	43	15	60
13	EDDIE DOWLING HWY	0.8	25%	Urban Principal Arterial - Other	Urban	182	7	4	39	1,481	54	16	58	2,295	83	20	111	2,456	89	11	39	1,551	56	13	59
13	OLD LOUISQUISSET PIKE	0.0	1%	Urban Principal Arterial - Other	Urban	118	4	4	39	1,216	44	9	51	2,151	78	8	99	2,676	97	9	36	1,383	50	6	52
	Summary / Wgt Avg	**3.4**	**100%**			**177**	**6**	**19**	**54**	**2,677**	**97**	**92**	**134**	**2,770**	**100**	**158**	**249**	**3,480**	**126**	**86**	**114**	**1,901**	**69**	**43**	**88**
14	W MAIN RD	6.9	23%	Urban Principal Arterial - Other	Urban	938	34	75	84	5,496	199	173	191	8,360	303	368	412	6,863	249	140	150	7,999	290	79	91
14	TEN ROD RD	6.0	20%	Rural Principal Arterial - Other	Rural	299	11	29	37	4,034	146	192	210	7,394	268	323	367	5,369	195	160	170	3,128	113	46	58
14	STATE HWY 138 E	3.6	12%	Urban Principal Arterial - Expressway	Urban	414	15	57	66	3,248	118	150	168	4,417	160	202	247	2,506	91	91	101	2,440	88	32	44
14	STATE HWY 138 W	3.3	11%	Urban Principal Arterial - Expressway	Urban	198	7	22	31	2,416	88	130	148	5,508	200	310	354	4,797	174	136	147	3,457	125	49	61
14	VICTORY HWY	2.3	8%	Rural Principal Arterial - Other	Rural	79	3	25	34	4,144	150	188	206	7,084	257	304	348	5,132	186	152	162	1,331	48	38	51
14	PELL BRIDGE	2.1	7%	Urban Principal Arterial - Expressway	Urban	661	24	84	93	6,809	247	335	353	11,261	408	601	645	8,323	302	259	270	6,457	234	96	108
14	STATE HWY 4 S	1.6	6%	Urban Principal Arterial - Expressway	Urban	831	30	83	92	3,395	123	181	198	7,517	273	205	249	4,066	147	106	116	5,082	184	54	67
14	STATE HWY 4 N	1.6	5%	Urban Principal Arterial - Expressway	Urban	692	25	47	55	4,195	152	105	122	7,517	273	233	277	4,709	171	111	122	5,518	200	61	74
14	ADMIRAL KALBFUS RD	0.7	2%	Urban Principal Arterial - Other	Urban	251	9	43	52	2,531	92	115	133	4,223	153	249	293	3,030	110	106	116	2,906	105	53	65
14	TOWER HILL RD	0.6	2%	Urban Principal Arterial - Expressway	Urban	833	30	78	86	4,388	159	161	179	8,666	314	267	311	5,125	186	112	123	6,159	223	60	73
14	JOHN C ELDRED PKWY	0.5	2%	Urban Principal Arterial - Expressway	Urban	409	15	51	59	4,030	146	187	205	5,965	216	309	353	4,022	146	132	142	3,307	120	49	62
14	EXIT 5	0.2	1%	Urban Major Collectors	Urban	90	3	7	16	1,390	50	47	65	1,535	56	78	122	1,250	45	51	61	1,412	51	23	35
14	STATE HWY 24 N	0.1	0%	Urban Principal Arterial - Expressway	Urban	249	9	50	59	1,992	72	121	139	5,010	182	220	264	6,265	227	114	124	4,929	179	35	48
14	ON RAMP RI-138 W	0.1	0%	Urban Major Collectors	Urban	122	4	19	28	1,674	61	101	119	3,664	133	240	284	2,545	92	97	107	2,376	86	43	56
	Summary / Wgt Avg	**29.5**	**100%**			**520**	**19**	**51**	**60**	**4,216**	**153**	**176**	**194**	**7,178**	**260**	**319**	**363**	**5,277**	**191**	**141**	**151**	**4,608**	**167**	**57**	**69**
15	EAST RD	4.7	43%	Rural Principal Arterial - Other	Rural	52	2	6	59	6,832	248	105	174	8,705	316	234	383	9,099	330	91	132	920	33	14	58
15	W GREENVILLE RD	3.0	27%	Urban Principal Arterial - Other	Urban	81	3	8	62	4,625	168	124	194	7,169	260	361	510	6,417	233	103	144	1,194	43	21	65
15	PUTNAM PIKE	1.9	17%	Urban Principal Arterial - Other	Urban	1,101	40	81	134	4,057	147	130	200	6,202	225	298	448	5,047	183	102	143	5,378	195	88	132
15	SMITH AVE	1.4	13%	Urban Principal Arterial - Other	Urban	150	5	6	60	5,013	182	171	241	7,039	255	422	571	6,454	234	144	185	1,999	72	46	91
	Summary / Wgt Avg	**11.0**	**100%**			**254**	**9**	**19**	**71**	**5,527**	**200**	**123**	**192**	**7,647**	**277**	**303**	**449**	**7,340**	**266**	**103**	**144**	**1,903**	**69**	**33**	**76**
16	STATE HWY 10 N	2.7	36%	Urban Principal Arterial - Expressway	Urban	1,410	51	18	79	5,853	212	62	112	10,622	385	96	184	6,594	239	31	58	7,277	264	16	71
16	STATE HWY 10 S	2.6	35%	Urban Principal Arterial - Expressway	Urban	1,693	61	29	89	6,387	232	89	139	12,370	449	164	252	8,254	299	46	72	7,895	286	43	98
16	US HWY 6 W	1.1	15%	Urban Principal Arterial - Expressway	Urban	2,443	89	48	108	8,034	291	118	168	17,243	625	263	352	12,498	453	77	104	13,054	473	64	119
16	US HWY 6 E	1.0	14%	Urban Principal Arterial - Expressway	Urban	3,756	136	78	139	9,384	340	63	113	15,308	555	173	261	8,604	312	38	64	10,610	385	26	81
	Summary / Wgt Avg	**7.4**	**100%**			**1,991**	**72**	**35**	**78**	**6,859**	**249**	**80**	**124**	**12,877**	**467**	**155**	**257**	**8,337**	**302**	**44**	**70**	**8,821**	**320**	**34**	**97**

Table C-9 2040 Base Case Average Weekday Diversion Impacts by Time-of-Day

						12AM-6AM				6AM-9AM				9AM-3PM				3PM-6PM				6PM-12AM			
						No Toll			Toll	No Toll			Toll	No Toll			Toll	No Toll			Toll	No Toll			Toll
Route	Name	Length (miles)	% Total Length	Functional Class	Setting	Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer	
1	NOOSENECK HILL RD	8.9	98%	Rural Major Collector	Rural	121	4	38	69	846	31	84	143	2,082	76	277	348	1,349	49	83	108	918	33	44	64
1	WOODVILLE ALTON RD	0.2	2%	Rural Major Collector	Rural	61	2	12	44	327	12	21	81	584	21	92	163	492	18	34	60	562	20	19	39
	Summary / Wgt Avg	**9.1**	**100%**			**120**	**4**	**37**	**62**	**833**	**30**	**82**	**138**	**2,045**	**74**	**272**	**326**	**1,328**	**48**	**82**	**104**	**909**	**33**	**43**	**60**
2	VICTORY HWY	13.7	40%	Rural Principal Arterial - Other	Rural	220	8	69	93	4,243	154	359	392	6,888	250	632	693	5,791	210	262	280	2,304	84	94	113
2	CHOPMIST HILL RD	8.2	24%	Rural Principal Arterial - Other	Rural	88	3	31	55	3,526	128	371	403	4,070	148	563	624	5,927	215	393	411	1,231	45	114	133
2	BRONCOS HWY	5.4	16%	Urban Principal Arterial - Other	Urban	238	9	14	37	3,312	120	196	229	3,839	139	266	326	4,930	179	173	191	2,483	90	33	52
2	PLAINFIELD PIKE	5.2	15%	Rural Principal Arterial - Other	Rural	164	6	152	176	6,190	225	455	488	10,131	367	926	986	8,126	295	309	327	1,692	61	49	68
2	QUAKER HIGHWAY	0.6	2%	Urban Minor Arterial	Urban	100	4	134	158	2,909	105	365	397	2,827	103	712	773	2,896	105	290	308	1,284	47	187	206
2	PUTNAM PIKE	0.6	2%	Rural Principal Arterial - Other	Rural	482	17	99	123	5,470	198	451	484	6,019	218	635	696	7,665	278	467	485	3,946	143	160	179
2	QUAKER HWY	0.5	2%	Urban Minor Arterial	Urban	100	4	132	156	2,912	106	360	393	2,831	103	711	772	2,894	105	283	302	1,314	48	187	206
2	N MAIN ST	0.2	1%	Urban Minor Arterial	Urban	354	13	180	204	5,481	199	490	523	6,020	218	847	908	5,879	213	375	393	2,789	101	221	240
2	NOOSENECK HILL RD	0.1	0%	Rural Principal Arterial - Other	Rural	276	10	109	133	6,863	249	377	410	12,831	465	745	806	7,463	271	274	292	3,120	113	128	148
	Summary / Wgt Avg	**34.4**	**100%**			**184**	**7**	**67**	**89**	**4,210**	**153**	**353**	**385**	**6,095**	**221**	**606**	**667**	**5,983**	**217**	**291**	**309**	**1,984**	**72**	**87**	**106**
3	POST RD	7.4	83%	Urban Principal Arterial - Other	Urban	215	8	24	31	5,865	213	104	121	11,062	401	296	326	6,542	237	81	88	3,279	119	32	44
3	MAIN ST	1.2	13%	Urban Principal Arterial - Other	Urban	158	6	2	9	5,825	211	90	107	11,668	423	286	315	6,093	221	68	75	2,902	105	18	30
3	VETERANS MEMORIAL DR	0.2	2%	Urban Principal Arterial - Other	Urban	269	10	8	15	5,897	214	62	78	8,887	322	238	268	7,976	289	53	60	4,595	167	12	24
3	MAIN AVE	0.1	1%	Urban Principal Arterial - Other	Urban	257	9	8	15	3,684	134	69	86	6,578	239	176	205	5,187	188	57	64	2,978	108	21	33
3	GREENWICH AVE	0.0	1%	Urban Principal Arterial - Other	Urban	349	13	10	17	8,560	310	86	103	14,462	525	351	380	13,026	472	78	86	6,829	248	18	30
	Summary / Wgt Avg	**8.9**	**100%**			**209**	**8**	**21**	**27**	**5,855**	**212**	**101**	**119**	**11,070**	**401**	**293**	**328**	**6,536**	**237**	**78**	**84**	**3,274**	**119**	**30**	**40**
4	BALD HILL RD	2.5	65%	Urban Principal Arterial - Other	Urban	262	10	15	25	5,884	213	133	158	11,954	434	286	330	7,704	279	58	69	4,815	175	26	44
4	QUAKER LN	1.4	35%	Urban Principal Arterial - Other	Urban	297	11	21	32	6,497	236	165	190	14,474	525	425	469	7,094	257	102	113	4,904	178	46	64
	Summary / Wgt Avg	**3.9**	**100%**			**275**	**10**	**17**	**27**	**6,100**	**221**	**144**	**172**	**12,845**	**466**	**335**	**387**	**7,488**	**272**	**73**	**82**	**4,846**	**176**	**33**	**48**
5	KNOTTY OAK RD	2.7	29%	Urban Principal Arterial - Other	Urban	133	5	7	103	5,847	212	145	277	11,129	404	327	569	7,552	274	120	192	2,154	78	24	101
5	NORTH RD	2.2	24%	Urban Principal Arterial - Other	Urban	187	7	5	100	7,883	286	167	299	13,690	497	340	583	9,574	347	131	203	2,450	89	25	102
5	NOOSENECK HILL RD	2.0	22%	Urban Principal Arterial - Other	Urban	503	18	65	161	5,255	191	290	422	10,840	393	550	793	6,912	251	152	224	3,541	128	45	122
5	TIOGUE AVE	1.6	17%	Urban Principal Arterial - Other	Urban	152	6	10	105	4,251	154	220	352	9,147	332	438	681	4,803	174	84	156	2,925	106	13	89
5	SANDY BOTTOM RD	0.5	5%	Urban Principal Arterial - Other	Urban	203	7	22	118	5,444	197	168	300	10,872	394	386	628	6,406	232	125	197	3,011	109	22	98
5	MAIN ST	0.1	1%	Urban Principal Arterial - Other	Urban	507	18	30	126	8,675	315	258	389	17,347	629	573	816	9,080	329	147	219	5,961	216	31	107
5	WASHINGTON ST	0.1	1%	Urban Principal Arterial - Other	Urban	507	18	30	126	8,675	315	258	389	17,347	629	573	816	9,080	329	147	219	5,961	216	31	107
5	WOOD ST	0.1	1%	Urban Principal Arterial - Other	Urban	203	7	22	118	5,444	197	168	300	10,872	394	386	628	6,406	232	125	197	3,011	109	22	98
	Summary / Wgt Avg	**9.2**	**100%**			**241**	**9**	**21**	**110**	**5,976**	**217**	**198**	**326**	**11,461**	**416**	**405**	**649**	**7,404**	**269**	**124**	**194**	**2,782**	**101**	**27**	**102**
6	ATWOOD AVE	5.5	33%	Urban Principal Arterial - Other	Urban	189	7	13	61	4,579	166	95	160	7,498	272	146	268	6,379	231	64	100	2,108	76	19	58
6	SCITUATE AVE	5.4	33%	Urban Minor Arterial	Rural	212	8	15	63	4,753	172	177	243	7,132	259	368	489	5,902	214	108	144	2,334	85	28	66
6	GREENVILLE AVE	1.9	12%	Urban Principal Arterial - Other	Urban	65	2	5	53	4,863	176	96	161	5,222	189	134	256	6,443	234	98	134	1,473	53	11	49
6	PLEASANT VIEW AVE	1.8	11%	Urban Principal Arterial - Other	Urban	189	7	7	55	4,848	176	145	211	6,695	243	346	467	6,899	250	152	188	1,930	70	16	54
6	CEDAR SWAMP RD	1.0	6%	Urban Principal Arterial - Other	Urban	270	10	8	56	2,297	83	40	105	2,999	109	129	250	3,705	134	70	106	1,997	72	20	58
6	SANDERSON RD	0.6	4%	Urban Principal Arterial - Other	Urban	140	5	13	61	4,331	157	134	200	5,220	189	266	387	6,477	235	138	174	1,771	64	21	60
6	PHENIX AVE	0.3	2%	Urban Minor Arterial	Urban	309	11	11	59	3,296	120	99	165	5,680	206	215	336	4,529	164	50	86	3,365	122	24	62
	Summary / Wgt Avg	**16.4**	**100%**			**187**	**7**	**12**	**57**	**4,533**	**164**	**126**	**189**	**6,644**	**241**	**244**	**366**	**6,100**	**221**	**95**	**130**	**2,089**	**76**	**21**	**59**

