



Submitted to:
**Rhode Island
Turnpike and Bridge Authority**

Mt. Hope Bridge Toll Feasibility Study

January 8, 2010

Submitted by:

Jacobs Engineering Group Inc.
5 Penn Plaza, 18th Floor
New York, NY 10001



TABLE OF CONTENTS

- 1. Introduction1**
- 2. Travel Characteristics Survey3**
 - 2.1 Trip frequency3**
 - 2.2 Trip Purpose.....3**
 - 2.3 Vehicle Occupancy4**
 - 2.4 Origins and Destinations.....5**
 - 2.5 E-ZPass Ownership.....5**
 - 2.6 Summary.....6**
- 3. Demographics7**
 - 3.1 Regional Population and Employment Review7**
 - 3.2 Local Area Development9**
- 4. Historical Traffic Trends11**
 - 4.1 Annual Traffic Trends11**
 - 4.2 Seasonality12**
 - 4.3 Vehicle Classification.....13**
 - 4.4 Hourly Traffic Profile.....15**
- 5. Transportation Network16**
- 6. Median Income and Value of Time17**
- 7. Travel Time Surveys19**
- 8. Alternative Toll Schedules.....21**
- 9. Traffic and Toll Revenue Analyses25**
 - 9.1 Forecast of Toll Free Traffic.....25**
 - 9.2 Mt. Hope Bridge Traffic and Revenue (T&R) Model25**
 - 9.3 Estimates of Tolled Traffic and Toll Revenue26**
- 10. Cost Estimates.....31**
 - 10.1 Toll Plaza Sizing and Collection Types.....31**
 - 10.2 Mixed Mode Toll Collection.....31**
 - 10.2.1 Capital Costs31**
 - 10.2.2 Operations and Maintenance (O&M) Costs32**
 - 10.2.2.1 Toll System Maintenance32**
 - 10.2.2.2 Customer Service Center (CSC) Fees.....33**
 - 10.2.2.3 Toll Operations Maintenance35**
 - 10.2.2.4 Toll Operations Staffing35**
 - 10.2.2.5 O&M Summary.....36**
 - 10.3 All Electronic Tolling (AET)37**
 - 10.3.1 Capital Costs37**
 - 10.3.2 Operations and Maintenance Costs37**
 - 10.3.2.1 Toll System Maintenance.....37**

TABLE OF CONTENTS (CONTINUED)

10.3.2.2 <i>Customer Service Center (CSC) Fees</i>	38
10.3.2.3 <i>Toll Operations Maintenance</i>	39
10.3.2.4 <i>O&M Summary</i>	39
11. Net Toll Revenues	40
12. Limits, Disclaimers and Caveats	<i>Error! Bookmark not defined.</i>

LIST OF TABLES

<i>Table 1: Historical and Projected County and State Population Estimates.....</i>	<i>7</i>
<i>Table 2: Historical and Projected Employment for Rhode Island.....</i>	<i>8</i>
<i>Table 3: Local Area Historical Population Estimates.....</i>	<i>9</i>
<i>Table 4: Historical Traffic Trends for Mt. Hope Bridge</i>	<i>12</i>
<i>Table 5: Historical Traffic Trends for Sakonnet River Bridge</i>	<i>12</i>
<i>Table 6: Mt. Hope and Sakonnet River Bridges 12-hour Vehicle Class Survey.....</i>	<i>14</i>
<i>Table 7: Mt. Hope and Sakonnet River Bridges Truck Axle Factor</i>	<i>14</i>
<i>Table 8: Mt. Hope Percent of Vehicles 3 or more Axles and Axle Factor, FY88 to FY97</i>	<i>15</i>
<i>Table 9: Median Income for potential Mt. Hope Bridge motorists.....</i>	<i>17</i>
<i>Table 10: Mount Hope Bridge, Toll Schedule Alternative 1.....</i>	<i>21</i>
<i>Table 11: Mount Hope Bridge, Toll Schedule Alternative 2.....</i>	<i>22</i>
<i>Table 12: Mount Hope Bridge, Toll Schedule Alternative 3.....</i>	<i>23</i>
<i>Table 13: Mount Hope Bridge, Toll Schedule Alternative 4.....</i>	<i>23</i>
<i>Table 14: Mount Hope Bridge, Toll Schedule Alternative 5.....</i>	<i>23</i>
<i>Table 15: Passenger Car Toll Rates by Alternative over the Forecast Period.....</i>	<i>24</i>
<i>Table 16: Mt. Hope Bridge Toll-Free Traffic Forecast.....</i>	<i>25</i>
<i>Table 17: Mt. Hope Annual Traffic and Toll Revenue Estimates for all Toll Schedule Alternatives, FY11 to FY40.....</i>	<i>27</i>
<i>Table 18: Capital Cost Estimate for Mt. Hope Bridge Toll Plaza – Mixed Mode Collection</i>	<i>32</i>
<i>Table 19: Toll System Maintenance Estimates, Mixed Mode</i>	<i>33</i>
<i>Table 20: Customer Service Center Fees, Mixed Mode, Toll Schedule Alternative 1</i>	<i>34</i>
<i>Table 21: Customer Service Center Fees, Mixed Mode, All Toll Schedule Alternatives.....</i>	<i>34</i>
<i>Table 22: Toll Operations Maintenance Estimates, Mixed Mode</i>	<i>35</i>
<i>Table 23: Toll Operations Staffing Estimate, Mixed Mode</i>	<i>35</i>
<i>Table 24: O&M Cost Summary, Mixed Mode by Toll Schedule Alternative</i>	<i>36</i>
<i>Table 25: Capital Cost Estimate for Mt. Hope Bridge Toll Plaza – AET Collection</i>	<i>37</i>
<i>Table 26: Customer Service Center Video Collection Fees, AET, Toll Schedule Alternative 1</i>	<i>38</i>
<i>Table 27: Customer Service Center, Video Collection Fees, AET, All Toll Schedules</i>	<i>38</i>
<i>Table 28: Toll Operations Maintenance Estimates, AET</i>	<i>39</i>
<i>Table 29: O&M Cost Summary AET by Toll Schedule Alternative</i>	<i>39</i>
<i>Table 30: Mt. Hope Bridge Estimates of Net Toll Revenue, Mixed Mode Collection</i>	<i>41</i>
<i>Table 31: Mt. Hope Bridge Estimates of Net Toll Revenue, AET Collection</i>	<i>42</i>

LIST OF FIGURES

Figure 1: Location Map..... 2

Figure 2: Trip Frequency 3

Figure 3: Trip Purpose 4

Figure 4: Vehicle Occupancy 4

Figure 5: Origins and Destinations of Mt. Hope Motorists..... 5

Figure 6: E-ZPass Ownership and Knowledge 6

Figure 7: Historical and Projected County and State Population Estimates..... 8

Figure 8: Local Area Historical Population Estimates 10

Figure 9: Mt. Hope Bridge Historical Traffic 11

Figure 10: Seasonality for RITBA Facilities, FY97..... 13

Figure 11: Mt. Hope Hourly Traffic Profile..... 15

Figure 12: Distribution of Median Household Income by County 17

Figure 13: Travel Time Survey Location Map..... 20

Figure 14: Mt. Hope Bridge Annual Toll Transaction Estimate by Toll Schedule Alternative 28

Figure 15: Mt. Hope Bridge Annual Toll Revenue Estimate by Toll Schedule Alternative..... 29

Figure 16: Mt. Hope Toll Sensitivity Curve, FY11 30

1. Introduction

Jacobs Engineering Group (Jacobs) was retained by the Rhode Island Turnpike and Bridge Authority (the Authority) to conduct a toll feasibility study for the Mount Hope Bridge. This is a preliminary analysis to understand the financial feasibility of implementing a toll on the Mt. Hope Bridge, including estimates of toll revenue and capital costs to construct the toll plaza and on-going costs to collect tolls. This preliminary analysis is *not* suitable for financing.

The Mt. Hope Bridge, designated Rhode Island Route 114, is a two lane suspension bridge connecting the towns of Bristol and Portsmouth in Eastern Rhode Island. Figure 1 provides the location of the Bridge with respect to other roadways and cities in Rhode Island and southern Massachusetts.

The Bridge was constructed by a private firm and opened to traffic on October 24, 1929 as a toll bridge. The Authority took over ownership of the Bridge in the early 1960s implementing a toll of \$0.30 for passenger vehicles and \$0.10 for commuters via a token program. This toll schedule was in place until May 1, 1998 when tolls were removed from the Bridge.

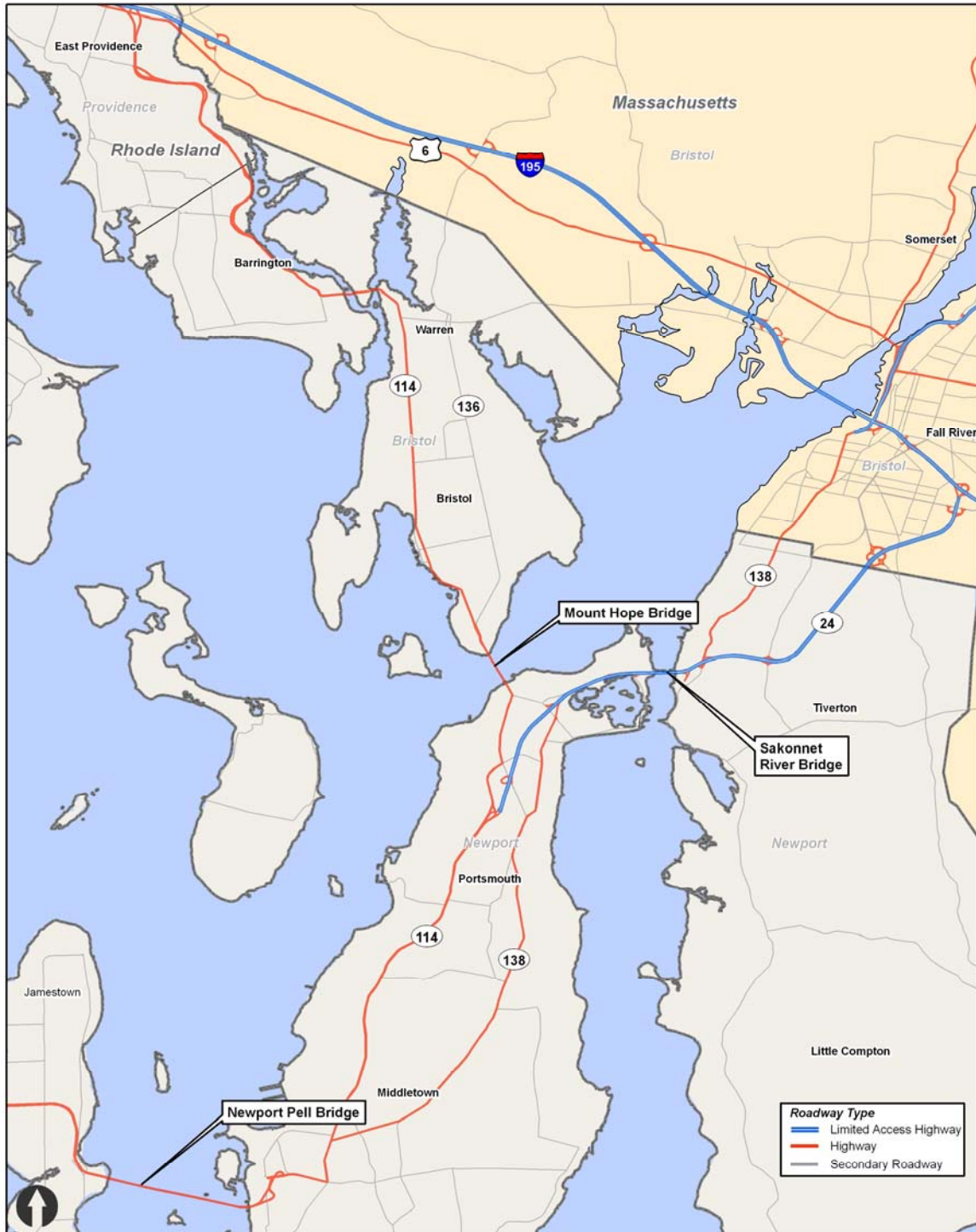
Jacobs analyzed the possibility reinstating tolls on the Mt. Hope Bridge under various toll schedules. Our Mount Hope Toll Feasibility Study consists of the following two major tasks:

- Development of traffic and toll revenue estimates; and
- Development of capital and operations and maintenance (O&M) cost estimates associated with toll collection.