						12AM-6AM				6AM-9AM				9AM-3PM				3PM-6PM				6PM-12AM			
						No Toll			Toll	No Toll			Toll	No Toll			Toll	No Toll			Toll	No Toll			Toll
Route	Name	Length (miles)	% Total Length	Functional Class	Setting	Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer	
7	FARNUM PIKE	5.3	38%	Urban Minor Arterial	Urban	57	2	3	15	3,844	139	119	170	5,348	194	220	323	4,964	180	89	100	947	34	8	27
7	GREENVILLE RD	3.0	21%	Urban Minor Arterial	Urban	121	4	27	39	2,033	74	94	145	2,100	76	133	236	2,869	104	83	94	659	24	34	53
7	MANTON AVE	1.8	13%	Urban Minor Arterial	Urban	396	14	8	19	2,849	103	29	80	5,010	182	80	183	3,538	128	32	44	3,312	120	10	29
7	WOONASQUATUCKET AVE	1.8	12%	Urban Major Collectors	Urban	157	6	8	20	2,066	75	23	75	2,680	97	48	150	2,552	93	27	38	1,622	59	6	26
7	WATERMAN AVE	1.6	11%	Urban Minor Arterial	Urban	88	3	3	14	4,433	161	98	149	6,524	237	201	304	5,592	203	62	73	2,255	82	12	31
7	DOUGLAS PIKE	0.2	1%	Urban Principal Arterial - Other	Urban	141	5	7	19	6,083	221	211	263	6,160	223	261	363	7,651	277	168	180	1,586	58	14	34
7	SMITH ST	0.2	1%	Urban Principal Arterial - Other	Urban	684	25	42	54	5,267	191	77	128	8,342	303	148	251	5,893	214	55	67	6,260	227	55	74
7	FRUIT HILL AVE	0.2	1%	Urban Minor Arterial	Urban	231	8	17	29	3,999	145	49	101	7,171	260	110	213	5,242	190	45	56	3,389	123	11	31
7	WESTMINSTER ST	0.1	1%	Urban Minor Arterial	Urban	725	26	13	25	6,657	241	81	132	13,096	475	231	334	8,453	307	53	65	5,511	200	22	42
	Summary / Wgt Avg	**14.1**	**100%**			**146**	**5**	**10**	**22**	**3,251**	**118**	**87**	**135**	**4,544**	**165**	**159**	**270**	**4,188**	**152**	**69**	**82**	**1,559**	**57**	**15**	**34**
8	EDDY ST	1.3	22%	Urban Principal Arterial - Other	Urban	35	1	2	15	1,194	43	22	42	1,991	72	36	78	1,533	56	13	23	934	34	5	34
8	ALLENS AVE	0.9	15%	Urban Principal Arterial - Other	Urban	429	16	71	83	7,669	278	140	159	12,959	470	286	328	7,580	275	62	71	6,303	229	43	72
8	HENDERSON BRIDGE	0.8	14%	Urban Minor Arterial	Urban	119	4	34	46	6,416	233	231	251	11,294	410	534	576	7,258	263	107	116	4,673	169	78	108
8	N BROADWAY	0.6	10%	Urban Minor Arterial	Urban	130	5	10	22	3,275	119	80	100	5,137	186	113	154	3,539	128	27	36	2,697	98	22	51
8	WICKENDEN ST	0.5	9%	Urban Principal Arterial - Other	Urban	506	18	20	32	3,035	110	77	97	6,397	232	138	180	3,419	124	47	56	4,650	169	46	75
8	IVES ST	0.5	7%	Urban Major Collectors	Urban	127	5	11	23	4,179	152	95	115	7,759	281	187	229	4,906	178	33	42	3,719	135	30	59
8	PITMAN ST	0.4	6%	Urban Major Collectors	Urban	41	1	1	14	2,555	93	58	78	3,135	114	52	93	2,138	78	17	27	948	34	10	39
8	POINT ST	0.3	4%	Urban Principal Arterial - Other	Urban	73	3	2	14	2,200	80	45	64	2,448	89	42	83	1,717	62	15	25	1,234	45	9	39
8	BROADWAY	0.2	4%	Urban Minor Arterial	Urban	14	1	1	14	497	18	12	31	788	29	15	57	661	24	7	17	279	10	2	31
8	BUTLER AVE	0.2	3%	Urban Major Collectors	Urban	35	1	2	15	1,777	64	37	56	2,734	99	36	78	1,837	67	27	37	1,166	42	5	35
8	HENDERSON EXPY	0.2	3%	Urban Non Classified	Urban	655	24	41	53	3,215	117	79	99	5,006	182	110	152	3,050	111	51	60	5,191	188	54	83
8	S ANGELL ST	0.1	2%	Urban Minor Arterial	Urban	153	6	4	17	2,474	90	47	66	3,949	143	75	117	2,141	78	14	24	2,557	93	18	47
8	WATERMAN ST	0.1	1%	Urban Minor Arterial	Urban	65	2	4	16	1,725	63	25	45	3,148	114	68	109	2,590	94	11	20	1,709	62	9	39
	Summary / Wgt Avg	**6.1**	**100%**			**222**	**8**	**26**	**33**	**4,178**	**152**	**101**	**120**	**7,061**	**256**	**196**	**237**	**4,370**	**158**	**45**	**55**	**3,547**	**129**	**34**	**61**
9	COTTAGE ST	1.1	60%	Urban Minor Arterial	Urban	246	9	51	46	2,512	91	79	79	4,175	151	142	146	2,785	101	39	42	3,038	110	42	40
9	CENTRAL AVE	0.3	16%	Urban Principal Arterial - Other	Urban	385	14	17	13	2,884	105	64	64	4,900	178	137	141	3,203	116	41	44	3,489	127	17	16
9	NEWPORT AVE	0.2	10%	Urban Principal Arterial - Other	Urban	781	28	96	91	6,341	230	285	285	10,331	375	621	625	7,744	281	184	187	7,326	266	131	129
9	BROADWAY	0.2	8%	Urban Principal Arterial - Other	Urban	348	13	15	10	2,886	105	62	62	4,782	173	103	106	2,646	96	25	28	2,518	91	32	31
9	NEWPORT AVENUE	0.1	7%	Urban Principal Arterial - Other	Urban	803	29	96	92	6,398	232	285	285	10,440	379	622	626	7,833	284	185	188	7,439	270	131	130
	Summary / Wgt Avg	**1.8**	**100%**			**366**	**13**	**50**	**49**	**3,238**	**117**	**109**	**112**	**5,364**	**195**	**217**	**225**	**3,664**	**133**	**62**	**66**	**3,782**	**137**	**52**	**52**
10	ROOSEVELT AVE	0.3	41%	Urban Major Collectors	Urban	459	17	114	112	1,935	70	69	74	3,297	120	85	99	2,213	80	33	41	3,234	117	52	53
10	WASHINGTON STREET	0.3	38%	Urban Minor Arterial	Urban	347	13	46	44	4,997	181	204	209	7,728	280	412	427	5,310	193	164	172	3,592	130	54	54
10	FOUNTAIN ST	0.1	18%	Urban Major Collectors	Urban	416	15	120	118	1,198	43	39	44	1,871	68	66	80	1,253	45	22	30	1,712	62	46	46
10	BROADWAY	0.0	3%	Urban Principal Arterial - Other	Urban	453	16	164	162	5,896	214	282	287	9,125	331	516	531	6,071	220	211	219	4,896	178	126	126
	Summary / Wgt Avg	**0.4**	**100%**			**219**	**15**	**91**	**89**	**3,092**	**112**	**121**	**127**	**4,911**	**178**	**219**	**234**	**3,341**	**121**	**86**	**94**	**3,151**	**114**	**54**	**54**
11	ANGELL RD	1.6	73%	Urban Minor Arterial	Urban	46	2	15	75	1,442	52	81	150	1,043	38	70	222	2,318	84	131	177	492	18	25	93
11	MENDON RD	0.4	19%	Urban Principal Arterial - Other	Urban	591	21	26	87	6,852	249	141	210	9,477	344	361	514	7,542	274	192	239	6,009	218	81	150
11	DIAMOND HILL RD	0.2	8%	Urban Principal Arterial - Other	Urban	344	12	48	109	4,412	160	201	270	6,090	221	297	450	5,310	193	187	233	3,465	126	102	170
	Summary / Wgt Avg	**2.2**	**100%**			**172**	**6**	**20**	**74**	**2,695**	**98**	**102**	**166**	**3,030**	**110**	**143**	**296**	**3,538**	**128**	**147**	**193**	**1,765**	**64**	**42**	**109**
12	LONSDALE AVE	2.7	54%	Urban Principal Arterial - Other	Urban	1,161	42	42	45	4,335	157	68	94	7,159	260	158	227	4,962	180	56	72	5,730	208	31	43
12	MENDON RD	2.4	46%	Urban Principal Arterial - Other	Urban	518	19	28	30	4,802	174	91	118	7,674	278	280	350	5,465	198	102	118	5,476	199	53	65
	Summary / Wgt Avg	**7.4**	**100%**			**862**	**31**	**35**	**40**	**4,552**	**165**	**79**	**105**	**7,398**	**268**	**215**	**289**	**5,196**	**188**	**77**	**98**	**5,611**	**204**	**41**	**53**

						12AM-6AM				6AM-9AM				9AM-3PM				3PM-6PM				6PM-12AM			
						No Toll			Toll	No Toll			Toll	No Toll			Toll	No Toll			Toll	No Toll			Toll
Route	Name	Length (miles)	% Total Length	Functional Class	Setting	Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer		Auto	SU Truck	Tractor Trailer	
13	GREAT RD	1.6	46%	Urban Minor Arterial	Urban	254	9	47	76	4,465	162	182	221	4,194	152	334	387	5,033	183	161	179	2,751	100	96	132
13	SMITHFIELD RD	0.9	28%	Urban Minor Arterial	Urban	71	3	4	33	2,327	84	90	129	2,183	79	69	122	2,859	104	61	80	1,183	43	16	53
13	EDDIE DOWLING HWY	0.8	25%	Urban Principal Arterial - Other	Urban	172	6	4	33	1,655	60	29	69	2,409	87	24	77	2,580	94	14	32	1,476	54	15	51
13	OLD LOUISQUISSET PIKE	0.0	1%	Urban Principal Arterial - Other	Urban	107	4	4	33	1,482	54	17	57	2,228	81	14	67	2,741	99	11	29	1,259	46	6	42
	Summary / Wgt Avg	**3.4**	**100%**			**182**	**7**	**24**	**53**	**3,143**	**114**	**117**	**156**	**3,173**	**115**	**180**	**233**	**3,798**	**138**	**95**	**113**	**1,984**	**72**	**53**	**89**
14	W MAIN RD	6.9	23%	Urban Principal Arterial - Other	Urban	950	34	75	80	5,752	209	172	186	8,986	326	408	435	7,155	259	149	155	8,070	293	79	87
14	TEN ROD RD	6.0	20%	Rural Principal Arterial - Other	Rural	355	13	35	40	4,793	174	194	208	8,607	312	368	394	5,941	215	159	166	3,725	135	55	63
14	STATE HWY 138 E	3.6	12%	Urban Principal Arterial - Expressway	Urban	438	16	62	67	3,470	126	155	169	4,810	174	234	261	2,704	98	99	105	2,599	94	34	41
14	STATE HWY 138 W	3.3	11%	Urban Principal Arterial - Expressway	Urban	208	8	23	28	2,410	87	130	144	5,632	204	330	356	4,840	176	136	142	3,621	131	52	60
14	VICTORY HWY	2.3	8%	Rural Principal Arterial - Other	Rural	98	4	33	38	5,171	188	203	217	9,172	333	389	416	6,030	219	167	173	1,680	61	47	55
14	PELL BRIDGE	2.1	7%	Urban Principal Arterial - Expressway	Urban	690	25	89	94	7,075	257	343	357	11,951	433	661	688	8,597	312	270	276	6,732	244	102	110
14	STATE HWY 4 S	1.6	6%	Urban Principal Arterial - Expressway	Urban	915	33	92	97	3,600	131	184	198	7,983	290	226	253	4,313	156	112	118	5,458	198	60	68
14	STATE HWY 4 N	1.6	5%	Urban Principal Arterial - Expressway	Urban	739	27	51	56	4,291	156	104	117	7,551	274	245	272	4,819	175	99	105	5,890	214	68	75
14	ADMIRAL KALBFUS RD	0.7	2%	Urban Principal Arterial - Other	Urban	257	9	47	52	2,455	89	115	129	4,205	152	256	283	3,033	110	108	114	2,973	108	59	66
14	TOWER HILL RD	0.6	2%	Urban Principal Arterial - Expressway	Urban	924	34	88	93	4,550	165	164	177	8,901	323	291	318	5,370	195	116	123	6,705	243	68	76
14	JOHN C ELDRED PKWY	0.5	2%	Urban Principal Arterial - Expressway	Urban	428	16	54	59	4,232	153	193	207	6,393	232	344	371	4,202	152	140	146	3,453	125	52	60
14	EXIT 5	0.2	1%	Urban Major Collectors	Urban	257	4	8	13	1,260	46	42	56	1,640	59	97	124	1,152	42	38	44	1,619	59	26	34
14	STATE HWY 24 N	0.1	0%	Urban Principal Arterial - Expressway	Urban	251	9	51	55	2,197	80	117	131	5,660	205	247	274	6,392	232	119	126	5,108	185	35	43
14	ON RAMP RI-138 W	0.1	0%	Urban Major Collectors	Urban	123	4	20	24	1,629	59	103	116	3,510	127	228	255	2,498	91	93	99	2,463	89	48	55
	Summary / Wgt Avg	**29.5**	**100%**			**552**	**20**	**56**	**60**	**4,575**	**166**	**179**	**192**	**7,884**	**286**	**357**	**384**	**5,606**	**203**	**146**	**152**	**4,888**	**177**	**62**	**69**
15	EAST RD	4.7	43%	Rural Principal Arterial - Other	Rural	56	2	7	54	6,862	249	135	201	9,892	359	248	369	8,984	326	116	152	1,008	37	18	56
15	W GREENVILLE RD	3.0	27%	Urban Principal Arterial - Other	Urban	93	3	9	57	5,157	187	150	216	7,449	270	368	489	6,508	236	116	153	1,372	50	26	64
15	PUTNAM PIKE	1.9	17%	Urban Principal Arterial - Other	Urban	1,202	44	90	138	4,378	159	134	200	6,457	234	325	446	5,459	198	115	151	5,774	209	96	134
15	SMITH AVE	1.4	13%	Urban Principal Arterial - Other	Urban	171	6	8	55	5,428	197	177	242	7,417	269	442	564	6,646	241	144	180	2,418	88	56	94
	Summary / Wgt Avg	**11.0**	**100%**			**280**	**10**	**22**	**67**	**5,790**	**210**	**144**	**208**	**8,326**	**302**	**318**	**440**	**7,410**	**269**	**119**	**154**	**2,111**	**77**	**38**	**76**
16	STATE HWY 10 N	2.7	36%	Urban Principal Arterial - Expressway	Urban	1,452	53	20	50	5,557	202	62	96	10,718	389	103	179	6,787	246	35	58	7,466	271	18	55
16	STATE HWY 10 S	2.6	35%	Urban Principal Arterial - Expressway	Urban	1,765	64	31	61	6,207	225	88	123	12,037	437	166	242	8,234	299	46	69	7,873	286	41	78
16	US HWY 6 W	1.1	15%	Urban Principal Arterial - Expressway	Urban	2,542	92	52	82	8,098	294	144	179	17,441	633	296	372	12,270	445	85	108	13,477	489	67	104
16	US HWY 6 E	1.0	14%	Urban Principal Arterial - Expressway	Urban	3,877	141	85	115	9,205	334	82	116	15,988	580	207	284	8,883	322	42	65	10,703	388	28	65
	Summary / Wgt Avg	**7.4**	**100%**			**2,063**	**75**	**38**	**65**	**6,674**	**242**	**86**	**118**	**12,920**	**469**	**168**	**245**	**8,405**	**305**	**47**	**70**	**8,958**	**325**	**35**	**69**

APPENDIX D – ADDITIONAL INFORMATION AND CLARIFICATIONS (05/07/2018)

This appendix was created to provide additional information in support of an Environmental Assessment (EA) for the ten locations 3, 4, 6-13 of the RIDOT Tolling Program. Because the toll locations are spread throughout the state, the EA requires an in-depth look at anticipated toll diversions and the potential impacts to the Rhode Island roadway network. This appendix clarifies specific areas of the traffic and revenue forecast report, and is broken out into the following topic areas:

- Stated preference survey
    - Geographic coverage
    - Travel market segmentation
    - Qualified respondents
- Future year trip table growth assumptions
- Post-processing adjustments to the modeling outputs
- Diversion route analysis
    - Diversion route roadway network leakage assumption
    - Long-distance truck diversions around Rhode Island

D1: Stated Preference Survey (Section 4.0)

Geographic Coverage and Considerations (Section 4.1.1)

Louis Berger reviewed the State of Rhode Island Freight and Goods Movement Plan (SRIFGMP) that showed the different types of commodities that pass through and within the State of Rhode Island. According to the document, the key commodities contributing to freight movement within and through the state includes consumer goods, specialized high-value equipment, construction materials and petroleum products.

- According to the SRIFGMP, construction materials (e.g. gravel and sand, concrete and broken stone and riprap) contribute substantially to Rhode Island's truck tonnage volume. Some of this traffic stays within the state; while a significant portion goes to Massachusetts or Connecticut, and to a lesser extent the Mid-Atlantic States.
- Petroleum products, which comprise a significant portion of outbound truck traffic, are imported directly and distributed throughout the state, Massachusetts, and to a lesser extent eastern Connecticut.
- Consumer goods are expected to be unloaded in warehousing/distribution centers within Rhode Island or near the Massachusetts border and to a lesser extent in Connecticut along the I-395 corridor, from where they are redistributed to locations throughout New England.
- Specialized equipment, such as medical instruments, pharmaceuticals and customized metal products, represent a source of high-value trucking volume. Motor vehicles entering the Port of Davisville are then moved via truck to New England locations.

In order to fully capture and represent the trucking markets in Rhode Island, Louis Berger considered and evaluated four potential survey locations that were identified based on analytical considerations that sought to obtain a mix of both long and short distance tractor trailer trips, as well as practical and logistical data collection considerations. The four locations initially considered included

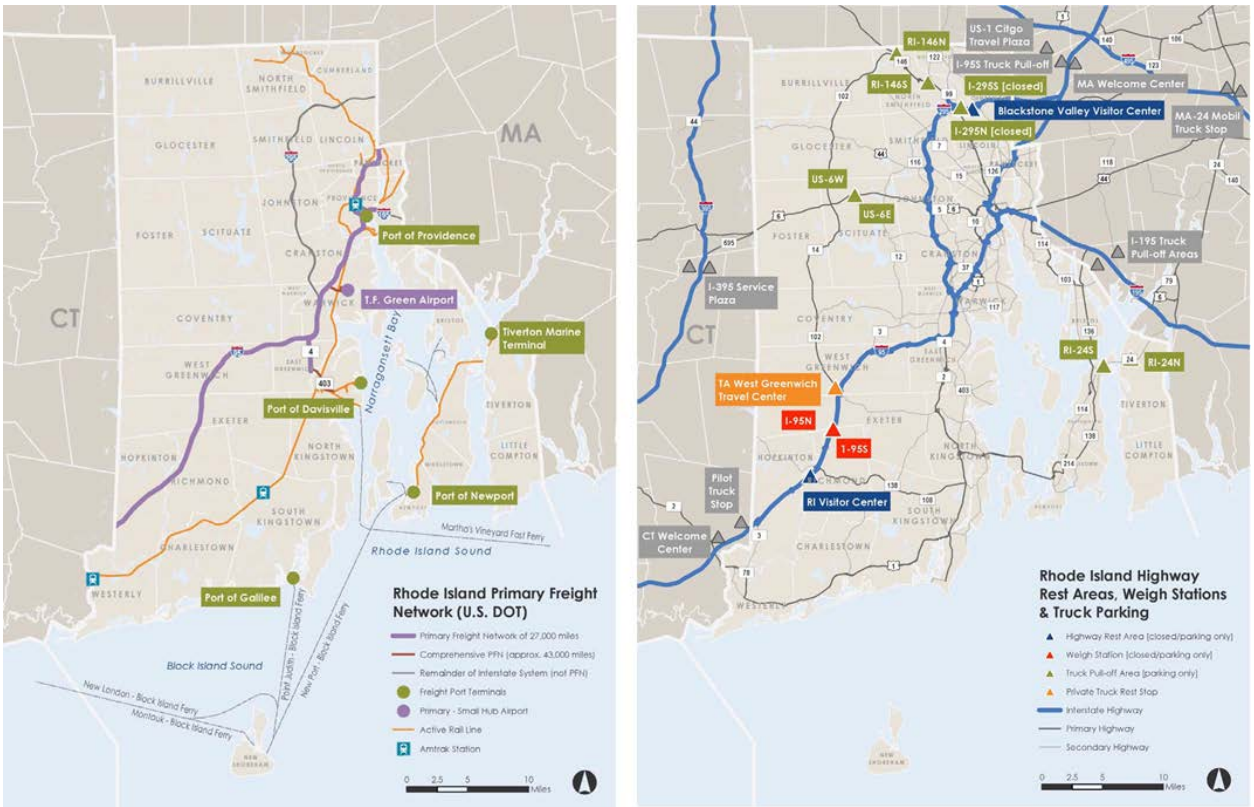
- Port of Providence (ProvPort)
- Port of Davisville

- TravelCenters of America #253 Rest Area, (I-95), West Greenwich, RI
- Blackstone Valley Visitors Center Rest Area (I-295), Lincoln, RI

Ultimately Louis Berger settled on the Port of Providence, and the TravelCenters of America Rest Area locations.

Although the Port of Davisville is a key facility for the movement of automobiles in and out of the state, the Louis Berger Team settled on the Port of Providence as the ideal location for survey coverage due to the wider assortment of goods moved through that facility. As indicated in the SRIFGMP, the Port of Providence is an important regional hub, particularly for the state's leading export commodity, scrap metal. ProvPort (part of the Port of Providence) can handle dry, liquid, and break bulk commodities for both imports and exports. The port also handles cement, chemicals, coal, cobblestone, heavy machinery, liquid petroleum products, lumber, pearlite, salt, scrap metal, project cargo, and steel products. The Port of Providence also featured more centrally within the Rhode Island Primary Freight Network (PFN) as indicated by the left portion of Figure D-1 that highlights some of the state's freight transportation assets.

Figure D-1 Rhode Island State Freight Transportation Assets



Source: State of Rhode Island Freight and Goods Movement Plan, RIDOT 2016

The right portion of the Figure D-1 highlights the various rest areas throughout the state where truck drivers could potentially be intercepted as part of the data collection effort supporting this investment-grade study. As per the SRIFGMP, five of the facilities were either closed, had no facilities for truck drivers to use, or had limited or no parking, thereby eliminating them from further consideration. Following a field visit to evaluate the two remaining locations, the Louis Berger team settled on the Travel Centers of America Rest Area due to the notably higher volume of truck parking capacity and ultimately traffic

throughput. This location also afforded the added advantage of being located by the main interstate and the state PFN such that a wider array of goods was more likely to be captured in the intercept survey.

By using these two locations, the Louis Berger Team ensures that the survey data used to support the travel demand model development process, reflected both the geographic and commodity variations of the target markets.

Travel Market Segmentation (Section 4.1.2)

Louis Berger developed the investment grade traffic and revenue forecast using traditional modeling approaches similar to those applied in other tolling studies that involved the modeling of trucks as a separate vehicle class such as the Atlanta Managed Lanes Study and the I-710 Major Corridor in Los Angeles (Refer to page 69 of the report). The use of value-of-time distributions instead of point estimate approaches reflect the variety of travel conditions that would affect route choice including the value of commodity being carried.

Qualified Respondents (Section 4.4.1)

In order to provide a more conservative outlook on resulting toll revenue (as per the goals of the investment-grade approach – see Section 1.3.2), the survey focused on drivers who had full or partial route choice discretion and utilized these responses in the travel demand model, since the drivers who were route captives were not explicitly accounted for as a separate segment of the target market – this assumption also likely overstated the diversion potential.

It should however be noted, that although some drivers may not have the discretion over route choice, the introduction of tolls on tractor trailer traffic may ultimately result in routing changes from whoever has that authority. Therefore, the modeling decision to use only qualified drivers also likely captures some of the potential route choice shifts arising from those arrangements.

D2: Future Year Trip Table (Section 5.2.1.4)

A review of the SRIFGMP indicates projected growth rates of truck freight tonnage of 2.0 percent per annum out to the year 2030. The empirical basis for these forecasts is not detailed in the SRIFGMP. However, a review of employment data from Moody's Analytics shows that transportation and warehousing sector comprising truck drivers, has only grown at an average annualized rate of 0.65 percent between 2000 and 2017 (Table D-1).