The report first reviews the data collection efforts and the analysis of those data, resulting in the estimates of tolled traffic and toll revenue for the Mt. Hope Bridge under five alternative toll schedules. Following that is a presentation of the development of estimates of capital costs to construct the Mt. Hope toll plaza and the future operations and maintenance costs associated with collecting tolls. The gross toll revenues are then compared to the estimated costs to understand the estimated net toll revenue stream available to the Authority. The report is, therefore, broken up into the following sections:

- Travel Characteristics Survey
- Demographics
- Historical Traffic Trends
- Historical Traffic Trends
- Transportation Network
- Median Income and Value of Time
- Travel Time Surveys
- Alternative Toll Schedules
- Traffic and Toll Revenue Analysis
- Cost Estimates
- Net Toll Revenues

Figure 1: Location Map



Sources: State of Rhode Island Geographic Information System Database; MassGIS; ESRI Data

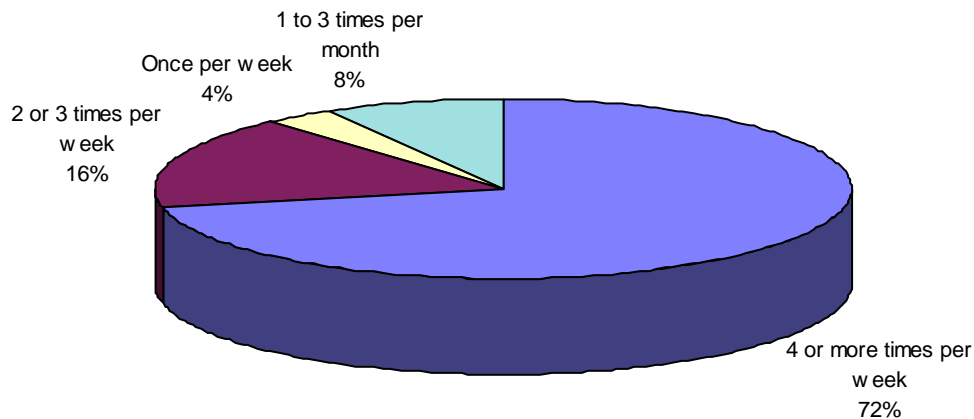
2. Travel Characteristics Survey

A travel characteristics survey was conducted for the Mount Hope Bridge. This internet-based survey was advertised through Variable Message Signs (VMS) near the Mt. Hope Bridge for motorists accessing the Bridge. The sign and survey were “live” from September 7, 2009 to October 18, 2009, asking motorists such questions relating to their trip frequency and purpose, vehicle occupancy, trip origin and destination, and knowledge and use of the *E-ZPass* program. The results of this survey are provided herein with a summary specifically related to their input into the traffic and toll revenue study. Typical of these types of surveys, motorists who travel across the Bridge frequently responded in greater quantity in relation to overall patronage. It is with that knowledge that the results were used in the analysis, such that specific values were not used directly but informed the analysis generally. The results presented are not expanded or factored results but raw data representing percentages of actual respondents.

2.1 Trip frequency

The trip frequency of a motorist is defined by the number of trips that is taken over a given period of time. Figure 2 presents the results of the survey, with over 70 percent of respondents stating that they make this particular trip 4 or more times per week. Over 90 percent of respondents make the trip once per week, with no one responding as an occasional user, i.e. less than one time per month.

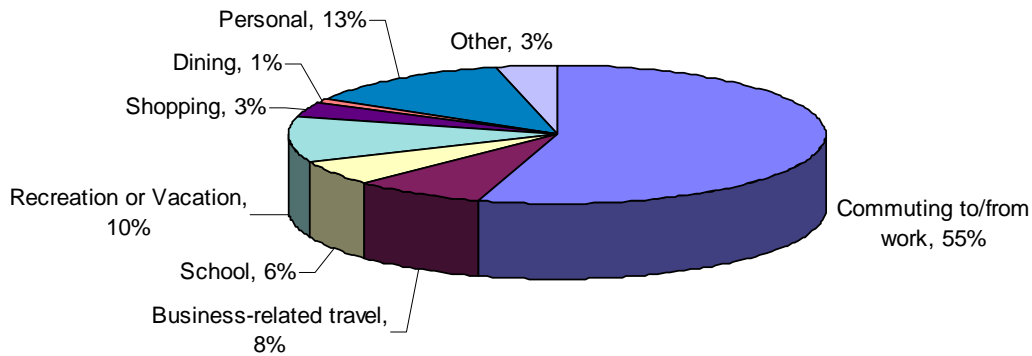
Figure 2: Trip Frequency



2.2 Trip Purpose

The stated trip purposes of respondents are presented in Figure 3. Approximately 55 percent of respondents were commuting to or from work. This corresponds with the frequency data, as work is typically four or more times per week. The other most popular responses included personal (such as doctor office visits), recreation/vacation and business related travel.

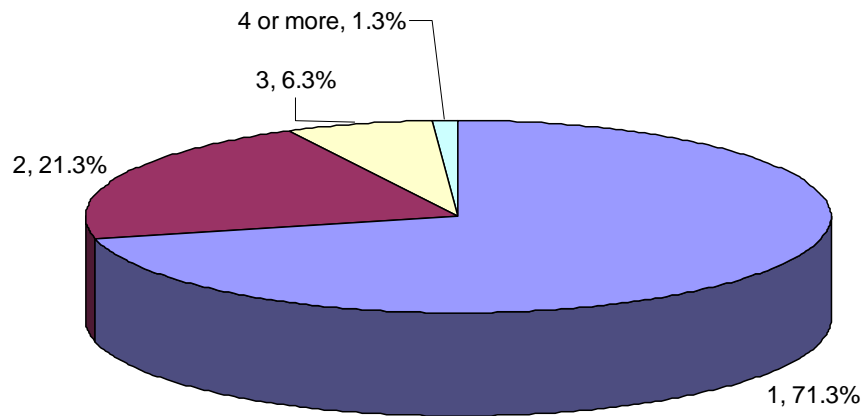
Figure 3: Trip Purpose



2.3 Vehicle Occupancy

Vehicle occupancy refers to the number of occupants in a single vehicle. By far the most common response was to be a single occupancy vehicle (SOV), or have only one person in the vehicle. This is typical of all roadways in the United States, but also matches up with the trip purpose and trip frequency data, since most commuting trips are both frequent and with single-occupant vehicles.

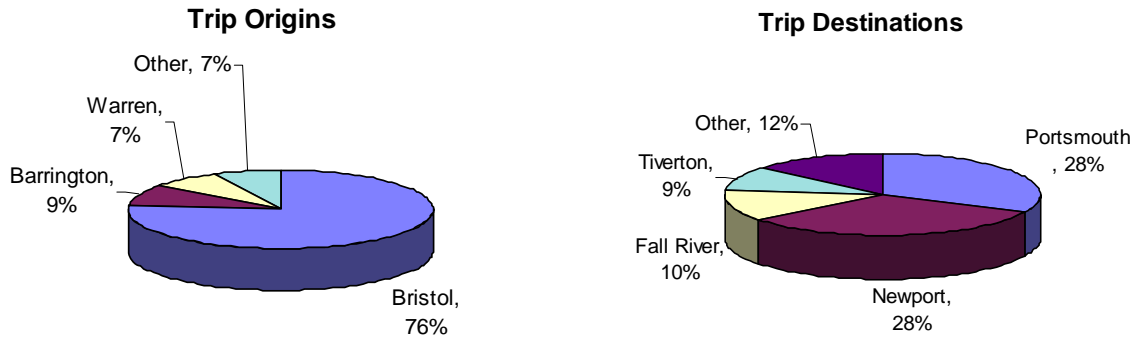
Figure 4: Vehicle Occupancy



2.4 Origins and Destinations

The trip origins and destinations were also revealed. For the analysis all trips were converted to southbound trips to have a consistent data set to analyze. The results are provided in Figure 5.

Figure 5: Origins and Destinations of Mt. Hope Motorists

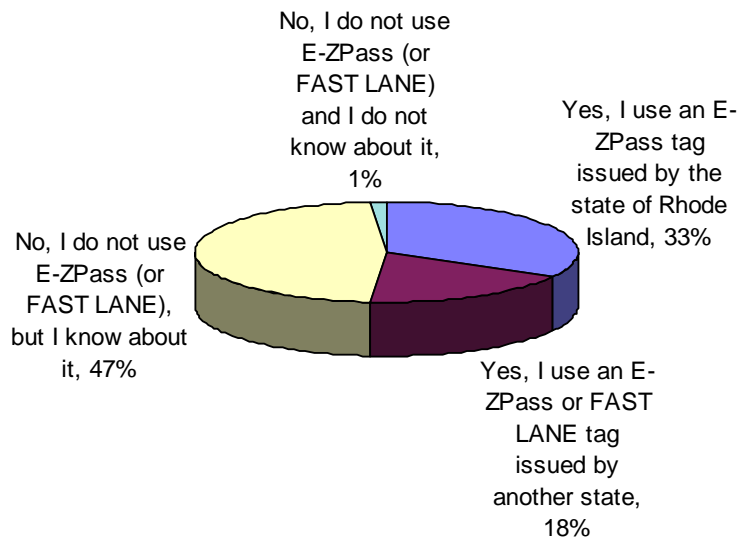


By a significant margin, the majority of the people surveyed originated their trip in the Town of Bristol. This is followed by origins from Barrington and Warren, the two towns essentially bordering Bristol to the north. There was a little more diversity in the trip destinations, with essentially equal respondents citing Portsmouth and Newport as the destination. Fall River, MA and Tiverton were the 3rd and 4th most popular destination, respectively, followed by a number of other cities making up the remainder.

2.5 E-ZPass Ownership

In order to understand the current ownership, usage and understanding of *E-ZPass*, the common form of electronic toll collection in the Northeast and Mid-Atlantic, a specific question was asked of Mt. Hope Bridge motorists. Figure 6 presents the results of the ownership question.

Figure 6: E-ZPass Ownership and Knowledge



As evident from the responses, approximately half of respondents indicated that they use an electronic toll transponder either issued by Rhode Island or another State. The remaining half do not personally use an electronic toll transponder but do have an understanding of the programs described. A small number claimed no understanding of the electronic toll collection program offered.

2.6 Summary

The travel characteristics survey data indicate that the Mt. Hope Bridge is truly a local roadway. The majority of trip origins are in the Town of Bristol, with almost all origins within the County of Bristol, which includes the towns of Warren and Barrington. Additionally, the majority of trips appear to be motorists in single occupancy vehicles commuting to and from work, more than 4 times per week. These are the key takeaways from the survey effort. These data inform the analysis that a closer look at the immediate area is warranted, as opposed to the Newport-Pell Bridge, which would incorporate trends from the entire region.

3. Demographics

This section reviews the historical and forecasted demographic data in the region, including population, employment and median income. Additionally, a cursory review of the development patterns in the local area of the Town of Bristol is presented. As mentioned in the previous section, the majority of trips on the Bridge appear to be made by motorists from the local area, in single occupant vehicles, commuting to and from work, more than 4 times per week. These data inform the analysis that a close look at the demographics of the local region is warranted.

3.1 Regional Population and Employment Review

Historical and forecasted population and employment in the region is key to understanding the possible growth of traffic on the region's roadways. Table 1 presents the actual and projected population of Bristol County, Newport County and the State of Rhode Island from 1960 to 2030. Recent historical and forecasted population growth in the region is modest, with average annual growth rates from 2000 to 2030 estimated to be approximately 0.2 percent for the counties surrounding the Mt. Hope Bridge.