TABLE D-1 EMPLOYMENT TRANSPORTATION AND WAREHOUSING (THOUSANDS)

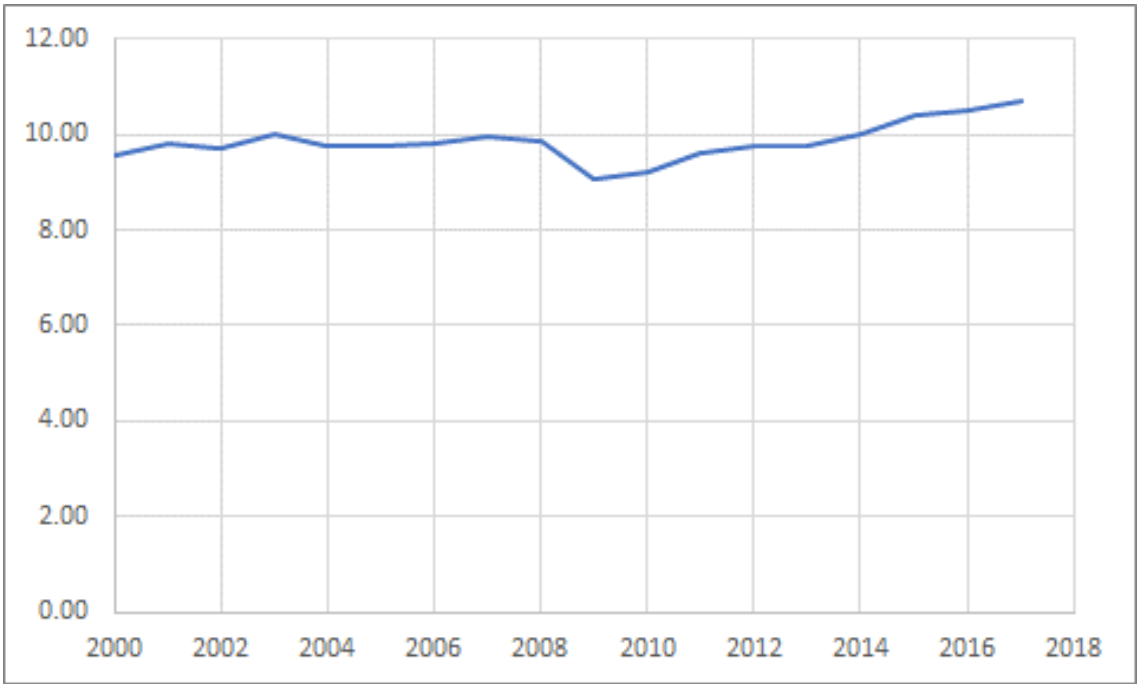
	Rhode Island	New York	Connecticut	Massachusetts	United States
2000	9.6	239.8	39.9	82.6	4,411.8
2010	9.2	224.0	38.7	72.2	4,191.7
2017	10.7	257.0	45.6	85.6	4,956.7
CAGR 2010-17	2.15%	1.98%	2.39%	2.46%	2.42%
CAGR 2000-17	0.65%	0.41%	0.80%	0.21%	0.69%

Source: Moody's Analytics

Although this is among the highest growth rates in the surrounding region, it is still well short of the 2.0 percent projected for truck tonnage going forward in the SRIFGMP. Employment in the Rhode Island Transportation and Warehousing Industry has grown at annualized rate of 2.15 percent between 2010

and 2017, however, this period includes the economic recovery following Great Recession (Figure D-2) and reversion to the mean should be anticipated in the long-term future.

FIGURE D-2 RHODE ISLAND EMPLOYMENT TRANSPORTATION AND WAREHOUSING (THOUSANDS)



Source: Moody's Analytics

D3: Post-Processing Adjustments to Model Outputs (Section 6.2.3)

As noted in Section 6.2.3, the Louis Berger Team adjusted the raw model outputs to account for police enforcement of tractor trailer use of alternate local routes. As noted in the report, truck diversions were reduced by 50 percent based on case study examples in Ohio and Wyoming, as well as the resources committed by RIDOT towards increased commercial vehicle enforcement throughout the state, including local roadways where enforcement did not previously exist. This section of the appendix provides additional details of both the level of commitment towards this goal, as well as a separate attempt to quantify the potential impact of increased enforcement on modeled tractor trailer toll diversions.

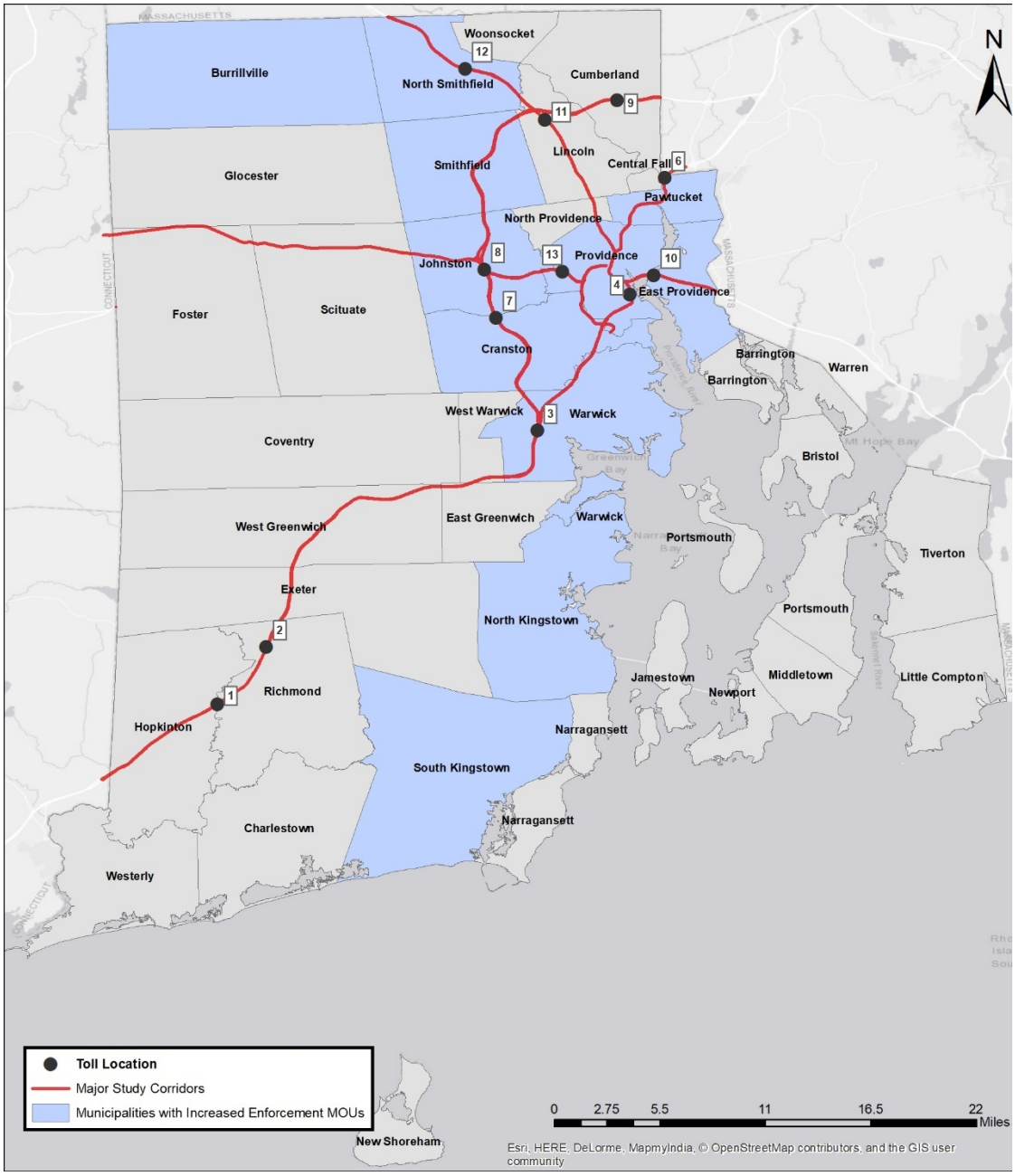
RIDOT Enforcement Efforts

In addition to state police enforcement efforts statewide, and in response to directives from FHWA regarding Rhode Island's noncompliance with Federal Law regarding Vehicle Size and Weight Plans, RIDOT has established memoranda of understanding (MOUs) with 11 cities and towns throughout the state to increase enforcement on secondary roadways. The cities and towns are listed below and are also presented in Figure D-3.

- Burrillville
- Cranston
- East Providence
- Johnston
- North Kingstown

- North Smithfield
- Pawtucket
- Providence
- Smithfield
- South Kingstown
- Warwick

Figure D-3 Municipalities with Increased Enforcement MOUs



As indicated in the report, approximately $500,000 have been set aside for increased funding of Rhode Island State Police and municipal police enforcement efforts. Included at the end of this appendix are the following documents attesting to the efforts of the state to attain compliance through the implementation of enforcement actions whose anticipated effects were incorporated into the traffic and revenue forecast presented in this report.

- Letter from FHWA putting RI on notice that our Vehicle Size and Weight plan was not in compliance with the federal law
- Example letter sent to municipalities requesting additional enforcement
    - Includes explanation of the funding set aside and the truck scales purchased by RIDOT for use by local police departments
- Example MOU signed by municipality
- Attached approved State Enforcement Plan 2017
    - "The portable scales allow for complete coverage throughout the state and are not restricted to specific state highways or solely to rural or urban areas. Locations throughout the state have been chosen by combined efforts of regular State Police patrols supplemented by Rhode Island Department of Transportation truck classification count data."
- Attached approved State Enforcement Plan 2018 (pending FHWA approval) – which continues with the same enforcement program on all roadways

Enforcement Diversion Impact Analysis

The diversion reduction assumption highlighted in Section 6.2.3 of the main report was based in part on case study examples obtained from the Wyoming and Ohio Turnpikes that implied a 25 to 36 percent reduction in truck toll diversions as a result of police weight enforcement actions. The Louis Berger Team applied a 50 percent diversion rate due to the state's concentrated efforts applied over relatively smaller area, however, this assumption was tested in a sensitivity analysis that also tested a zero, 25 and 50 percent enforcement impact.

In addition to the case study evidence listed in the report, the Louis Berger Team developed a diversion submodel that was designed to quantify the potential effect of enforcement activity. Unlike the all-or-nothing route assignment approach required to trace the likely movement tractor trailers traversing past multiple toll locations, the diversion submodel used a logit model formulation that pivoted off both the traffic and revenue forecasts (Section 6.3), as well as the subsequent diversion analysis (Appendix C).

This formulation simplifies the complex permutation of travel paths, and presents the truck driver's route decision as a binary choice between the tolled and untolled routes defined by the diversion analysis. As such, this submodel is conceptually similar to the modeling approach used in the Level 2 study and should thereby provide a solid basis for understanding the potential effect of enforcement actions.

The diversion submodel model looks to frame the potential effects of weight enforcement traffic stops on the 16 primary diversion routes as additional travel time that a truck driver considers in a route choice decision. This additional time combines the perceived probability of a traffic stop with the corresponding time delay. The following is a brief description of the submodel's operating features and assumptions.

- Data for the 16 diversion and corresponding tolled mainline routes were collected from the travel demand model and verified against travel times from google maps. This information was used to characterize both tolled and untolled route options in terms of both travel time and travel cost. Table D-2 summaries the resulting travel characteristics of all 16 options.

Table D-2 Summary Characteristics of Tolled & Diversion Routes

Measures	Tolled Routes	Alternative Diversion Routes
Average Travel Times	13 Minutes	28 minutes
Average Distance	14 Miles	15 miles
Average Speed	60 mph	30 mph
Average Tolls	$5.20	$0.0

- The diversion submodel uses the logit formulation to analyze and ultimately predict route choice using the economic theory of utility maximization. Using this formulation both the toll and untolled route options provide a decision maker with a level utility that is calculated using the following linear functions:

  $U_{TOLL} = (\beta_1 \times \text{Travel Time}_{TOLL}) + (\beta_2 \times (VOC_{TOLL} + \text{Toll})) + \text{Freeway Bias}$

  $U_{DIV} = (\beta_1 \times \text{Travel Time}_{DIV}) + (\beta_2 \times VOC_{DIV})$

  Where:

  - U_{TOLL} = Utility of toll route
  - U_{DIV} = Utility of diversion route
  - β_1 = Travel time coefficient from stated preference survey (= -0.19484 after conversion from mixed logit formulation – see Section 4.4.2)
  - β_2 = Travel cost coefficient derived from implied median value-of-time (VOT) relationships
    - $\beta_{2LONG\ DISTANCE}$ = - 0.2550 based on $45.87/hr for long distance trips, and
    - $\beta_{2SHORT\ DISTANCE}$ = - 0.4043 based on $28.93/hr for short distance trips
  - VOC = Vehicle operating cost (travel distance × $1.59/mile – see Section 5.2.4)
  - Freeway bias = assumed to be 0.755 (equivalent to 4 minutes of travel time savings)

  The travel times and costs for each pair of tolled and diverted routes were used to predict the route choice decision by applying the multinomial logit equation below:

$$Prob_{TOLL} = \frac{e^{U_{TOLL}}}{e^{U_{TOLL}} + e^{U_{DIV}}}$$

- The submodel was first calibrated to replicate the shares of both mainline toll and diversion route traffic for each of the 16 options and then subsequently used to estimate the impact of additional travel time accruing to potential traffic stops along the primary diversion routes. Rhode Island State Police provided information regarding the types of stops they make, and the typical durations associated with each stop:
  - Commercial Weight Stop Only – 20 to 30 min
  - Level 1 Roadside Inspection – 45 min to 1 hr
  - Level 1 Roadside Inspection with Weight Enforcement – 1 hr to 1 hr 15 min
  - Level 3 Inspection – 20 to 30 min

- Level 3 Inspection with Weight Enforcement – 45 min

It should be noted that the submodel only explicitly represents the duration of traffic stop on the toll route choice decision, and does not take into account the potential that vehicles pulled over and inspected would be in violation, nor the consequences of such violations. Research however showed that the likelihood of violations is high.

- The Ohio Turnpike case study for instance showed that more than 90 percent of trucks stopped along primary diversion routes over a 5-week period had weight violations.
- A one-week operation conducted on the Indiana Turnpike by state police reported 36 weight violations out of 74 trucks inspected; resulting in 10 impounded vehicles and over 100 violations of Federal Motor Carrier Regulations.
- In Delaware citations ran between $77 and $95 dollars, and could also include 2 points assessed to the driver's license. A week-long operation conducted in October of 2005 netted 87 violations out of 152 trucks inspected, including the removal of two vehicles and 14 drivers from service.
- Stops by Pennsylvania state police indicated that of 2,300 trucks stopped over two separate weekends in June and September of 2010, 1,600 vehicles were cited for various weight and safety violations

The likelihood of violations in the above examples, combined with the corresponding severity of consequences, is expected to deepen the perceived likelihood of a traffic stop. As such, the Louis Berger Team added six minutes of travel time to all the diversion routes to account for a drivers perceived likelihood that there is a ten percent chance of an hour long traffic stop. Table D-3 presents the resulting reductions in unadjusted diversion rates on each toll rate following the addition of travel delays accruing to police enforcement traffic stops.