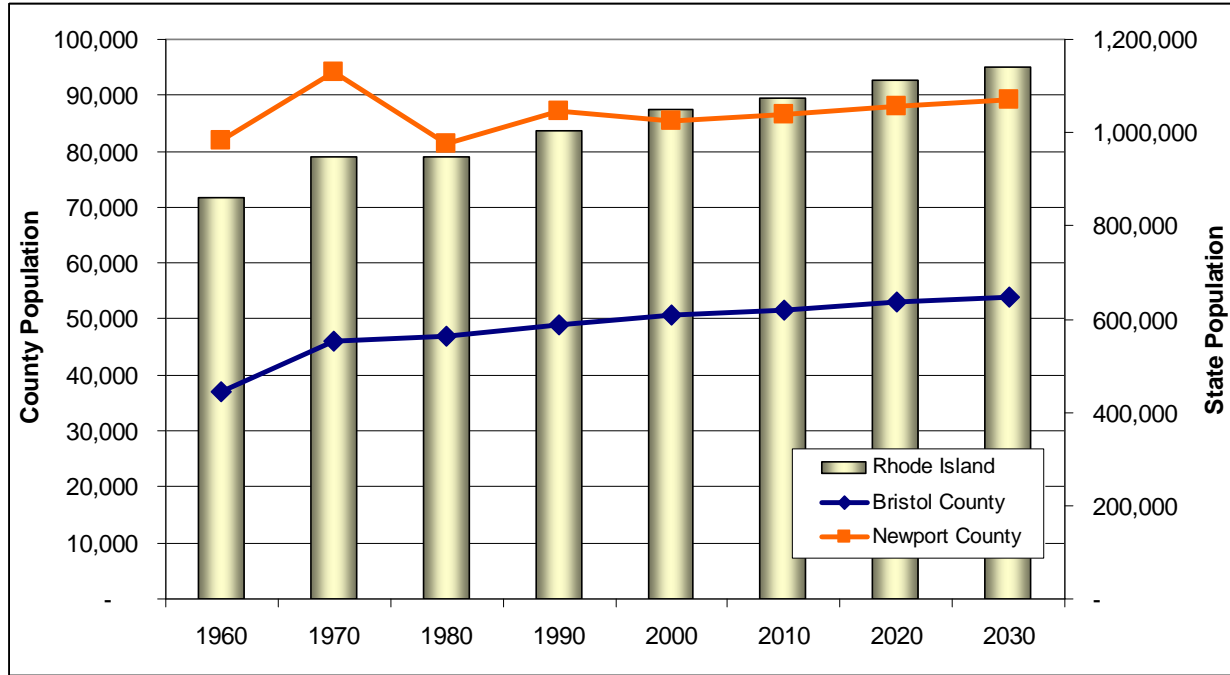
Table 1: Historical and Projected County and State Population Estimates

Population Estimates			
Year	Bristol County	Newport County	Rhode Island
1960	37,146	81,891	859,488
1970	45,937	94,228	949,723
1980	46,942	81,383	947,154
1990	48,859	87,194	1,003,464
2000	50,648	85,433	1,048,319
2010	51,596	86,470	1,074,199
2020	52,961	87,960	1,111,464
2030	54,026	89,125	1,140,543
Population Growth (Average Annual Percent Change {AAPC})			
1960-1970	2.15%	1.41%	1.00%
1970-1980	0.22%	-1.45%	-0.03%
1980-1990	0.40%	0.69%	0.58%
1990-2000	0.36%	-0.20%	0.44%
2000-2010	0.19%	0.12%	0.24%
2010-2020	0.26%	0.17%	0.34%
2020-2030	0.20%	0.13%	0.26%
1960-2000	0.78%	0.11%	0.50%
2000-2030	0.22%	0.14%	0.28%

Source: RI Statewide Planning Office/Census

The population data presented in Table 1 is graphically represented in Figure 7, further illustrating the very low growth forecasted over the next 20 years.

Figure 7: Historical and Projected County and State Population Estimates



In addition to population, employment is also an economic driver of traffic. Table 2 presents the historical and forecasted employment levels for the State of Rhode Island. The employment growth rates are consistent with the modest population growth rates, with an estimated 0.3 percent annual growth for the State.

Table 2: Historical and Projected Employment for Rhode Island

Year	Rhode Island	
	Employment	AAPC
2000	467,299	
2005	474,899	0.32%
2010	481,816	0.29%
2015	491,252	0.39%
2020	501,749	0.42%
2020	510,189	0.33%
2030	516,048	0.23%
2000-2030		0.33%

Source: RI Statewide Planning

3.2 Local Area Development

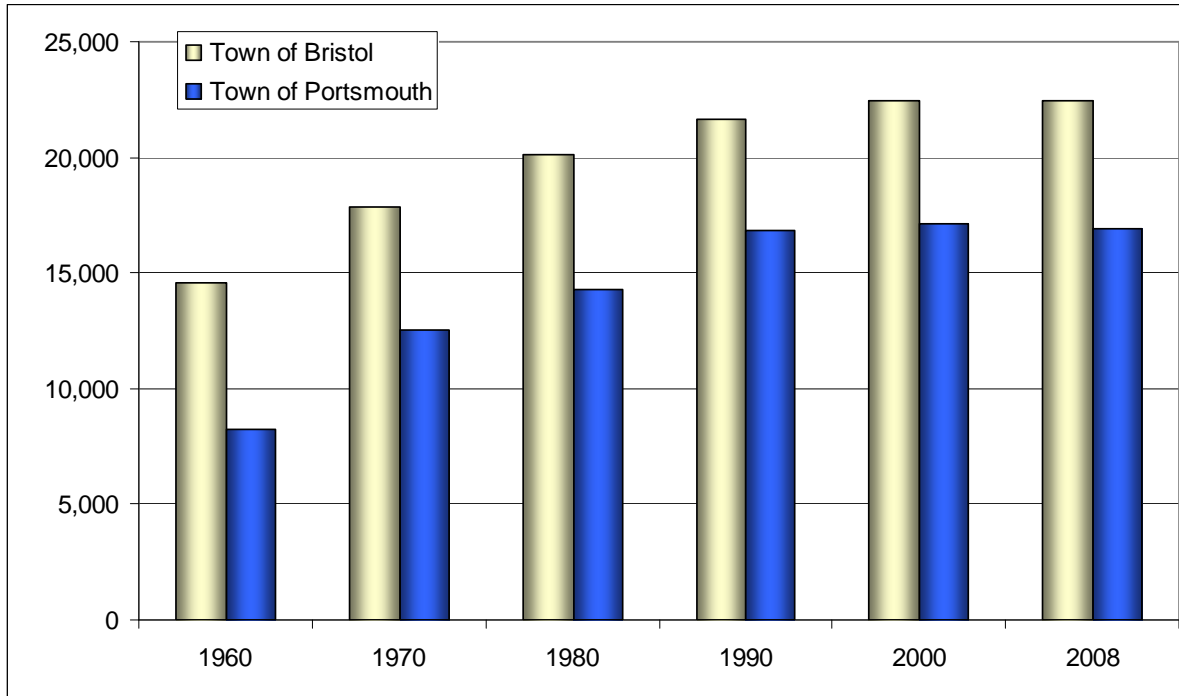
In the previous section, county and state population and employment levels were presented, but it is apparent from the trip characteristics survey that the Mt. Hope Bridge caters more to local traffic than to traffic outside of the region; therefore, the trends in the local area would provide better insight into the possibilities of Mt. Hope Bridge traffic into the future. Table 3 provides the historical population trends for the towns of Bristol and Portsmouth from 1960 to 2008. Population growth has slowed since 1960, with actual estimated losses in population from 2000 to 2008. Figure 8 illustrates this leveling off of population in the recent years for the two towns connected by the Mt. Hope Bridge.

Table 3: Local Area Historical Population Estimates

Population Estimates		
Year	Town of Bristol	Town of Portsmouth
1960	14,570	8,251
1970	17,860	12,521
1980	20,128	14,257
1990	21,625	16,857
2000	22,469	17,149
2008	22,465	16,909
Population Growth (AAPC)		
1960-1970	2.06%	4.26%
1970-1980	1.20%	1.31%
1980-1990	0.72%	1.69%
1990-2000	0.38%	0.17%
2000-2008	0.00%	-0.14%

Source: US Census

Figure 8: Local Area Historical Population Estimates



In addition to the review of historical and forecasted population and employment trends in the local area, a cursory review of major land uses in Bristol and Portsmouth was undertaken.

Roger Williams University is a significant traffic generator in the Town of Bristol just north of the Mt. Hope Bridge. The University has approximately 4,300 undergraduate students, 900 graduate students and 430 faculty members. Approximately 63 percent of students live on campus, consequently, approximately 1,900 students commute, in addition to the traveling faculty that must use the transportation network to access campus. This traffic generator is already accounted for in the current and past traffic counts and, as there are no known expansion plans for the University, traffic from and to this development are anticipated to be static.

Additionally, the future land use plans for Bristol and Portsmouth were reviewed to understand significant changes to development patterns during the forecast period. As identified in the review of the historical and forecasted population estimates for the towns, counties and state, the Mt. Hope traffic shed is a mature area with very little change in population, employment or developments both in the recent past and anticipated in the near future. While there are some small tracts of undeveloped land in both Bristol and Portsmouth, the modest projection of population growth for the counties does not lend itself to aggressive development of this land.

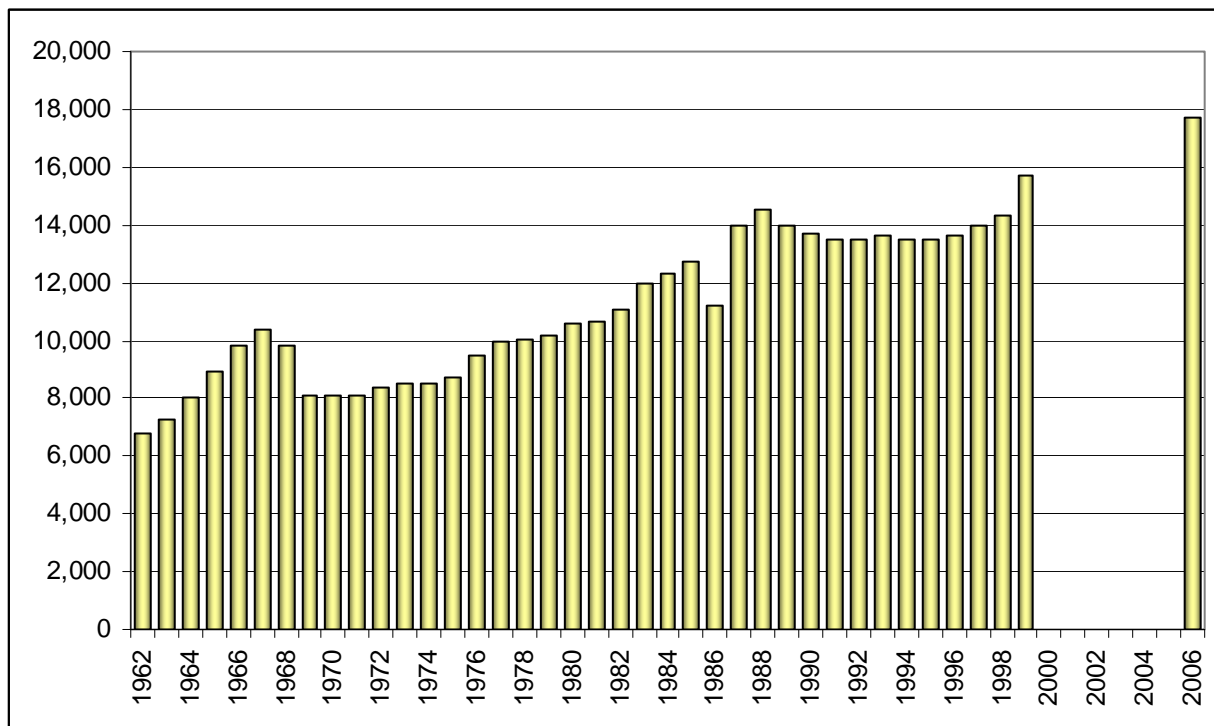
4. Historical Traffic Trends

This section presents the historical traffic trends of the Mt. Hope Bridge as well as providing comparisons to neighboring bridges. Additionally, details of the traffic are analyzed including seasonality, vehicle classification and hourly profiles.

4.1 Annual Traffic Trends

The annual traffic trends for Mt. Hope Bridge by fiscal year (FY) are presented in Figure 9 and Table 4. The Authority fiscal year runs from July to June, such that the current fiscal year, FY10, runs from July 2009 to June 2010. The trends from FY62 to FY98 represent tolled traffic. The data for 1998 were prorated from the 11 months of tolled data available before the removal of tolls on the Bridge on May 1, 1998. The traffic counts from 1999 and 2006 are non-toll traffic provided by Rhode Island Department of Transportation.

Figure 9: Mt. Hope Bridge Historical Traffic



Data unavailable from 2000 to 2005, and 2007 to current

From 1988 to 1998, average annual daily tolled traffic was flat, decreasing by approximately 200 vehicles, representing a one percent decrease for the ten year period. Conversely, in 1999 it is estimated that daily traffic increased by 9.8 percent over the previous year. This is due in large part to the removal of tolls from the Bridge. Additionally, traffic growth from 1999 to 2006 averaged 1.7 percent per year, which far outpaces the decade of the 1990s.

Table 4: Historical Traffic Trends for Mt. Hope Bridge

Mt. Hope Bridge Traffic		
Year	AADT	Growth (APPC)
1988	14,500	
1989	14,000	-3.4%
1990	13,700	-2.1%
1991	13,500	-1.5%
1992	13,500	0.0%
1993	13,600	0.7%
1994	13,500	-0.7%
1995	13,500	0.0%
1996	13,600	0.7%
1997	14,000	2.9%
1998	14,300	2.1%
1999	15,700	9.8%
2006	17,700	1.7% *

Data unavailable from 2000 to 2005, and 2007 to current

** AAPC from 1999 to 2006*

In addition to the review of traffic trends on the Mt. Hope Bridge, the historical traffic on the neighboring Sakonnet River Bridge was analyzed. The available data from the Rhode Island Department of Transportation are provided in Table 5. There are only two data points from the recent history available, showing moderate growth from 2000 to 2007 of 2.2 percent.

Table 5: Historical Traffic Trends for Sakonnet River Bridge

Sakonnet River Bridge Traffic		
Year	AADT	Growth (APPC)
2000	27,500	
2007	32,000	2.2%

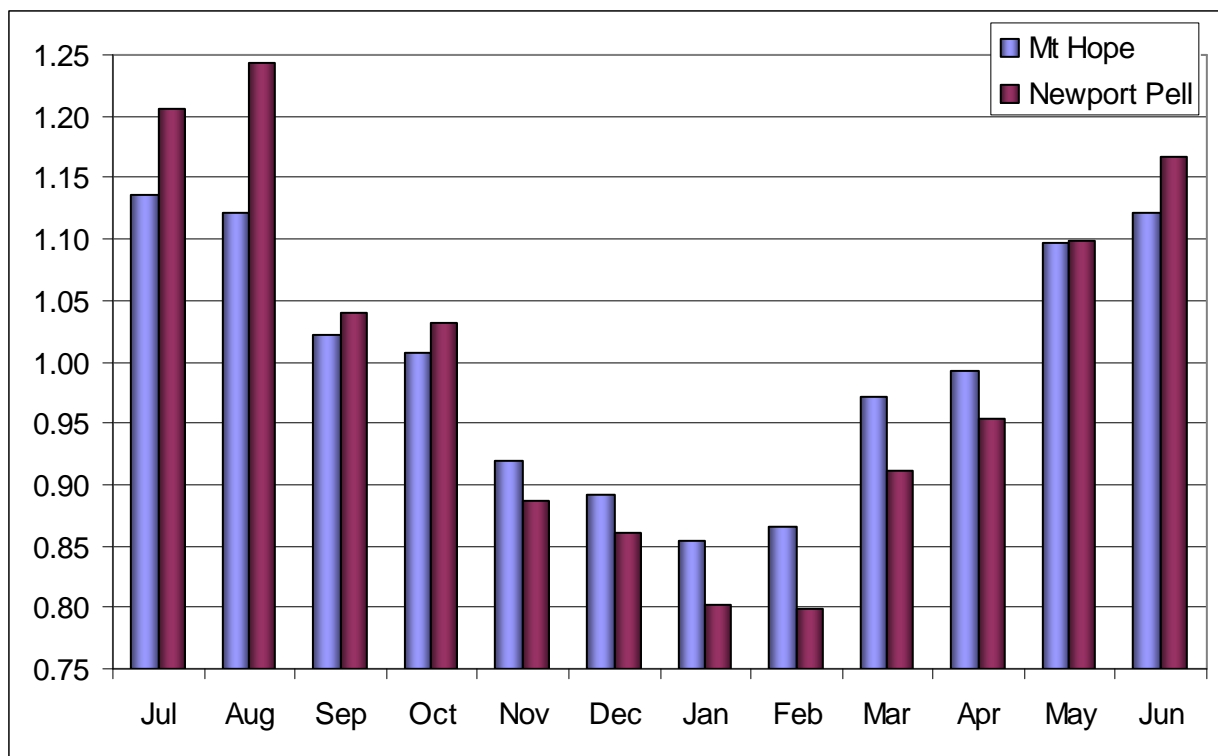
4.2 Seasonality

Newport County is in part a tourist destination with traffic patterns reflecting the seasonality of travel. The Newport-Pell Bridge has a significant history of seasonal trends, with higher traffic volumes in the summer months for tourists accessing the beaches, waterfront and other summer activities. A comparison of the monthly traffic levels of the Newport-Pell Bridge and the Mt. Hope Bridge for FY97 is provided in Figure 10. This is the most recent year of monthly data for the Mt. Hope Bridge and was the final full year of tolling. The monthly traffic is indexed such that the average month is equal to 1.0. While the Mt. Hope Bridge does not exhibit the same extreme seasonality as the Newport-Pell Bridge, it does definitely follow the pattern of significantly higher

traffic in the summer months as compared to the winter months. In FY97, Mt. Hope Bridge exhibited a range of indexed traffic from 0.85 during the lowest volume month of January to 1.14 during the highest volume month of July, a 33 percent difference between low and high months. For the Newport-Pell Bridge this ranges was 0.80 in January and February and 1.24 in August, a 56 percent differential between the lowest and highest volume months.

Typically, highly seasonal roadways carry tourist traffic. However, based on the trip characteristics survey results and the indication that Mt. Hope Bridge is a local thoroughfare, it is possible that the seasonality experienced by the Mt. Hope Bridge includes seasonal employment.

Figure 10: Seasonality for RITBA Facilities, FY97



4.3 Vehicle Classification

On Thursday, August 27, 2009, Jacobs conducted a vehicle class count survey on the Mt. Hope and Sakonnet River Bridges in the southbound and westbound directions, respectively. The survey was conducted during the daytime hours of 7 am to 7 pm. The vehicle class survey provided an indication of truck traffic for the two bridges, as well as the number of axles per truck. The actual data and percent of vehicles with 3 or more axles are provided in Table 6.

Table 6: Mt. Hope and Sakonnet River Bridges 12-hour Vehicle Class Survey

Facility	2 Axle	3+ Axle	Total	% 3+ Axle
Mt. Hope Bridge	7,438	153	7,591	2.0%
Sakonnet River Bridge	17,748	172	17,920	1.0%
Total	25,186	325	25,511	1.3%

It is apparent from the survey that truck percentages on the bridges are minimal. It should be noted that the Sakonnet River Bridge currently has a weight limit restricting most multi-axle trucks. This is evident from the data presented in Table 7, detailing the number of axles of the counted trucks. The axle factor presented in Table 7 is the weighted average number of axles for vehicles with 3 or more axles. This is important to a traffic and toll revenue analysis because toll schedules are typically axle based, so estimates of trucks must contain an understanding of the average number of axles of the trucks.

Table 7: Mt. Hope and Sakonnet River Bridges Truck Axle Factor

Facility	3 Axle	4 Axle	5 Axle	6 Axle	Total	Axle Factor
Mt. Hope Bridge	73	20	58	2	153	3.9
Sakonnet River Bridge	100	63	9	0	172	3.5
Total	173	83	67	2	325	3.7

The Sakonnet River Bridge currently carries very few vehicles of 5 axles or more. The Bridge is currently being replaced by a structure that will again allow heavy trucks to use this facility. For the analysis of the Mt. Hope Bridge, it is important to understand that the percent trucks and axle factor calculated based on current data will not be representative of future performance. Both Table 6 and Table 7 provided totals of the Mt. Hope and Sakonnet River Bridges to understand the total demand over this screenline of traffic accessing Aquidneck Island from the north and east. These totals are a better indication of overall demand and more indicative of future usage patterns.

In addition to current survey data, a review of historical axle data for the Mt. Hope Bridge was conducted. Table 8 presents the percent of vehicles with 3 or more axles and the axle factor (average number of axles) for those vehicles on the Mt. Hope Bridge from FY88 to FY97. The percent of vehicles with 3 or more axles is approximately one percent in every year and the axle factor is consistently 3.5 with the exception of FY97. The axle factor calculated from the vehicle survey, 3.9, is significantly higher than the historical factor because of the restrictions on the Sakonnet River Bridge. It is estimated that once these restrictions are lifted with the completion of the updated bridge, the axle factor for the Mt. Hope Bridge will be closer to 3.5.

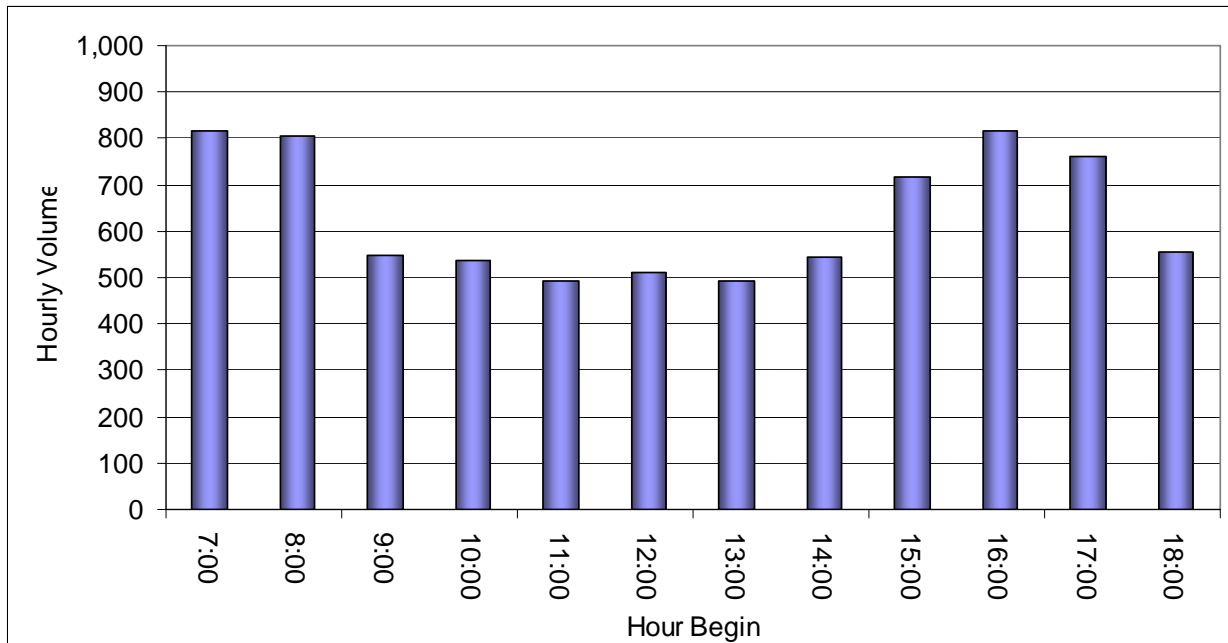
Table 8: Mt. Hope Percent of Vehicles 3 or more Axles and Axle Factor, FY88 to FY97

Fiscal Year	% 3+ Axle	Axle Factor
1988	0.94%	3.53
1989	0.88%	3.50
1990	0.96%	3.50
1991	0.99%	3.53
1992	1.00%	3.55
1993	0.91%	3.45
1994	0.99%	3.52
1995	0.95%	3.51
1996	0.88%	3.49
1997	1.21%	3.64

4.4 Hourly Traffic Profile

During the vehicle classification survey, hourly traffic data was also collected. Figure 11 presents the southbound hourly traffic profile for the Mt. Hope Bridge. There are definite peaks in the morning and evening indicating commuting occurs in both directions, i.e. motorists live in Newport County and commute to Bristol County and motorists live in Bristol County and commute to Newport County.

Figure 11: Mt. Hope Hourly Traffic Profile



5. Transportation Network

In this section the existing and future transportation network is reviewed. In the conduct of a traffic and toll revenue study it is critical to understand the improvements to competing and feeding routes, as they affect traffic on the facility.