Table D-3 Diversion Submodel Summary Results

Route	Mainline Build	Unadjusted Diverted Volume	Diversion Rate	Diverted Volume w/ Stop	Diversion Rate w/ Stop	Diversion Rate Reduction
1	2,593	707	21.4%	258	7.8%	63.6%
2	305	358	53.9%	177	26.7%	50.6%
3	596	284	32.3%	113	12.9%	60.1%
4	894	426	32.3%	170	12.9%	60.1%
5	671	1,431	68.1%	837	39.8%	41.5%
6	335	715	68.1%	419	39.8%	41.5%
7	275	463	62.7%	253	34.3%	45.3%
8	1,051	430	29.0%	167	11.3%	61.2%
9	704	35	4.8%	11	1.5%	67.9%
10	1,308	65	4.8%	21	1.5%	67.9%
11	644	1,125	63.6%	622	35.2%	44.7%
12	352	383	52.1%	186	25.2%	51.5%
13	527	487	48.0%	226	22.3%	53.6%
14	441	221	33.3%	89	13.4%	59.7%
15	335	715	68.1%	419	39.8%	41.5%
16	1,290	561	30.3%	220	11.9%	60.7%
TOTAL	**12,323**	**8,406**	**40.6%**	**4,187**	**20.2%**	**50.2%**

- Table D-3 shows that based on the assumptions listed above, tractor trailer diversions would range between 41 and 67 percent depending on the route, but would ultimately fall by almost exactly 50 percent at the system level. Thereby further supporting the post-processing assumption outlined in Section 6.3 of the main report.

  Because the perceived likelihood of a traffic stop is difficult to quantify, the Louis Berger Team conducted a sensitivity test of this parameter and analyzed the effect of both a five and twenty percent chance of a traffic stop. These alternative analyses returned a 27 and 80 percent reduction in diversion rates. Both these values also fall close to the other enforcement impact sensitivity test results in Section 6.5 of the main report.

D4: Diversion Route Assumptions (Section 6.3 & Appendix C)

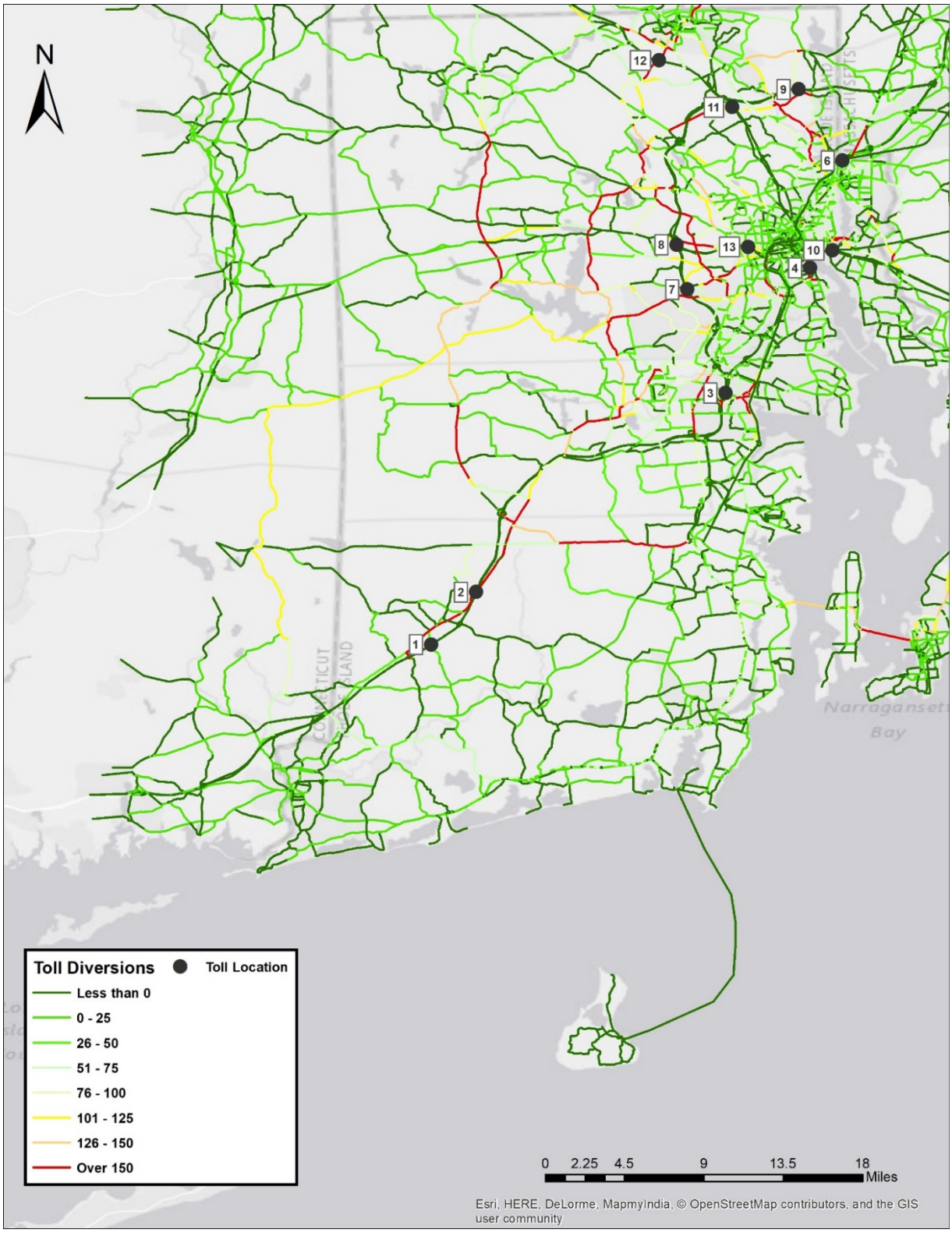
Diversion Route Leakage Assumption (Section 6.3 / Appendix C)

To simplify and streamline the complexity of the diversion impacts analysis, the Louis Berger Team developed an approach described in Appendix C that included the assumption that 20 percent of trips diverted at the 12 tolled locations used alternate routes outside of the 16 diversion routes delineated.

Figure D-4 presents the full roadway network following the introduction of tolls at the twelve proposed locations. This figure highlights the degree to which very low levels of tractor trailer traffic are channeled onto other roadways outside the 16 diversion routes that were ultimately identified and analyzed based on the 150 daily increase threshold discussed in appendix C. While these network patterns make it difficult to determine the level of leakage, the Louis Berger Team analyzed the traffic patterns around toll locations 1 and 2 that provided a clearer picture of notable movements outside the designated diversion route in that location.

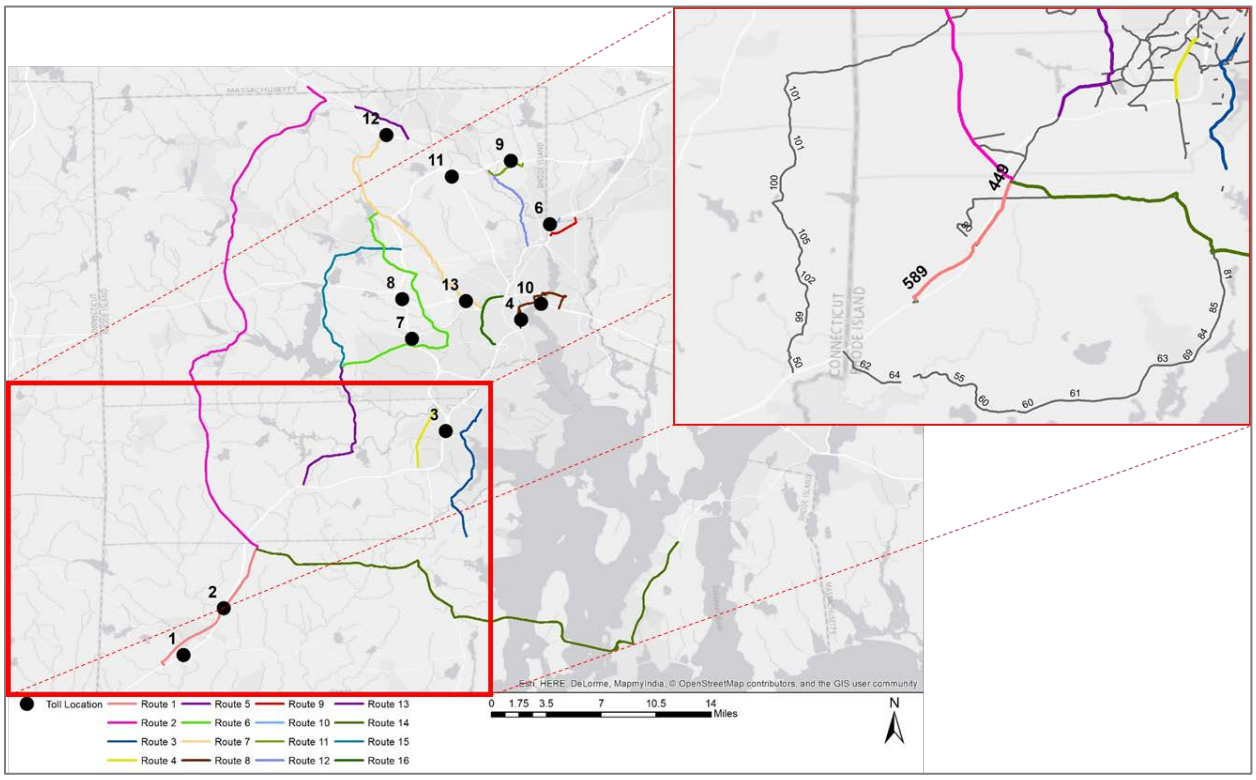
Figure D-5 presents the 16 routes analyzed but the inset focusing on diversion route 1 around toll locations 1 and 2 also includes additional grey traces indicating roadways that were projected to experience daily tractor trailer traffic increases of more than 50 vehicles per day (a third of the 150 threshold used determine the 16 routes).

Figure D-4 Toll Scenario Tractor Trailer Daily Diversion Volumes



The approximate average volume of truck traffic on the northern branch (≈100 vehicles) combined with the approximate average volume of truck traffic on the northern branch (≈60 vehicles), makes up roughly 20 percent of the total traffic diverting around that location (100+60+590). Louis Berger used this relationship as the basis for estimating leakage at the other locations with more complex traffic movements away from toll locations.

FIGURE D-5 DIVERSION ROUTE LEAKAGE ANALYSIS



Around-State Diversions (Section 6.3)

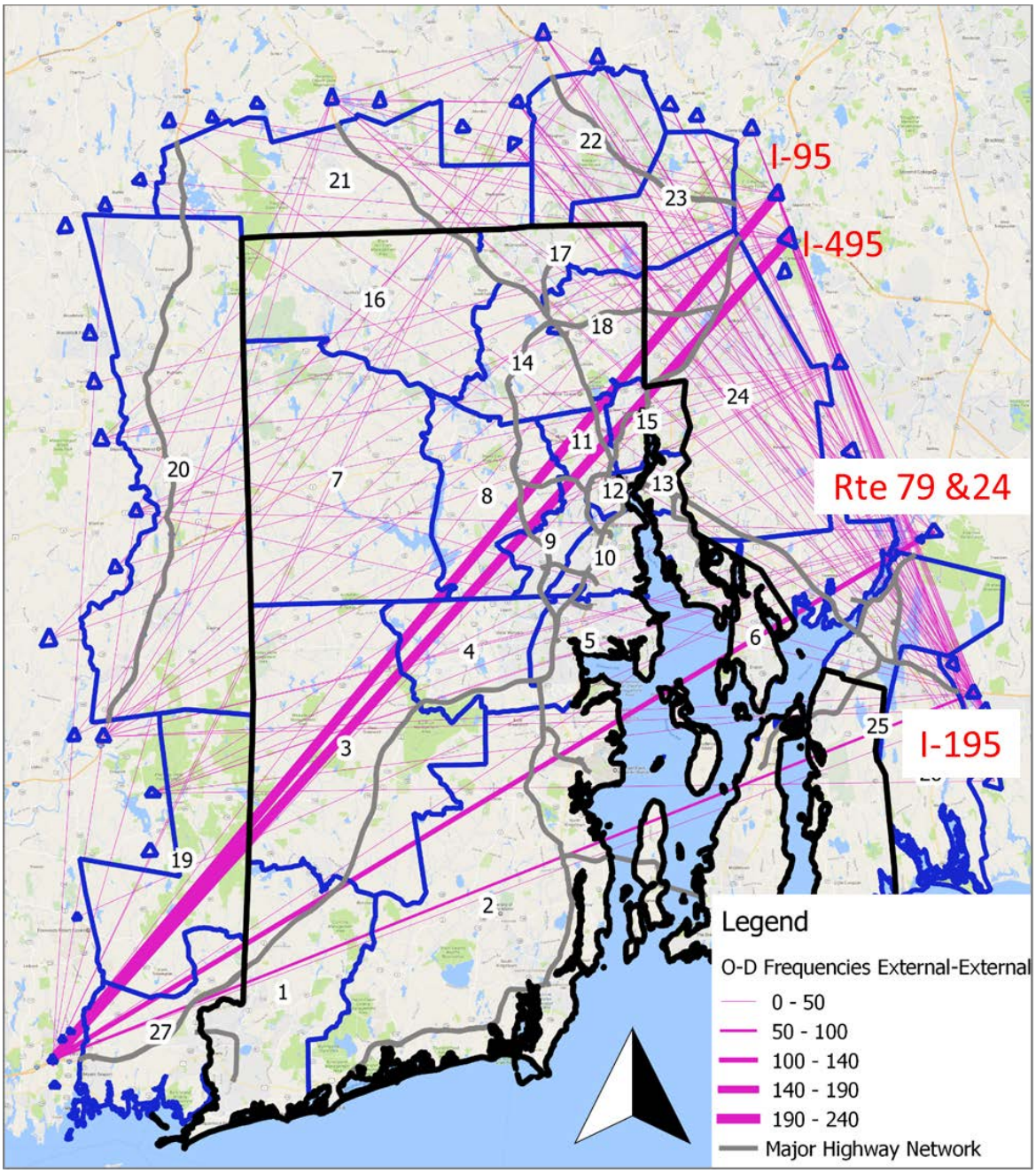
Due to the limits of the modified travel demand model coverage area (Figure 5-1), Louis Berger conducted and briefly described an off-model analysis of potential diversions around the State of Rhode Island in response to the implementation of tolls in the future.

The travel demand model shows that approximately 3,971 tractor trailers pass through toll location 1 daily in the base year. However, as shown in Table D-4, only 1,343 of those trips are through trips (E-E) that may potentially benefit from diverting around the state. Louis Berger further determined that only 82 percent of those E-E trips (1,034 trips) originate from the I-95 external station at the bottom left of Figure D-6, the remaining 17 percent (241 trips) originate from district 27 as shown in the figure. Given that 17 percent of the E-E trips originate in the 12 mile distance between the 1-95 external zone and the Rhode Island/Connecticut border, the Louis Berger Team assumed that 10 percent of the 1,034 E-E trips also originate in the 10 mile distance between the external zone location and the I-95/I-395 interchange to the west, leaving 992 E-E trips that are estimated to approach that interchange I-95/I-395 interchange.

Table D-4 Toll Location 1 Traffic by Trip Type

	Traffic	Distribution of Diversions by Trip Type			
		Internal-Internal (I-I)	Internal-External (I-E)	External-Internal (E-I)	External-External (E-E)
Location 1	3,971	285	1,298	1,045	1,343
		7.2%	32.7%	26.3%	33.8%

Figure D-6 Around State Diversions Analysis - Origin/Destination Patterns



Based on the origin and destination patterns depicted in Figure D-6, Louis Berger further estimates that 32.5 percent of E-E trips (323 trips) approaching the I-95/I-395 interchange, continue on to the Massachusetts portion of I-95 (Table D-5). Table D-5 also shows that approximately 30.6 percent go on to I-495, 10.8 percent go on to I-195, and a combined 23.9 percent go on to Routes 79 and 24; the remaining 2.3 percent are scattered across the remaining external zones of the model.

Table D-5 Origin/Destination Pattern of Through Trips Approaching I-95/I-395 Interchange

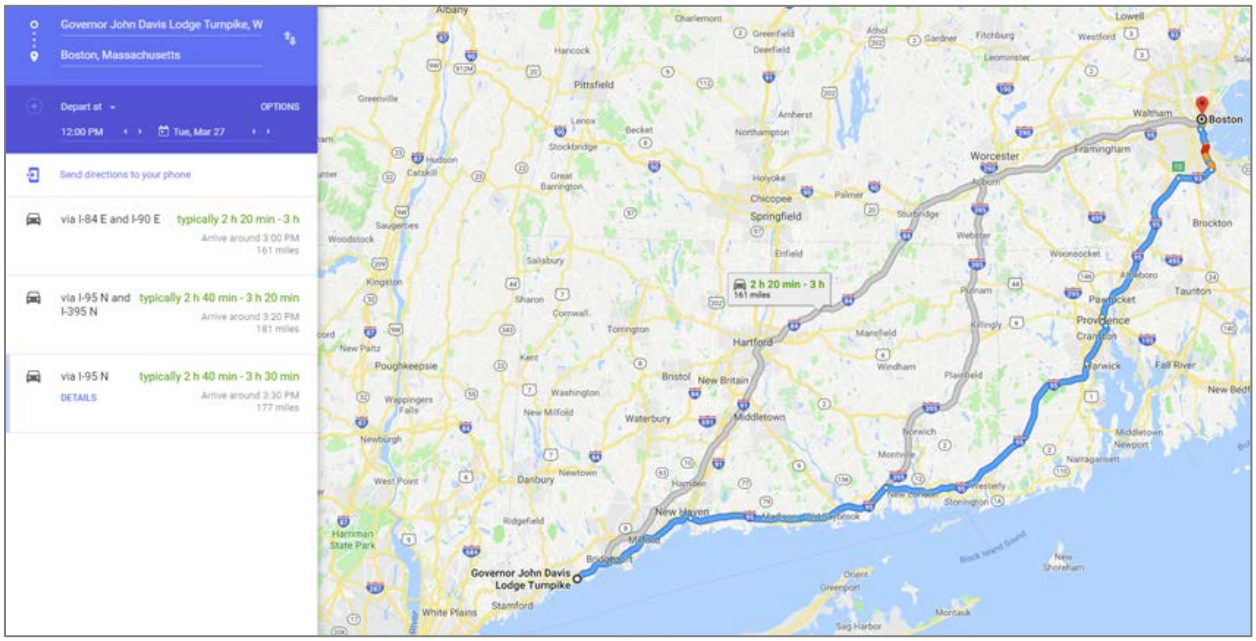
Trip Diversion	I-95 MA	I-495 MA	I-195 MA	Rte 24 MA	Rte 79 MA	Others	Total
Traffic	323	304	107	98	138	23	**992**
Percentage	32.5%	30.6%	10.8%	9.9%	13.9%	2.3%	**100.0%**

Louis Berger conducted two analyses of potential diversions around the state based on the origin/destination patterns depicted in Figure D-6:

- The first analysis considers movements through Rhode Island to locations to/from Boston and beyond. Figure D-7 shows that there are two alternative routes in addition to the travel path through Rhode Island along I-95. The first alternative branches off I-95 around Bridgeport, CT and tracks along I-91 and I-84 before connecting onto the Massachusetts Turnpike (I-90), in Sturbridge, MA. The second alternative branches off I-95 around East Lyme, CT and tracks along I-395 before connecting to the I-90 in Auburn, MA as shown in Figure D-6 (Figure D-7). All three routes converge at the I-90/I-93 interchange in Boston.

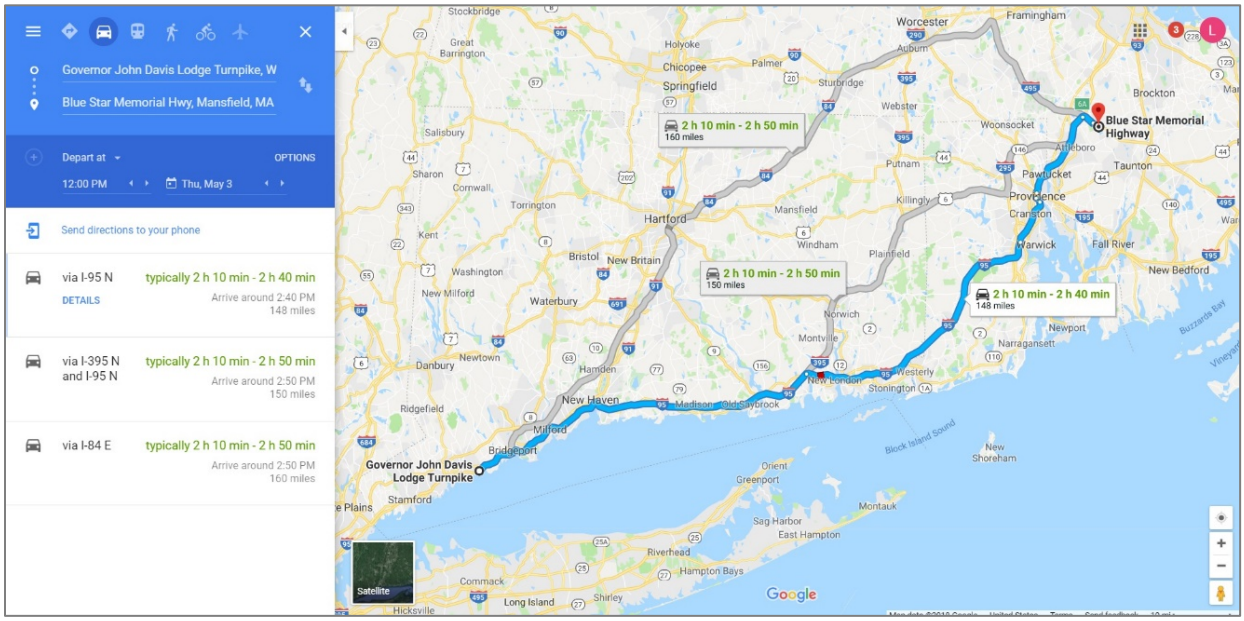
  Although I-95 traffic through Rhode Island may originate from or be destined to locations south of Boston, Louis Berger conservatively stipulates in this analysis that all 323 trips originate from, or are destined to Boston and points north.

Figure D-7 Around State Diversions Analysis – Route Choices (Northern New England Movements)



- The second analysis considers movements through Rhode Island that would branch off I-95 at the I-495 interchange, to/from locations in Eastern Massachusetts. Figure D-8 shows that there are two alternative routes in addition to the travel path through Rhode Island along I-95. The first alternative branches off I-95 around Bridgeport, CT and tracks along I-91, I-84, I-90 before connecting onto I-495 in Westborough, MA. The second alternative branches off I-95 around East Lyme, CT and tracks along I-395 and Route 6 before connecting back onto I-295 in Rhode Island and passing through toll locations 8 and 9. Although this route only represents a partial diversion around the state and Rhode Island tolls along I-95, it was still analyzed to determine potential tractor trailer diversion impacts.

FIGURE D-8 AROUND STATE DIVERSIONS ANALYSIS – ROUTE CHOICES (EASTERN MASSACHUSETTS MOVEMENTS)



Around-State Diversion Analysis (Northern New England Movements)

Table D-6 summarizes the three routes according to three key variables used in this diversion route analysis. Figure D-7 shows the distance in miles associated with each route. This distance was multiplied by the per mile vehicle operating costs of $1.802/mile obtained from the 2017 update of the Operational Costs of Trucking (American Trucking Research Institute) and updated to reflect current fuel prices and trends in other operating costs. The tolls associated with each route were combined together with the vehicle operating costs and converted into minutes of equivalent travel time using the average long distance value of time of $45.87 per hour (Section 4.4.2) – for example the $339.02 cost associated with the I-95 route, converts into 443 minutes of travel time by dividing $339.02 by $45.87 to obtain the travel equivalent travel time in hours, and then multiplying that number by 60 to obtain the equivalent time in minutes.

As can be seen from the resulting measures in Table D-6, the I-91/I-84/I-90 route has significant travel time advantages over both the I-95 and I-395/I-90 options in terms of travel costs converted into equivalent travel time. This finding combined with the typical range of actual journey travel time associated with this route as presented in Figure D-7 implies that this option is always faster once the total cost of travel is taken into account. In fact, even with its current estimated toll of $12.80 this option

would still be notably faster than an untolled I-95 in terms of equivalent minutes. As a result, and based on the methodological approach that the Louis Berger Team has applied in this forecast, this route is not considered a diversion alternative as tractor trailers should already be taking advantage of the route's travel time benefit.

TABLE D-6 ROUTE ALTERNATIVE PARAMETERS (NORTHERN NEW ENGLAND MOVEMENT)

	Route		
	I-95	I-91/I-84/I-90	I-395/I-90
Distance (miles)	177	162	181
Vehicle Operating Cost	$319.02	$291.99	$326.23
Tolls	$20.00	$12.80	$10.85
Total Cost	**$339.02**	**$304.79**	**$337.08**
Equivalent Time (min)	**443**	**399**	**441**

However, Table D-6 shows that there is close similarity between the I-95 and I-395/I-90 route options in terms of travel costs converted into equivalent travel time. Figure D-7 also shows that both routes have very similar actual journey times predicted by the google travel time ranges. Louis Berger therefore conducted an hour-by-hour assessment of total travel times throughout the day for these two routes – the results are presented in Figure D-9. This figure shows that I-95 is typically faster in the overnight and early morning time periods when large portions of the truck volume pass through Location 1 (see Figure 3-3).

FIGURE D-9 ACTUAL JOURNEY TRAVEL TIME COMPARISON I-95 V I-395/I-90

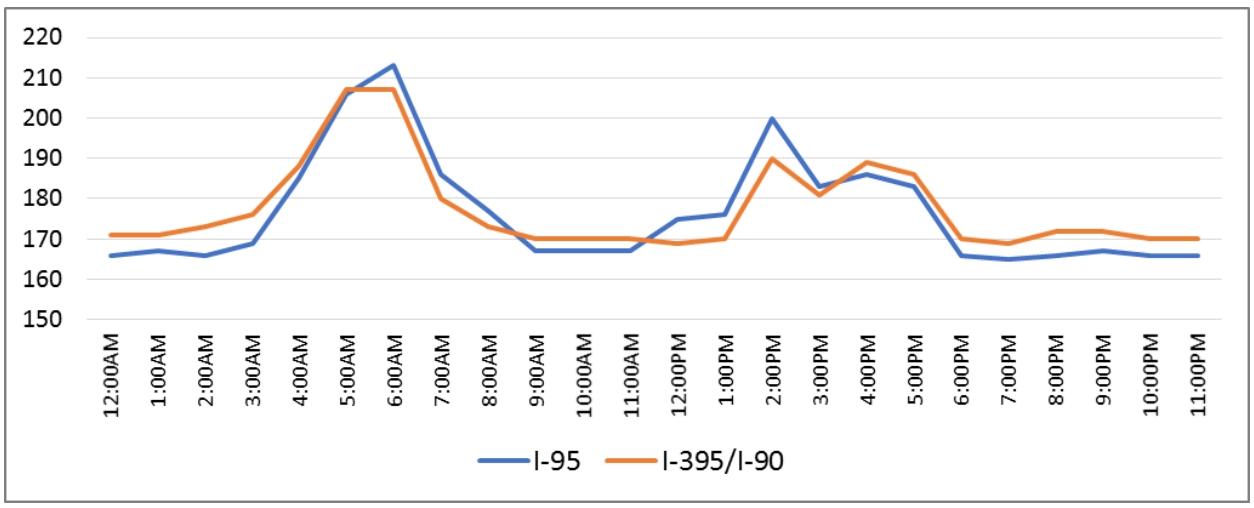


Table D-7 summarizes the total travel time difference between I-395/90 and I-95 by hour (combined cost and actual journey time) and calculates the resulting diversion potential by applying the same all-or-nothing assignment approach used in the rest of this study, to an hourly distribution of the 323 candidate trips described above. The hourly distribution of from Figure 3-3 is used to distribute the candidate trips by hour. A total of 135 trips are estimated to divert around the state as a result of the introduction of tolls on I-95. This volume of diversions does not trigger a separate diversion impact analysis on this route based on the threshold set forth in Appendix C.