The most significant change to the transportation network during the forecast period is the upgrading of the Sakonnet River Bridge. The Sakonnet River Bridge is a competitive route to the Mt. Hope Bridge connecting Portsmouth with Tiverton and the greater Falls River, Massachusetts region. The new bridge is anticipated to be completed by 2012 and will consist of two 12-foot travel lanes in each direction, as well as a bicycle and pedestrian path.

The current Sakonnet River Bridge has an 18-ton weight limit that requires truck traffic to use the alternate route through Bristol and across the Mt. Hope Bridge. The new bridge will not have weight limitations, which will allow for truck traffic to revert to previous travel patterns (i.e. some trucks currently using the Mt Hope Bridge will switch back to the new Sakonnet Bridge) that existed before the ban was implemented.

From the review of the approved improvement projects for the entire state, the upgrade of the Sakonnet River Bridge is the only improvement that is estimated to have a material impact on traffic demand for the Mt. Hope Bridge. All other improvements were either minor or geographically separated from the Mt. Hope Bridge in the greater Providence area or western Rhode Island.

6. Median Income and Value of Time

The median household incomes for the counties in the area of influence of the Mt. Hope Bridge as well as the States of Rhode Island and Massachusetts are presented in Table 9. Bristol and Newport Counties in Rhode Island are well above the median income for the State, whereas median income in Bristol County, Massachusetts is below the Massachusetts state median income as well as the neighboring counties in Rhode Island.

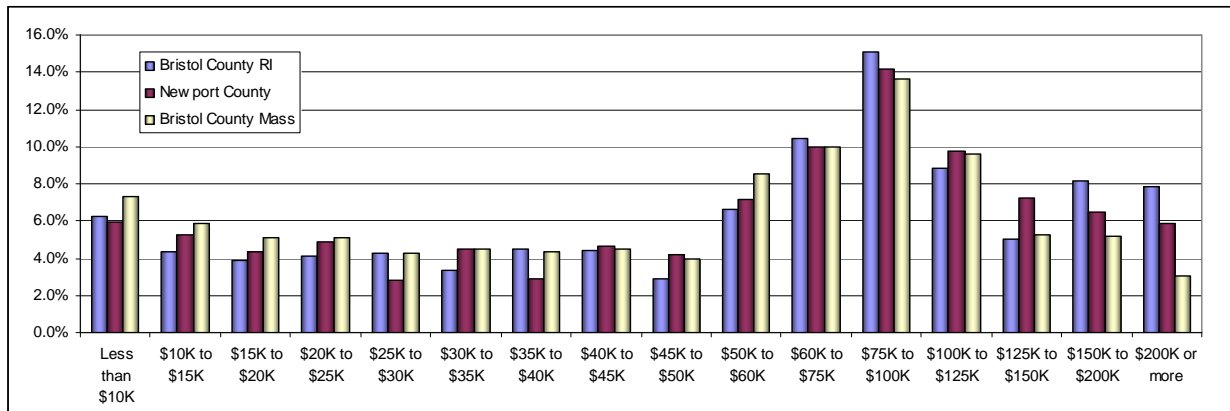
Table 9: Median Income for potential Mt. Hope Bridge motorists

Rhode Island			Massachusetts	
Bristol County	Newport County	State	Bristol County	State
68,126	64,802	55,327	55,845	64,684

Source: 2008 American Community Survey, US Census

It is important to understand median income in the area as it is the most significant independent variable in the estimation of motorists' values of time. Value of time influences driver behavior in route choice, specifically for the option of toll and toll free paths. In addition to overall median income in the counties, the distribution by income level provides a more detailed description of the area. These income distributions by county are provide in Figure 12.

Figure 12: Distribution of Median Household Income by County



All three counties show similarity in that the most common occurrence is the range of \$75,000 to \$100,000 annual household income. Again for all three counties, the second and third most common are the adjacent categories representing one income level lower (\$60 to 75K) and one income level higher (\$100 to \$125K). The data indicate that Bristol County, Rhode Island skews slightly higher than Newport County, as would be anticipated by the higher median income presented in Table 9. Bristol County, Massachusetts skews the opposite direction with higher shares at the lower income levels relative to the Rhode Island counties as predicted by the previous data as well.

As mentioned in this section, motorists' value of time is directly related to income levels. Based on previous stated and revealed preference surveys for tolled transportation infrastructure, value of time is approximately 50 to 60 percent of income. For example, a person who earns \$50,000 per year makes approximately \$24/hour, based upon the typical 2,080 hours in a work year. Converting to cents/minute the income is approximately 40 cents per minute. This figure would be considered the motorist's value of time if value of time is 100 percent of income. From past experience, value of time could be 60 percent of this figure, which is approximately 24 cents per minute. Therefore, this particular motorist would need to save over 4 minutes in order to justify paying a \$1.00 toll. There are a wide range of values of time for potential motorists on the Mt. Hope Bridge, as well as travel time savings, depending on the origin and destinations of each particular motorist. It is these considerations that drive the estimates of traffic and toll revenue for the Mount Hope feasibility study.

7. Travel Time Surveys

Travel time surveys were conducted during the last week in August 2009 during both weekdays and weekend days as well as various time periods during those days in order to understand morning, midday and evening travel times on area roadways.

The routes that are relevant to this analysis include the following endpoints: RI 114/RI 24 interchange in Portsmouth; and MA 136/ I-195 Interchange north of Swansea, MA. Figure 13 presents the two different routes: Route A using the Mt. Hope Bridge; and Route B using the Sakonnet River Bridge. As shown in the Figure, the average time to travel the 12.7 miles of Route A is 27.3 minutes, while the average time to drive the 19 miles of Route B is 20 minutes. This equates to 7.3 minutes *additional* travel time for motorists using the Mt. Hope Bridge route.

The difference of the average speeds between the two routes is almost 30 miles per hour (mph), with speed on Route A of approximately 28 mph and Route B of 57 mph. Route A has multiple signalized intersections and low speed limits on the two lane arterial road network, while Route B is completely limited access, with no signalized intersections, and offers between 4 and 6 lanes for travel.

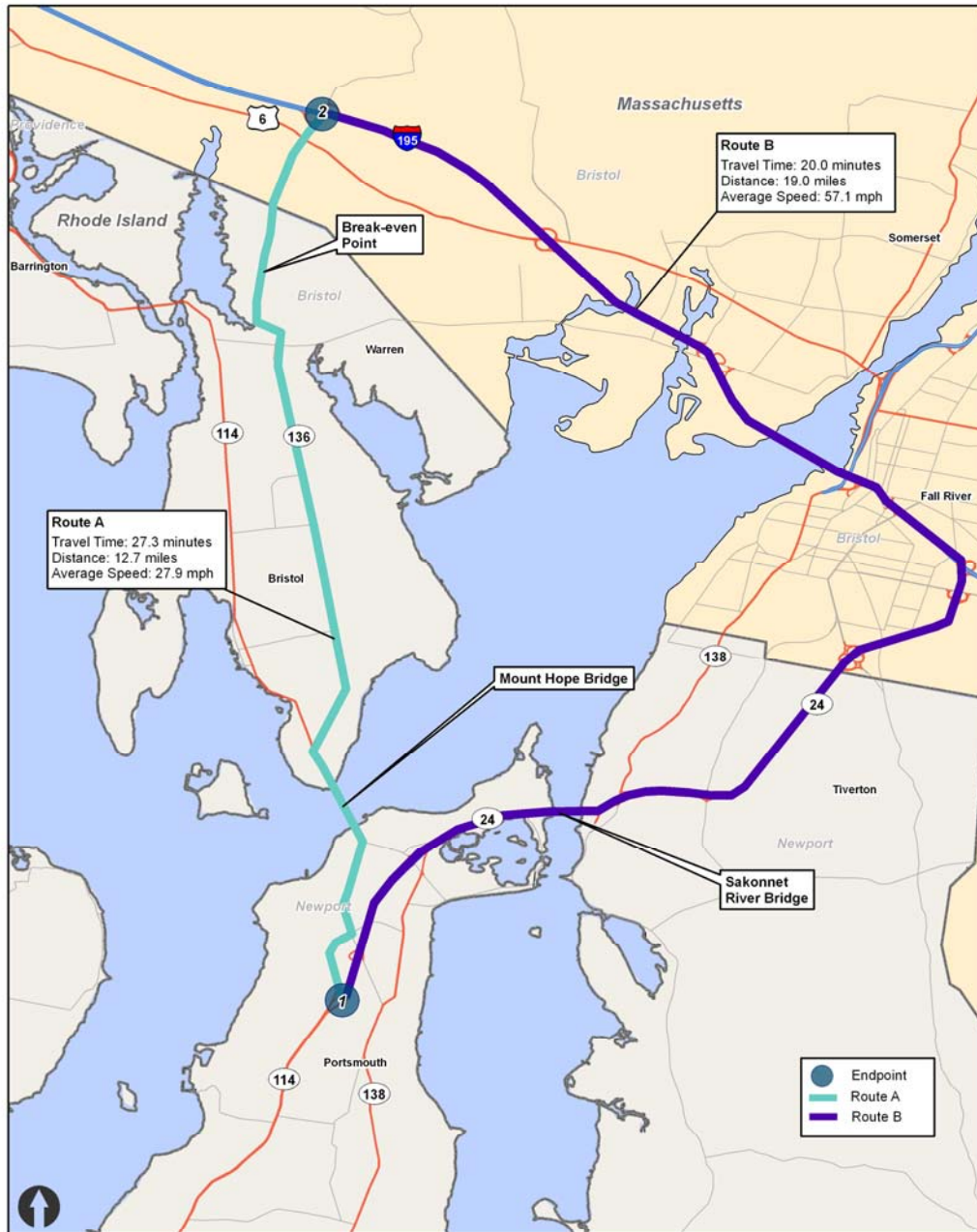
The travel time difference between the two routes helps define the functionality of the two competing bridges. For motorists that find themselves at Endpoint #1 that will need to get to Endpoint #2, the logical route would be Route B, over the Sakonnet River Bridge. Taking only travel time into account, the break-even point for the routes, i.e. the point on the routes that have equal travel time between taking the Mt. Hope or Sakonnet River Bridge, is just west of the state line on RI 136, as indicated in Figure 13. Again, from this point to Newport, there is no travel time difference between the two bridge routes. What this indicates is that out-of-state motorists would have no travel time advantage to taking the Mt. Hope Bridge instead of the Sakonnet for this regional trip. However, for the trips originating in Fall River, MA, the use of the combination of Mt. Hope and Sakonnet would be a reasonable route for motorists with destinations in southern Bristol County, RI.

The travel time survey results re-confirm the results of the other data collection efforts in that the Mt. Hope Bridge is a local roadway used by motorists that originate or are destined for Bristol County, RI. Use of the Mt. Hope Bridge as a regional route for motorists coming from outside the State of Rhode Island and destined for Newport County is not supported by the travel time data.

Additionally, combining the information from the travel time survey and the median income and value of time discussion in Section 6, the attractiveness of the Mt. Hope Bridge under various tolls can be analyzed. Using the median income for Bristol County, RI, approximately \$68,000, we can estimate a driving value of time of \$19.65 per hour. Based upon the travel speed of 27.9 mph on SR 136, an average resident of Bristol County would be estimated to pay \$0.70 for every mile of travel

saved, south of the “Break-even Point”. Again, this begins to inform the analysis with regard to the imposition of various toll schedules on the Mt. Hope Bridge.

Figure 13: Travel Time Survey Location Map



Sources: State of Rhode Island Geographic Information System Database; MassGIS; ESRI Data

8. Alternative Toll Schedules

The five alternative toll schedules that were analyzed are presented in the following five tables. The toll schedules are based upon the previous Mt. Hope toll schedule, the current Newport Pell toll schedule and proportional toll schedules that are in between the two. Table 10 presents the toll schedule that was applicable from 1960 to 1998 for the Mount Hope Bridge. This toll schedule is a strict axle based schedule for cash customers, charging \$0.15 per axle, regardless of weight, number of tires or height.

Updated for this analysis is the replacement of commuter tokens with the transponder discount. Based on the enabling legislation for RITBA with regard to the Mount Hope Bridge, the commuter rate cannot exceed the originally established rate of January 1, 1960. To be consistent with the current Pell Bridge toll schedule, there is a frequency requirement for non-Rhode Island residents with Rhode Island transponders. If 26 transactions, equivalent to 13 round trips, are not completed in a 30-day period, then the customer must pay the cash rate. Similarly, all non-Rhode Island transponders are charged the cash rate.