Table D-7 Diversion Analysis - Northern New England Movements

	Total Equivalent Travel Time			Trips	
	I-95 (A)	I-395/90 (B)	Diff (B-A)	I-95	I-395/I-90 Diverted
12:00AM	609.46	611.92	2.46	10	0
1:00AM	610.46	611.92	1.46	9	0
2:00AM	609.46	613.92	4.46	14	0
3:00AM	612.46	616.92	4.46	16	0
4:00AM	628.46	628.92	0.46	16	0
5:00AM	649.46	647.92	-1.54	17	17
6:00AM	656.46	647.92	-8.54	19	19
7:00AM	629.46	620.92	-8.54	19	19
8:00AM	620.46	613.92	-6.54	16	16
9:00AM	610.46	610.92	0.46	16	0
10:00AM	610.46	610.92	0.46	16	0
11:00AM	610.46	610.92	0.46	18	0
12:00PM	618.46	609.92	-8.54	17	17
1:00PM	619.46	610.92	-8.54	16	16
2:00PM	643.46	630.92	-12.54	17	17
3:00PM	626.46	621.92	-4.54	14	14
4:00PM	629.46	629.92	0.46	10	0
5:00PM	626.46	626.92	0.46	9	0
6:00PM	609.46	610.92	1.46	9	0
7:00PM	608.46	609.92	1.46	9	0
8:00PM	609.46	612.92	3.46	8	0
9:00PM	610.46	612.92	2.46	9	0
10:00PM	609.46	610.92	1.46	9	0
11:00PM	609.46	610.92	1.46	10	0
TOTAL				**323**	**135**

Around-State Diversion Analysis (Eastern Massachusetts Movements)

A similar analysis was conducted for trips to/from Eastern Massachusetts. Table D-8 calculates vehicle operating costs of each route option in Figure D-8 based on the reported travel distances, and adds that cost to tolls associated with each alternative. Table D-8 shows that both the I-95 and I-395/I-295 alternatives portray clear advantages over the I-91/I-84/I-90 route, and given the typical travel times of each option depicted in Figure D-8, this route is unlikely to be competitive with the I-95 option once all travel costs are considered.

Louis Berger however, conducted an hour-by-hour travel time analysis of the I-95 and I-395/I-295 options given the close comparison of travel costs in Table D-8. Figure D-10 shows that apart from one time period at 6 AM, I-95 always yields travel times at least equal to, or faster than the I-395/I-295 option.

The total travel time difference between I-395/I-295 and I-95 alternatives broken down by hour (combined cost and actual journey time) is summarized in Table D-9, showing the resulting diversion trips. Out of 304 total trips, 18 trips are estimated to divert around the state as a result of the introduction of tolls on I-95. This volume of diversions, again, does not trigger a separate diversion impact analysis on this route based on the threshold set forth in Appendix C.

Table D-8 Route Alternative Parameters (East-Bound)

	Route		
	I-95	I-91/I-84/I-90	I-395/I-295
Distance (miles)	148	160	150
Vehicle Operating Cost	$266.75	$288.38	$270.36
Tolls	$20.00	$3.60	$16.00
Total Cost	**$286.75**	**$291.98**	**$286.36**
Equivalent Time (min)	375	382	375

Figure D-10 Actual Journey Travel Time Comparison I-95 v I-395/I-295

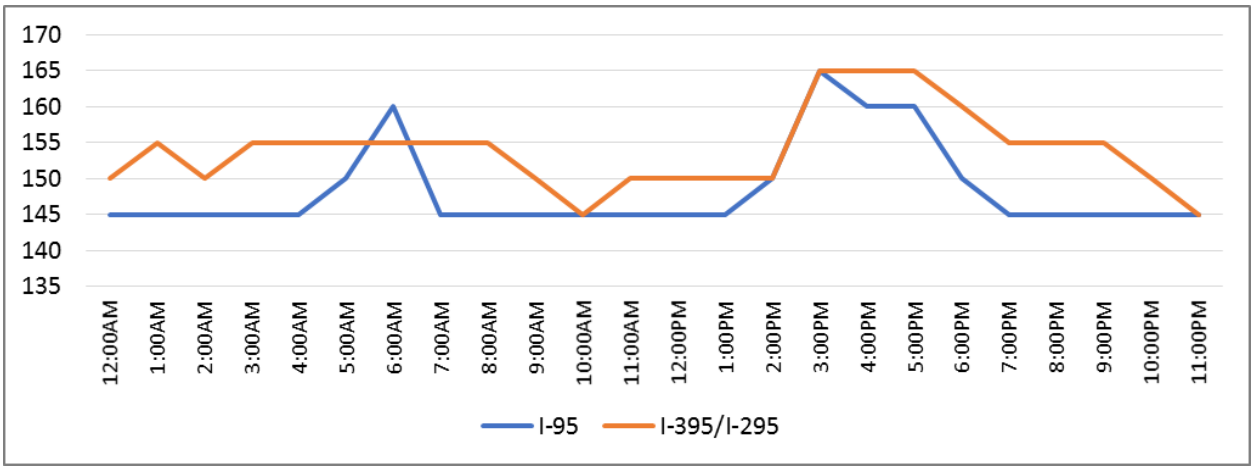


Table D-10 Diversion Analysis - Eastern Massachusetts Movements

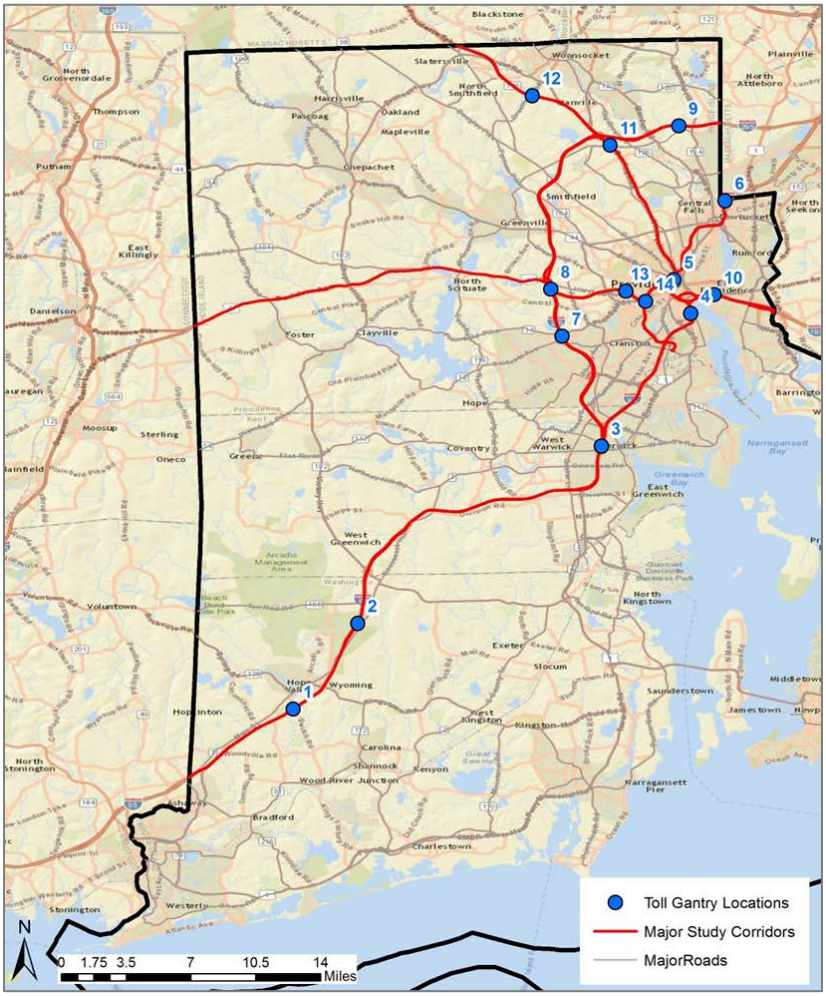
	Total Equivalent Travel Time			Trips	
	I-95 (A)	I-395/I-295 (B)	Diff (B-A)	I-95	I-395/I-90 Diverted
12:00AM	520	525	5	10	0
1:00AM	520	530	10	9	0
2:00AM	520	525	5	13	0
3:00AM	520	530	10	15	0
4:00AM	520	530	10	15	0
5:00AM	525	530	5	16	0
6:00AM	535	530	-5	18	18
7:00AM	520	530	10	18	0
8:00AM	520	530	10	15	0
9:00AM	520	525	5	15	0
10:00AM	520	520	0	15	0
11:00AM	520	525	5	17	0
12:00PM	520	525	5	16	0
1:00PM	520	525	5	15	0
2:00PM	525	525	0	16	0
3:00PM	540	540	0	13	0
4:00PM	535	540	5	10	0
5:00PM	535	540	5	9	0
6:00PM	525	535	10	8	0
7:00PM	520	530	10	8	0
8:00PM	520	530	10	7	0
9:00PM	520	530	10	9	0
10:00PM	520	525	5	8	0
11:00PM	520	520	0	9	0
TOTAL				**304**	**18**

APPENDIX E – ALTERNATIVE SCENARIO 4 (06/05/2019)

E1. Introduction

Louis Berger developed a level 3 investment-grade traffic and revenue study to investigate the likely toll revenue that would accrue from the RhodeWorks Bridge Tolling Program. The level 3 study evaluated 14 toll locations across the state along six major highway corridors (I-95, I-195, I-295, US Route 6, RI Route 146, and RI Route 10) as shown in Figure E-1.

FIGURE E-1. POTENTIAL TOLLING LOCATIONS



The final base case traffic and revenue forecast eventually excluded toll locations 5 and 14 as shown in Table E-1 that is copied over from the level 3 investment grade report dated November 3rd 2017. The investment grade study analyzed three alternative scenarios, including Alternative Scenario 3, which included a toll at all 14 locations and is copied over from the level 3 study in Table E-2.

Table E-1. 2016 Base Case Toll Rate & Corresponding Revenues

Toll Location	No Toll Tractor Trailer Traffic	Toll Revenue Tractor Trailer Traffic Estimate				Revenue	
		Toll Rate ($2016)	Diversion Rate	Toll Traffic		Daily	Annual (000's)
				Pre-Gantry Use Adj.	Multiple Gantry Adj.		
1	3,971	$3.75	10.1%	3,570	3,517	$13,190	$3,838
2	4,055	$4.50	9.7%	3,662	3,606	$16,226	$4,722
3	5,502	$7.00	16.1%	4,614	4,453	$31,169	$9,070
4	4,628	$2.50	14.5%	3,956	3,719	$9,297	$2,706
5	0	$0.00	0.0%	0	0	$0	$0
6	2,640	$2.25	2.4%	2,577	2,467	$5,552	$1,616
7	1,964	$6.50	34.7%	1,283	1,256	$8,167	$2,377
8	3,283	$8.50	34.0%	2,165	2,050	$17,429	$5,072
9	2,212	$7.50	31.8%	1,508	1,429	$10,718	$3,119
10	3,659	$10.00	13.9%	3,152	2,770	$27,701	$8,061
11	1,225	$4.00	26.0%	906	826	$3,303	$961
12	2,112	$6.75	24.0%	1,605	1,400	$9,448	$2,750
13	922	$2.00	29.6%	649	618	$1,236	$360
14	0	$0.00	0.0%	0	0	$0	$0
Total / (avg)	**36,173**	**$5.50**	**18.0%**	**29,649**	**28,112**	**$153,437**	**$44,651**

Table E-2. 2016 Alternative Scenario 3 (Toll at all 14 Locations)

Toll Location	No Toll Tractor Trailer Traffic	Toll Revenue Tractor Trailer Traffic Estimate				Revenue	
		Toll Rate ($2016)	Diversion Rate*	Toll Traffic		Daily	Annual (000's)
				Pre-Gantry Use Adj.	Multiple Gantry Adj.		
1	3,971	$3.25	7.9%	3,655	3,601	$11,704	$3,406
2	4,055	$3.50	7.1%	3,767	3,710	$12,984	$3,778
3	5,502	$6.25	12.8%	4,797	4,629	$28,933	$8,420
4	4,628	$2.25	12.3%	4,059	3,816	$8,586	$2,499
5	3,876	$2.25	10.8%	3,456	3,124	$7,030	$2,046
6	2,640	$2.50	4.5%	2,521	2,413	$6,033	$1,756
7	1,964	$6.50	33.9%	1,298	1,271	$8,260	$2,404
8	3,283	$8.50	33.4%	2,185	2,069	$17,587	$5,118
9	2,212	$7.50	31.2%	1,521	1,441	$10,807	$3,145
10	3,659	$9.50	13.6%	3,162	2,779	$26,399	$7,682
11	1,225	$3.50	25.2%	917	835	$2,924	$851
12	2,112	$6.75	23.7%	1,611	1,405	$9,480	$2,759
13	922	$2.00	31.2%	635	604	$1,208	$352
14	1,031	$3.00	27.4%	748	719	$2,158	$628
Total / (avg)	**41,080**	**$3.50**	**16.4%**	**34,331**	**32,417**	**$154,093**	**$44,842**

* Diversion rate includes effects of enforcement impacts

This document, which serves as an Appendix (Appendix E) to the level 3 investment grade report dated November 3rd 2017 presents the results of an assessment of the impact on traffic and revenue of a revised toll structure, which is Alternative Scenario 4. Section 2 of this memorandum describes Alternative Scenario 4. Section 3 presents the estimate of traffic and revenue that is likely to be generated in Alternative Scenario 4. Finally, Section 4 presents the Alternative Scenario 4 diversion analysis.

E2. Alternative Scenario 4

Alternative Scenario 4 uses toll rates that are identical to the toll rates used for Alternative Scenario 3 for toll locations 1 through 12. For toll location 13, Alternative Scenario 4 includes a $5 toll. Alternative Scenario 4 does not include a toll at location 14. The Base Case, Alternative Scenario 3 and Alternative Scenario 4 tolls are presented in Table E-3.