Additionally, all of the alternative toll schedules presented represent the initial toll schedule for the Alternative, which is assumed to increase every three years, similar to the financial plan of the Newport Pell Bridge. The planned toll increases by Alternative is presented in Table 15.

Table 10: Mount Hope Bridge, Toll Schedule Alternative 1

Cash or Non-Rhode Island Transponder	
2 axle	\$0.30
3 axle	\$0.45
4 axle	\$0.60
5 axle	\$0.75
6 axle	\$0.90
Rhode Island Transponder - 2 Axle	
RI Resident	\$0.10
Non-RI Resident	
26+ trips per 30 day period	\$0.10
Non-RI Resident	\$0.30

Mt. Hope Toll Schedule that was in effect from 1960 to 1998

Table 11 presents the current toll schedule for the Pell Bridge, which was also analyzed for implementation on the Mount Hope Bridge to offer consistent toll policy across the RITBA facilities.

Similar to Alternative 1, Alternative 2 offers a strict axle-based schedule, at \$2.00 per axle instead of \$0.15 per axle. Discount programs are also offered for commuters with Rhode Island transponders.

Table 11: Mount Hope Bridge, Toll Schedule Alternative 2

Cash or Non-Rhode Island Transponder	
2 axle	\$4.00
3 axle	\$6.00
4 axle	\$8.00
5 axle	\$10.00
6 axle	\$12.00
Rhode Island Transponder - 2 Axle	
RI Resident	\$0.83
Non-RI Resident	
26+ trips per 30 day period	\$0.91
Non-RI Resident	\$4.00

Evident from the comparison of the toll schedules Alternatives 1 and 2, there are toll schedules that exist between those two that should be analyzed to provide a full picture of toll feasibility for the potential toll facility. There is no existing toll facility in the United States that currently charges a \$0.10 toll. At the same time, a \$4.00 toll could be considered steep on what is either a local road with no alternative (for those motorists who have origin or destinations very close to the Bridge in Bristol or Portsmouth) or a regional route with a more attractive competitive toll-free route in close proximity.

Three additional toll schedules were analyzed. The schedules were developed based on the overall understanding of the direction of the toll policy: affording commuters with Rhode Island transponders substantial discounts; charging per axle; and implementing a toll schedule that does not unduly remove traffic from the facility but whose revenue supports the operations, maintenance and capital improvements needed to maintain a safe and functional facility. The commuter discount was adjusted proportionally from Toll Schedule Alternative 2. Table 12, Table 13 and Table 14 present Toll Schedule Alternatives 3, 4 and 5 respectively.

Table 12: Mount Hope Bridge, Toll Schedule Alternative 3

Cash or Non-Rhode Island Transponder	
2 axle	\$1.00
3 axle	\$1.50
4 axle	\$2.00
5 axle	\$2.50
6 axle	\$3.00
Rhode Island Transponder - 2 Axle	
RI Resident	\$0.21
Non-RI Resident	
26+ trips per 30 day period	\$0.23
Non-RI Resident	\$1.00

Table 13: Mount Hope Bridge, Toll Schedule Alternative 4

Cash or Non-Rhode Island Transponder	
2 axle	\$2.00
3 axle	\$3.00
4 axle	\$4.00
5 axle	\$5.00
6 axle	\$6.00
Rhode Island Transponder - 2 Axle	
RI Resident	\$0.42
Non-RI Resident	
26+ trips per 30 day period	\$0.46
Non-RI Resident	\$2.00

Table 14: Mount Hope Bridge, Toll Schedule Alternative 5

Cash or Non-Rhode Island Transponder	
2 axle	\$3.00
3 axle	\$4.50
4 axle	\$6.00
5 axle	\$7.50
6 axle	\$9.00
Rhode Island Transponder - 2 Axle	
RI Resident	\$0.62
Non-RI Resident	
26+ trips per 30 day period	\$0.68
Non-RI Resident	\$3.00

The previous Tables presented the initial toll schedules for the Alternatives analyzed. Table 15 provides the passenger car toll rates by Alternative over the full forecast period with toll increases approximately every 3 years. The full price column represents the cash and non-discounted transponder customer. The commuter rate is the Rhode Island resident E-ZPass rate. The full price toll was rounded to the nearest quarter but the commuter rate was increased to the nearest appropriate penny. The increases took into account the ratio between the full price and discounted rate, to remain consistent during the forecast. The truck rate remained based on the number of axles as a function of the full price fair as is currently the case on the Newport Pell Bridge. The forecasts of traffic and toll revenue that follow are based upon the toll rates in Table 15

Table 15: Passenger Car Toll Rates by Alternative over the Forecast Period

Fiscal Year	Toll Schedule 1		Toll Schedule 2		Toll Schedule 3		Toll Schedule 4		Toll Schedule 5	
	Full Price	Commuter	Full Price	Commuter	Full Price	Commuter	Full Price	Commuter	Full Price	Commuter
2011	\$0.30	\$0.10	\$4.00	\$0.83	\$1.00	\$0.21	\$2.00	\$0.42	\$3.00	\$0.62
2012	\$0.30	\$0.10	\$4.00	\$0.83	\$1.00	\$0.21	\$2.00	\$0.42	\$3.00	\$0.62
2013	\$0.35	\$0.12	\$4.50	\$1.00	\$1.25	\$0.25	\$2.25	\$0.50	\$3.50	\$0.75
2014	\$0.35	\$0.12	\$4.50	\$1.00	\$1.25	\$0.25	\$2.25	\$0.50	\$3.50	\$0.75
2015	\$0.35	\$0.12	\$4.50	\$1.00	\$1.25	\$0.25	\$2.25	\$0.50	\$3.50	\$0.75
2016	\$0.40	\$0.15	\$5.00	\$1.25	\$1.25	\$0.31	\$2.50	\$0.63	\$3.75	\$0.94
2017	\$0.40	\$0.15	\$5.00	\$1.25	\$1.25	\$0.31	\$2.50	\$0.63	\$3.75	\$0.94
2018	\$0.40	\$0.15	\$5.00	\$1.25	\$1.25	\$0.31	\$2.50	\$0.63	\$3.75	\$0.94
2019	\$0.45	\$0.18	\$5.50	\$1.50	\$1.50	\$0.38	\$2.75	\$0.75	\$4.25	\$1.13
2020	\$0.45	\$0.18	\$5.50	\$1.50	\$1.50	\$0.38	\$2.75	\$0.75	\$4.25	\$1.13
2021	\$0.45	\$0.18	\$5.50	\$1.50	\$1.50	\$0.38	\$2.75	\$0.75	\$4.25	\$1.13
2022	\$0.50	\$0.18	\$6.00	\$1.50	\$1.50	\$0.38	\$3.00	\$0.75	\$4.50	\$1.13
2023	\$0.50	\$0.18	\$6.00	\$1.50	\$1.50	\$0.38	\$3.00	\$0.75	\$4.50	\$1.13
2024	\$0.50	\$0.18	\$6.00	\$1.50	\$1.50	\$0.38	\$3.00	\$0.75	\$4.50	\$1.13
2025	\$0.55	\$0.21	\$6.50	\$1.75	\$1.75	\$0.44	\$3.25	\$0.88	\$5.00	\$1.31
2026	\$0.55	\$0.21	\$6.50	\$1.75	\$1.75	\$0.44	\$3.25	\$0.88	\$5.00	\$1.31
2027	\$0.55	\$0.21	\$6.50	\$1.75	\$1.75	\$0.44	\$3.25	\$0.88	\$5.00	\$1.31
2028	\$0.60	\$0.21	\$7.00	\$1.75	\$1.75	\$0.44	\$3.50	\$0.88	\$5.25	\$1.31
2029	\$0.60	\$0.21	\$7.00	\$1.75	\$1.75	\$0.44	\$3.50	\$0.88	\$5.25	\$1.31
2030	\$0.60	\$0.21	\$7.00	\$1.75	\$1.75	\$0.44	\$3.50	\$0.88	\$5.25	\$1.31
2031	\$0.65	\$0.21	\$7.50	\$1.75	\$2.00	\$0.44	\$3.75	\$0.88	\$5.75	\$1.31
2032	\$0.65	\$0.21	\$7.50	\$1.75	\$2.00	\$0.44	\$3.75	\$0.88	\$5.75	\$1.31
2033	\$0.65	\$0.21	\$7.50	\$1.75	\$2.00	\$0.44	\$3.75	\$0.88	\$5.75	\$1.31
2034	\$0.70	\$0.24	\$8.00	\$2.00	\$2.00	\$0.50	\$4.00	\$1.00	\$6.00	\$1.50
2035	\$0.70	\$0.24	\$8.00	\$2.00	\$2.00	\$0.50	\$4.00	\$1.00	\$6.00	\$1.50
2036	\$0.70	\$0.24	\$8.00	\$2.00	\$2.00	\$0.50	\$4.00	\$1.00	\$6.00	\$1.50
2037	\$0.75	\$0.24	\$8.50	\$2.00	\$2.25	\$0.50	\$4.25	\$1.00	\$6.50	\$1.50
2038	\$0.75	\$0.24	\$8.50	\$2.00	\$2.25	\$0.50	\$4.25	\$1.00	\$6.50	\$1.50
2039	\$0.75	\$0.24	\$8.50	\$2.00	\$2.25	\$0.50	\$4.25	\$1.00	\$6.50	\$1.50
2040	\$0.80	\$0.24	\$9.00	\$2.00	\$2.25	\$0.50	\$4.50	\$1.00	\$6.75	\$1.50

9. Traffic and Toll Revenue Analyses

The estimates of tolled traffic and toll revenue (T&R) for the Mt. Hope Bridge are based upon the information presented in this report. The steps to arrive at the final T&R estimates include:

- Forecast of toll free traffic;
- Development of Mt. Hope Bridge Traffic and Revenue (T&R) model; and
- Estimates of tolled traffic and toll revenue.

These three steps are presented in this section.

9.1 Forecast of Toll Free Traffic

The forecast of toll free traffic was based upon the historical traffic counts on the Mt. Hope Bridge from Table 4, which includes both tolled (through 1998) and non-tolled (recent) traffic, the current traffic trends on similar facilities in the State, and the anticipated growth in the area that would bring added traffic to the Bridge. Table 16 presents the toll-free traffic forecast for the Mt. Hope Bridge. It is anticipated that the Mt. Hope Bridge has experienced some traffic loss since the most recent traffic count taken in 2006 based on traffic volumes across the state decreasing. Traffic in 2010 is anticipated to be flat, with modest growth thereafter of 0.5 percent per year until 2020. Beyond 2020 growth is estimated to slow based on the maturity of the area that is served by the Mt. Hope Bridge.

Table 16: Mt. Hope Bridge Toll-Free Traffic Forecast

Fiscal Year	Mt. Hope Bridge Toll Free Traffic (AADT)
2011	17,000
2020	17,700
2030	18,200
2040	18,600

9.2 Mt. Hope Bridge Traffic and Revenue (T&R) Model

To arrive at tolled traffic and toll revenue estimates for the Mt. Hope Bridge, a customized T&R model was developed. The toll free traffic estimated in the previous step was broken into the various potential payment categories (i.e. vehicle classes and payment types), then a percentage of traffic was removed or moved to a different payment class based upon the toll burden by class, and finally toll revenue was calculated as a function of tolled traffic by payment class.

The toll free traffic was disaggregated into passenger cars and commercial vehicles, as defined by the number of axles. Two axle vehicles were considered passenger cars, and all other vehicles (i.e. all vehicles with 3 or more axles) were classified as commercial vehicles. Based on historical data, one percent of total vehicles was estimated to be commercial vehicles, with the remainder being passenger cars. This took into account the current vehicle restrictions on the Sakonnet that were in

place during the August 2009 vehicle class survey and the lifting of those restrictions before the beginning of the forecast. Those passenger cars were then further disaggregated into commuter and non-commuter vehicles. Based upon the historical data, the survey results, the travel time surveys, and comparisons to the Newport Pell Bridge, it was estimated that 70 percent of all passenger car transactions would be commuter.

These estimates of traffic splits resulted in an estimate of toll free transactions by vehicle and payment class. The next step was to divert the toll free traffic to an alternate route, suppress the trip or possibly move traffic from one payment type to another (only in the case of non-commuter to commuter for passenger cars). All of this diversion was a function of the toll schedule being analyzed. For example, traffic subjected to Toll Schedule Alternative 1 had the lowest diversion rates, increasing with the toll burden for the motorists.

The results of the diversion analyses were then checked against the known limits of *E-ZPass* penetration, commuter share, and the percentage of commercial vehicles. Additionally, the ability for the alternate routes to handle the diverted traffic was checked to assure that deterioration of capacity would not be at a level to re-divert traffic back to the Mt. Hope Bridge route.

Tolled traffic was forecasted for a 30 year period, from FY11 to FY40. Since the forecast for each Alternative was subject to on-going toll increases every three years, elasticity factors from the Newport Pell Bridge traffic and toll revenue study were used to estimate traffic decreases for the years of the toll increase. Similar to the recent analysis done for the Authority, a half of the traffic that was estimated to be diverted or suppressed because of the toll increases was brought back to the facility over a three year period. This accounts for the estimated recovery of traffic after the individual toll increases.

9.3 Estimates of Tolled Traffic and Toll Revenue

Based on the foregoing detail, the estimates of tolled traffic and toll revenue for each Toll Schedule Alternative were developed, and are presented numerically in Table 17 and illustratively in Figure 14 and Figure 15.

The FY 11 toll traffic and revenue estimates under Toll Schedule Alternative 1 are comparable to the most recent full year of tolled traffic on the Mt. Hope Bridge, FY97. The results from the T&R analysis provide approximately 16 percent more transactions comparing FY11 to FY97. This is due to overall growth in the area as well as the toll being lower in real terms, i.e. accounting for the influence of inflation to depreciate the value of the toll. Toll revenue is estimated to be approximately 11 percent higher than in FY 1997. This discrepancy between transactions and revenue differentials (16 vs. 11 percent growth) is because of the anticipated increased use of the

commuter program through transponder ownership, as opposed to the token program that was previously in place.

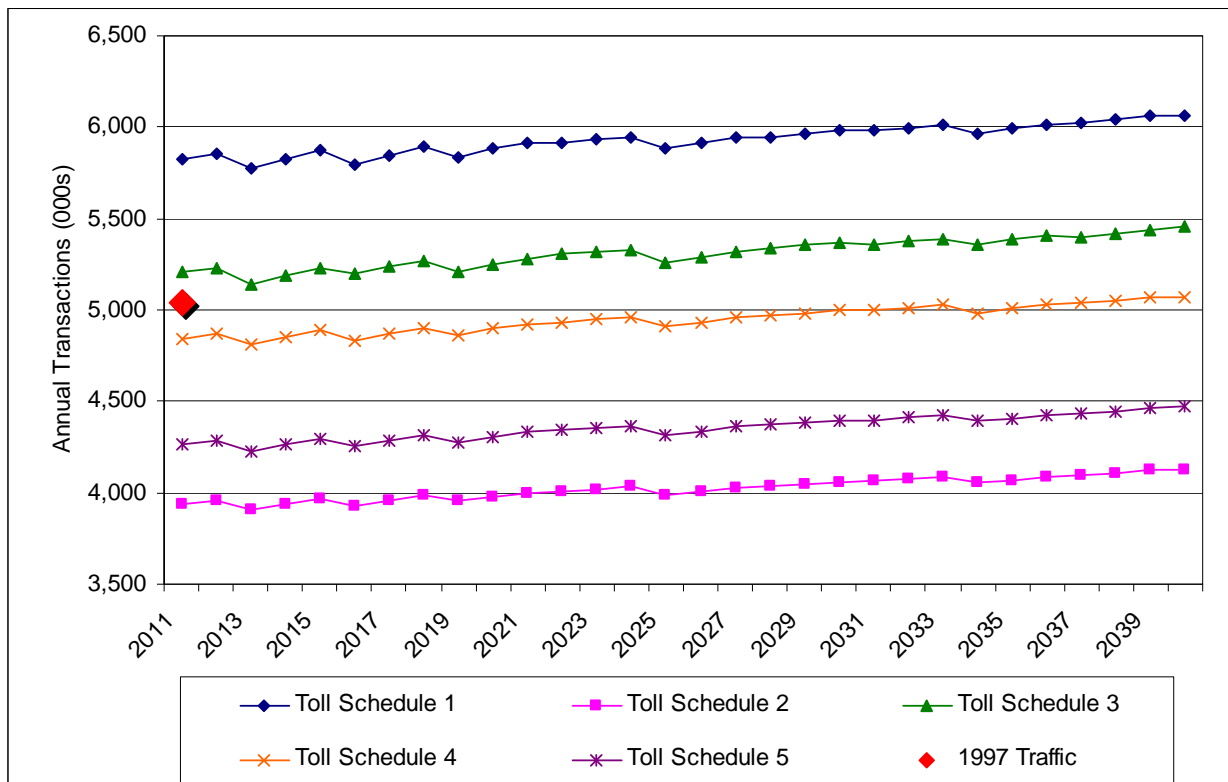
Table 17: Mt. Hope Annual Traffic and Toll Revenue Estimates for all Toll Schedule Alternatives, FY11 to FY40

Mt. Hope Annual Traffic and Toll Revenue Estimates (000s)										
Fiscal Year	Toll Schedule Alternative 1		Toll Schedule Alternative 2		Toll Schedule Alternative 3		Toll Schedule Alternative 4		Toll Schedule Alternative 5	
	Traffic	Toll Revenue	Traffic	Toll Revenue	Traffic	Toll Revenue	Traffic	Toll Revenue	Traffic	Toll Revenue
1997	5,044	\$810	5,044	\$810	5,044	\$810	5,044	\$810	5,044	\$810
2011	5,829	\$919	3,936	\$5,478	5,204	\$2,093	4,845	\$3,578	4,264	\$4,545
2012	5,859	\$924	3,956	\$5,505	5,230	\$2,104	4,869	\$3,596	4,285	\$4,568
2013	5,777	\$1,076	3,909	\$6,329	5,144	\$2,528	4,811	\$4,121	4,229	\$5,326
2014	5,824	\$1,085	3,940	\$6,380	5,188	\$2,554	4,849	\$4,154	4,263	\$5,371
2015	5,872	\$1,095	3,970	\$6,431	5,233	\$2,579	4,887	\$4,187	4,298	\$5,417
2016	5,799	\$1,289	3,923	\$7,521	5,197	\$2,832	4,829	\$4,873	4,252	\$6,231
2017	5,845	\$1,300	3,954	\$7,578	5,235	\$2,850	4,867	\$4,910	4,285	\$6,275
2018	5,891	\$1,310	3,985	\$7,636	5,273	\$2,867	4,905	\$4,947	4,317	\$6,319
2019	5,838	\$1,507	3,953	\$8,741	5,208	\$3,379	4,865	\$5,642	4,277	\$7,302
2020	5,881	\$1,518	3,981	\$8,804	5,249	\$3,409	4,900	\$5,682	4,309	\$7,358
2021	5,909	\$1,526	4,000	\$8,845	5,277	\$3,431	4,923	\$5,709	4,330	\$7,396
2022	5,911	\$1,603	4,009	\$9,182	5,306	\$3,453	4,933	\$5,945	4,344	\$7,603
2023	5,929	\$1,609	4,020	\$9,213	5,319	\$3,461	4,947	\$5,966	4,356	\$7,625
2024	5,948	\$1,615	4,032	\$9,244	5,332	\$3,470	4,961	\$5,986	4,367	\$7,648
2025	5,884	\$1,809	3,990	\$10,332	5,259	\$3,977	4,910	\$6,670	4,318	\$8,616
2026	5,912	\$1,818	4,008	\$10,379	5,287	\$4,000	4,933	\$6,700	4,339	\$8,659
2027	5,940	\$1,827	4,027	\$10,426	5,314	\$4,024	4,956	\$6,731	4,360	\$8,702
2028	5,945	\$1,905	4,038	\$10,769	5,342	\$4,047	4,967	\$6,971	4,375	\$8,914
2029	5,963	\$1,912	4,049	\$10,804	5,355	\$4,057	4,981	\$6,994	4,386	\$8,940
2030	5,981	\$1,918	4,060	\$10,839	5,369	\$4,067	4,996	\$7,017	4,398	\$8,965
2031	5,979	\$1,995	4,064	\$11,170	5,355	\$4,346	4,999	\$7,250	4,398	\$9,327
2032	5,997	\$2,002	4,075	\$11,206	5,373	\$4,367	5,013	\$7,274	4,411	\$9,361
2033	6,015	\$2,009	4,087	\$11,242	5,391	\$4,387	5,027	\$7,298	4,424	\$9,395
2034	5,963	\$2,206	4,052	\$12,350	5,361	\$4,643	4,985	\$7,994	4,390	\$10,221
2035	5,989	\$2,216	4,070	\$12,402	5,383	\$4,658	5,006	\$8,028	4,408	\$10,261
2036	6,015	\$2,225	4,087	\$12,454	5,404	\$4,674	5,028	\$8,061	4,427	\$10,300
2037	6,024	\$2,305	4,099	\$12,804	5,401	\$4,960	5,041	\$8,306	4,436	\$10,677
2038	6,041	\$2,313	4,110	\$12,844	5,419	\$4,982	5,054	\$8,332	4,448	\$10,714
2039	6,059	\$2,320	4,121	\$12,884	5,436	\$5,004	5,068	\$8,359	4,461	\$10,752
2040	6,060	\$2,398	4,126	\$13,222	5,454	\$5,025	5,074	\$8,597	4,469	\$10,959

Fiscal Year: July to June, FY11 = July 2010 to June 2011

Estimates of transactions for the different Toll Schedule Alternatives change as a function of the toll burden under a specific toll schedule. This can most easily be seen in Figure 14. The toll schedule with the most transactions is Toll Schedule 1 (lowest toll rates) and the schedule with the lowest number of transactions is Toll Schedule 2 (highest tolls). Also note the wave-like nature of the curves, with each dip representative of a toll increase in that fiscal year, causing transactions to decrease. The transaction level from FY97, the last full year of tolling is provided as the red diamond for reference.

Figure 14: Mt. Hope Bridge Annual Toll Transaction Estimate by Toll Schedule Alternative



When reviewing the results of estimated toll revenues, the exact opposite phenomenon is exhibited, meaning that the toll schedule with the highest tolls results in the highest toll revenue. Figure 15 presents the estimated toll revenues from each Toll Schedule Alternative. In spite of the small transaction drops in the year of a toll increase in Figure 14, the toll revenue increases at each toll increase. For some years, especially the more future years, the commuter rates do not increase with the full fare rates, causing only slight increases in toll revenue rather than more pronounced ones in the earlier years when all vehicle classes have toll increases. Similar to the graph of transactions, the toll revenue from FY97 is provided for reference in Figure 15 as well.