Table E-3. Toll Rate Comparison

Toll Location	Base Case Toll Rates	Alternative Scenario 3 Toll Rates	Alternative Scenario 4 Toll Rates
1	$3.75	$3.25	$3.25
2	$4.50	$3.50	$3.50
3	$7.00	$6.25	$6.25
4	$2.50	$2.25	$2.25
5	$0.00	$2.25	**$2.25**
6	$2.25	$2.50	$2.50
7	$6.50	$6.50	$6.50
8	$8.50	$8.50	$8.50
9	$7.50	$7.50	$7.50
10	$10.00	$9.50	$9.50
11	$4.00	$3.50	$3.50
12	$6.75	$6.75	$6.75
13	$2.00	$2.00	**$5.00**
14	$0.00	$3.00	**$0.00**

E3. Traffic and Revenue

To estimate traffic and revenue of Alternative Scenario 4, Louis Berger used the customized Rhode Island Statewide Model that was used to develop the Base Case Forecast and Alternative Scenario forecasts as part of the level 3 investment-grade traffic and revenue study final report dated November 2017. Louis Berger subsequently made the same post-processing adjustments to the model output as done for the Base Case Forecast and Alternative Scenario forecasts in November 3rd 2017 final report. The post-processing adjustments take into account enforcement and multiple gantry use as described in level 3 investment grade report dated November 3rd 2017.

Table E-4 presents the 2016 traffic and revenue estimates for Alternative Scenario 4. Starting with no toll tractor trailer traffic volume estimate, the application of tolls results in varied levels of diversions away from the tolled facilities – these diversions include the post model enforcement impacts. The resulting estimate of toll traffic is also adjusted to account for estimates of multiple gantry use. The resulting adjusted traffic represents the billable transactions that on an average weekday will generate an estimated $153,000, which translates to approximately $44.5 million dollars annually. By comparison, annual revenues were $44.7 million and $44.8 million in the Base Case and Alternative Scenario 3, respectively. Overall, a total of 16.6 percent of tractor trailer traffic is diverted under Alternative Scenario 4, compared to 18.0 percent in the Base Case and 16.4 percent in Alternative Scenario 3.

Table E-4. 2016 Alternative Scenario 4

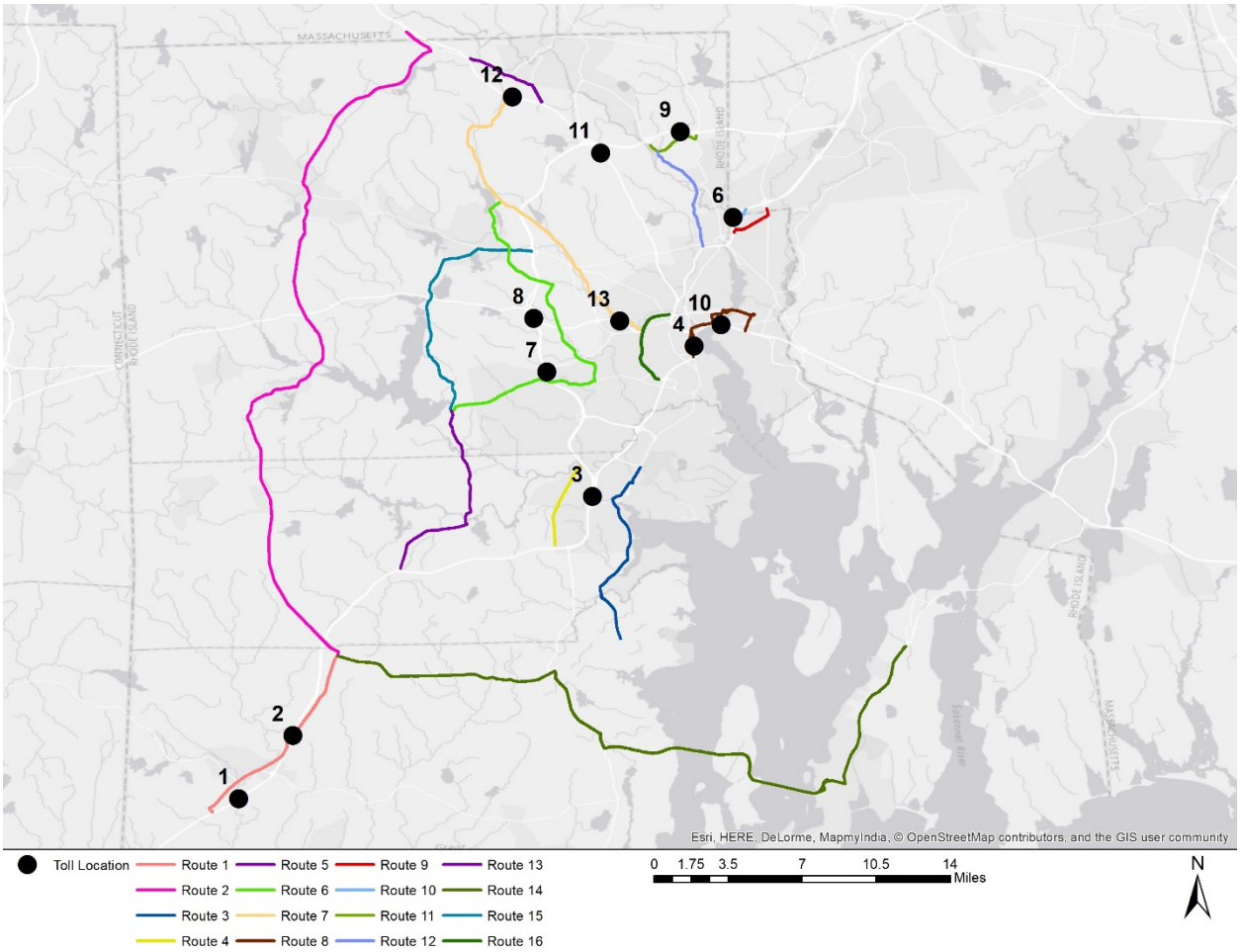
Toll Location	No Toll Tractor Trailer Traffic	Toll Revenue Tractor Trailer Traffic Estimate				Revenue	
		Toll Rate ($2016)	Diversion Rate*	Toll Traffic		Daily	Annual (000's)
				Pre-Gantry Use Adj.	Multiple Gantry Adj.		
1	3,971	$3.25	8.00%	3,651	3,596	$11,688	$3,401
2	4,055	$3.50	7.20%	3,765	3,709	$12,980	$3,777
3	5,502	$6.25	13.20%	4,776	4,608	$28,798	$8,380
4	4,628	$2.25	13.80%	3,989	3,750	$8,437	$2,455
5	3,876	$2.25	9.60%	3,504	3,168	$7,127	$2,074
6	2,640	$2.50	4.10%	2,532	2,424	$6,059	$1,763
7	1,964	$6.50	35.10%	1,274	1,247	$8,107	$2,359
8	3,283	$8.50	33.00%	2,198	2,081	$17,688	$5,147
9	2,212	$7.50	30.70%	1,532	1,452	$10,887	$3,168
10	3,659	$9.50	13.80%	3,155	2,774	$26,353	$7,669
11	1,225	$3.50	25.30%	915	834	$2,919	$849
12	2,112	$6.75	23.90%	1,607	1,401	$9,456	$2,752
13	922	**$5.00**	43.10%	524	499	$2,494	$726
14	1,031	**$0.00**	0.00%	0	0	$0	$0
Total / (avg)	**41,080**		**16.55%**	**33,422**	**31,541**	**$ 152,993**	**$ 44,521**

* Diversion rate includes effects of enforcement impacts

E4. Diversion analysis

As part of the level 3 investment-grade traffic and revenue study, Louis Berger identified 16 primary diversion routes in the state. Figure E-2, copied from the level 3 investment-grade traffic and revenue study November 3rd 2017 report, shows a regional overview of the primary diversion routes across the state. As part of the diversion analysis for the November 3rd 2017 report, Louis Berger assumed that 80 percent of diverted trucks at each toll location would use these diversion routes. The analysis also included assumptions about the combinations of toll locations that contribute to the volume of diverted tractor trailers for each diversion route. These assumptions take into account that some trucks would avoid more than one toll location, which further reduces the estimates of diversion route tractor trailer traffic.

Figure E-2. Main Toll Diversion Routes



To estimate the diversion impact of Alternative Scenario 4, Louis Berger used the same methodology and assumptions as were used in the level 3 investment grade study November 3rd, 2017 report. First, Louis Berger confirmed that Alternative Scenario 4 would not add any new diversion routes. Then, Louis Berger evaluated how the existing diversion route volumes would likely be affected by Alternative Scenario 4. Because toll location 5 was not included in the level 3 investment-grade Base Case, the study did not include assumptions about which diversion routes trucks avoiding toll location 5 would use and about how these truck diversions would contribute to the overall volume of the individual routes. Using the assignment outputs as an indication, Louis Berger developed assumptions about the diversion routes that would be used by trucks avoiding toll location 5. For the other toll locations, the diversion assumptions remained the same as in the level 3 investment grade study November 3rd 2017 report. The assumptions used for Alternative Scenario 4 are presented in Table E-5. Tables E-6 and E-7 present the resulting diverted tractor trailer traffic by diversion route for Alternative Scenario 4 for 2016 and 2040, respectively.

Table E-5. Tractor Trailer Diversion Calculation Assumptions

Diversion Route	Leakage Adj. %	Toll Diversion Combinations
1	80%	Toll Location 1 & 2
2	80%	15% of 3, 20% of 7, 20% of 8, 15% of 12
3	80%	20% of 3
4	80%	30% of 3
5	80%	20% of 3, 80% of 7, 80% of 8
6	80%	Half of Diversion Route 5
7	80%	25% of 11, 25% of 12, 14, 100% of 13, 40% of 5
8	80%	40% of 4, 30% of 10, 60% of 5
9	80%	35% of 6
10	80%	65% of 6
11	80%	100% of '9
12	80%	75% of 11
13	80%	60% of 12
14	80%	15% of 3, 10% of 4, 20% of 10
15	80%	Half of Diversion Route 5
16	80%	50% of 4, 50% of 10

.

Table E-6. 2016 Alternative Scenario 4 Diverted Tractor Trailer Traffic by Diversion Route

Diversion Route	Diversion Traffic					
	Total	12AM-6AM	6AM-9AM	9AM-3PM	3PM-6PM	6PM-12AM
1	282	33	64	123	36	26
2	174	26	34	73	20	22
3	116	10	20	58	12	16
4	174	15	30	86	18	25
5	694	102	135	292	79	87
6	347	51	68	146	39	43
7	319	20	63	170	36	30
8	226	36	31	92	20	48
9	30	-2	8	17	6	2
10	56	-4	14	31	11	3
11	544	73	103	219	64	85
12	186	3	37	104	24	18
13	243	35	38	97	27	46
14	93	9	18	43	10	12
15	347	51	68	146	39	43
16	267	44	46	93	25	60

Table E-7. 2040 Alternative Scenario 4 Diverted Tractor Trailer Traffic by Diversion Route

Diversion Route	Diversion Traffic					
	Total	12AM-6AM	6AM-9AM	9AM-3PM	3PM-6PM	6PM-12AM
1	168	22	53	57	19	17
2	149	22	32	60	16	19
3	73	6	13	37	7	10
4	110	10	19	56	10	15
5	596	89	126	240	66	75
6	298	44	63	120	33	38
7	235	12	53	129	20	22
8	114	7	21	43	12	30
9	13	-1	6	5	4	0
10	25	-2	11	9	7	0
11	379	53	61	151	47	67
12	133	4	29	71	17	11
13	158	29	24	52	17	36
14	60	5	13	28	6	8
15	298	44	63	120	33	38
16	189	27	30	75	24	33

Table E-8 compares 2016 tractor trailer traffic by diversion route in Alternative Scenario 4 with the Base Case presented in the level 3 investment grade study November 3rd 2017 report. Table E-9 provides the same comparison for 2040. Table E-8 shows that overall diversion traffic on the diversion routes is expected to decrease under Alternative Scenario 4 relative to the Base Case and that most diversion routes are expected to experience a decrease in diversion tractor trailer traffic under Alternative Scenario 4 relative to the Base Case. Only 4 diversion routes are expected to experience an increase in diversion traffic. Except for diversion route 7, shown in Figure 4-2, the increase in diversions is very small.

Table E-8. Comparison Tractor Trailer Diversion by Diversion Route, Alternative Scenario 4 with Base Case, 2016

Diversion Route	Base Case	Alternative Scenario 4	Difference (#)	Difference (%)
1	354	282	-72	-20%
2	179	174	-5	-3%
3	142	116	-26	-18%
4	213	174	-39	-18%
5	715	694	-21	-3%
6	358	347	-11	-3%
7	231	319	88	38%
8	215	226	11	5%
9	18	30	12	68%
10	33	56	23	71%
11	563	544	-19	-3%
12	191	186	-5	-2%
13	243	243	0	0%
14	110	93	-17	-16%
15	358	347	-11	-3%
16	281	267	-14	-5%
Total	4,204	4,098	-106	

Table E-9. Comparison Tractor Trailer Diversion by Diversion Route, Alternative Scenario 4 with Base Case, 2040

Diversion Route	Base Case	Alternative Scenario 4	Difference (#)	Difference (%)
1	208	168	-40	-19%
2	155	149	-6	-4%
3	72	73	1	2%
4	108	110	2	2%
5	618	596	-22	-4%
6	309	298	-11	-4%
7	197	235	38	19%
8	113	114	1	0%
9	1	13	12	1224%
10	2	25	23	1130%
11	396	379	-17	-4%
12	127	133	6	4%
13	168	158	-10	-6%
14	61	60	-1	-2%
15	309	298	-11	-4%
16	201	189	-12	-6%
Total	3045	2,995	-50	

FIGURE E-3. DIVERSION ROUTE 7