Figure 15: Mt. Hope Bridge Annual Toll Revenue Estimate by Toll Schedule Alternative

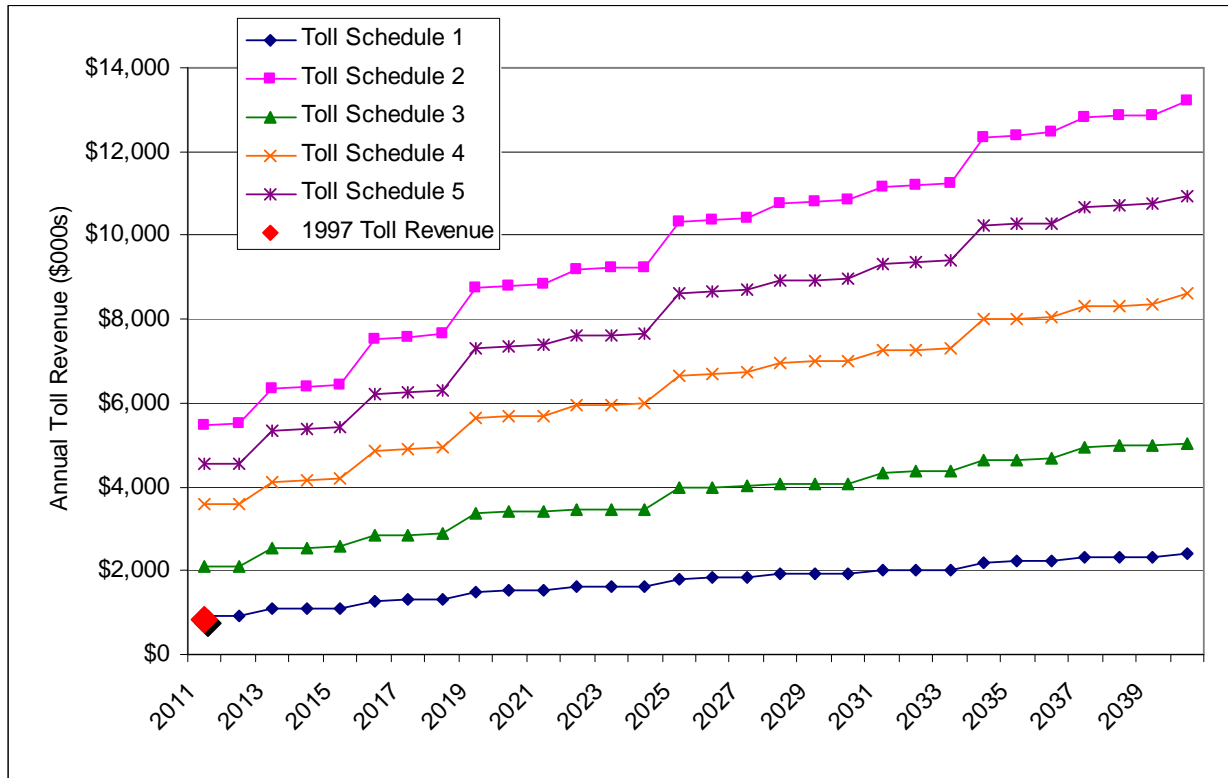
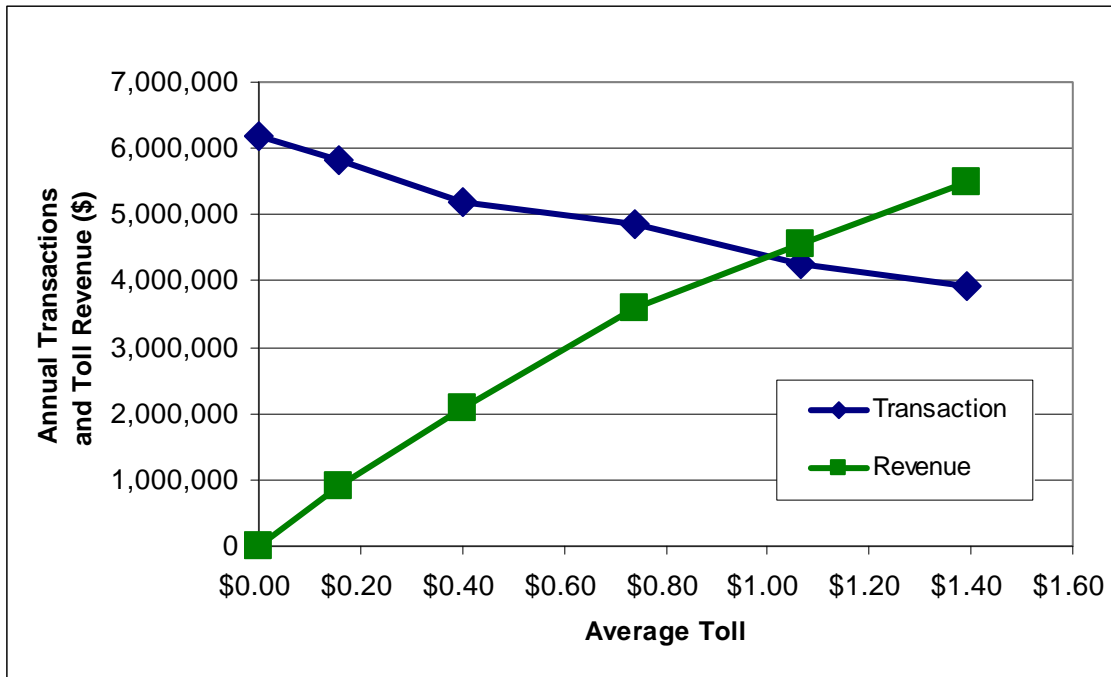


Figure 16 presents the toll sensitivity curve for the Mt. Hope Bridge, with both estimated transactions and toll revenue for FY11 under the different Toll Scenario Alternatives analyzed. The x-axis represents the average toll paid under the various Toll Schedule Alternatives, a weighted average based on the toll schedule and transactions by vehicle and payment class. As discussed previously, as the average toll increases, transactions decrease. It is the rate at which the transactions decrease that will cause the toll revenue to flatten out. Apparent from this analysis, the toll revenue does not flatten out within the toll schedules tested. There will be a point at which toll revenue will no longer increase with increases in toll because the transaction decrease is too great to be overcome by higher tolls. Typically toll authorities will price facilities below the revenue maximizing toll rate to assure investors that more revenue could be generated from the asset if the predicted traffic levels are not reached. This point is often called the optimal toll rate. The Authority has an added complexity with the very low commuter rate. For our analysis, very similar toll rate structures were considered, only changing the magnitude. Changing the toll rate structure could change the shape of the toll sensitivity curve, as motorists might not have all the options of avoiding the high cash rate.

Figure 16: Mt. Hope Toll Sensitivity Curve, FY11



10. Cost Estimates

To gain a full picture of the revenue opportunities for the Authority, the traffic and gross toll revenue estimates for the Toll Schedule Alternatives must be compared to the costs of collecting tolls on the Mt. Hope Bridge. The cost of toll collection includes the capital improvements needed to implement the toll plaza and toll collection system (Capital Costs) and the future “on-going” costs associated with toll collection including staffing, electronic toll processing and maintenance on the toll collection equipment (Operations and Maintenance, or “O&M” costs).

This section includes the summary cost estimates of both capital and O&M costs for all toll alternatives analyzed.

10.1 Toll Plaza Sizing and Collection Types

In order to estimate the capital and O&M costs for the proposed Mt. Hope Bridge toll plaza, it is necessary to estimate the number of lanes needed and define the toll collection methods. The hourly traffic survey detailed in Section 4.4 provides an understanding of current hourly demand on the Mt. Hope Bridge. Currently the highest hourly demand in one direction is approximately 820 vehicles. It is further estimated from the traffic and revenue analysis that between 75 and 85 percent of vehicles will be processed electronically. That being the case, it is estimated that two lanes, one processing only electronic transactions (*E-ZPass*) and one processing electronic and cash transactions (mixed mode) would be suitable for toll collection during the forecast period. The hourly traffic profile also indicates that during the AM and PM peak, traffic flows in both directions, therefore two lanes in each direction would be necessary, rather than a 3 lane plaza with a reversible middle lane.

The plaza described previously, 2 lanes with electronic and mixed mode processing in both directions, creating a 4 lane plaza, would be necessary to handle a toll facility that offers both cash and electronic payment (mixed-mode toll collection system). However, an analysis was also undertaken to understand the cost implications of an all electronic tolling (AET) system, in which cash was not accepted. There are mature toll roads that are moving toward AET and new ones that are opening up AET, so to provide the Authority a full picture of collection options this AET cost analysis was conducted.

10.2 Mixed Mode Toll Collection

In this section the Capital and O&M costs associated with the implementation of a mixed-mode toll collection system are estimated.

10.2.1 Capital Costs

It is estimated the capital cost for constructing the new toll plaza with 2 E-ZPassonly lanes and 2 cash or E-ZPass lanes, creating a 4 lane plaza, will be approximately \$3,275,000. This estimate does

not include the right-of-way costs for the new toll plaza. The following assumptions were made in determining this capital cost estimate:

1. All conventional lanes are equipped with E-ZPass equipment and can be run as cash only or mixed-use lanes;
2. All conventional lanes have gates with no video-based violation enforcement;
3. One toll plaza utility building will be constructed; and
4. There will be no pedestrian bridge or tunnel.

Table 18 presents the breakdown of the cost components for this capital cost estimate.

Table 18: Capital Cost Estimate for Mt. Hope Bridge Toll Plaza – Mixed Mode Collection

Item	Estimated Cost (000s)
Toll System Equipment and Installation	\$650
<i>Sub-Total</i>	<i>\$650</i>
Toll Plaza Roadway Construction	\$1,000
Toll Utility Building	\$500
Maintenance and Protection of Traffic	\$110
Contract Contingency	\$125
Mobilization	\$125
Construction Inspection	\$215
<i>Sub-Total</i>	<i>\$2,075</i>
Environmental Approval/Preliminary Design	\$275
Final Design	\$275
<i>Sub-Total</i>	<i>\$550</i>
Grand Total	\$3,275

10.2.2 Operations and Maintenance (O&M) Costs

The O&M costs are divided into four categories: toll system maintenance; Customer Service Center (CSC) fees, toll operations, and toll operations staffing.

10.2.2.1 Toll System Maintenance

The toll system maintenance cost accounts for the maintenance of the lane and plaza equipment and the communications system. The annual cost is based on the contract with the existing toll collection vendor. The estimate presented herein assumes that the vendor will maintain the Mount Hope Bridge for comparable fees as the Newport Pell Bridge. The annual maintenance cost is assumed to escalate at 3 percent per year, using an aggressive estimate of inflation and thus an overall conservative

approach to the feasibility assessment. We expect that the first year of operations will be covered under warranty, and that maintenance will commence in year two. Estimates of Toll System Maintenance are presented in Table 19.

Table 19: Toll System Maintenance Estimates, Mixed Mode

Year	Fiscal Year	Toll System Maintenance Estimate
1	2011	\$ -
2	2012	\$ 51,500
3	2013	\$ 53,000
4	2014	\$ 54,600
5	2015	\$ 56,300
6	2016	\$ 58,000
7	2017	\$ 59,700
8	2018	\$ 61,500
9	2019	\$ 63,300
10	2020	\$ 65,200

10.2.2.2 Customer Service Center (CSC) Fees

The CSC will incur processing fees of \$0.129 per transaction in FY11, and \$0.097 per transaction in FY12 and FY13, according to the existing contract. However these rates are relevant to the first 10 million Authority transactions, with lower rates of \$0.018 per transaction for transactions greater than 10 million. To develop the CSC costs for the Mt. Hope Bridge, Newport Pell Bridge transactions were taken into account which allowed for approximately 40 percent of Mt. Hope electronic transactions to qualify for the lower rate in FY11. This percentage grew throughout the forecast because of the anticipated growth of electronic transactions on the Newport Pell Bridge. Beyond FY13 the respective cost per transaction for each rate level was escalated at 3 percent to reflect anticipated future costs beyond the contract period. Table 20 presents the estimated fees per year calculated using the annual estimated electronic transactions and revenue for Toll Schedule Alternative 1 as defined in the traffic and toll revenue analysis.

Table 20: Customer Service Center Fees, Mixed Mode, Toll Schedule Alternative 1

Year	Date	Electronic Transactions	Electronic Toll Revenues	Processing Fees	Credit Card Fees	Total Fee
1	2011	4,569,000	\$469,000	\$381,000	\$7,500	\$388,500
2	2012	4,591,000	\$471,000	\$282,000	\$7,500	\$289,500
3	2013	4,535,000	\$538,000	\$277,000	\$8,600	\$285,600
4	2014	4,571,000	\$541,000	\$278,000	\$8,700	\$286,700
5	2015	4,607,000	\$544,000	\$277,000	\$8,700	\$285,700
6	2016	4,550,000	\$611,000	\$284,000	\$9,800	\$293,800
7	2017	4,586,000	\$614,000	\$286,000	\$9,800	\$295,800
8	2018	4,622,000	\$617,000	\$286,000	\$9,900	\$295,900
9	2019	4,583,000	\$685,000	\$293,000	\$11,000	\$304,000
10	2020	4,617,000	\$688,000	\$297,000	\$11,000	\$308,000

The CSC fees will be different for each toll schedule because of the different estimates of electronic transactions. Table 21 provides the estimated fees for each toll schedule analyzed.

Table 21: Customer Service Center Fees, Mixed Mode, All Toll Schedule Alternatives

Fiscal Year	Toll Schedule Alternative (\$000s)				
	1	2	3	4	5
2011	\$388	\$414	\$393	\$406	\$409
2012	\$290	\$316	\$294	\$307	\$310
2013	\$286	\$311	\$289	\$303	\$306
2014	\$286	\$311	\$290	\$303	\$306
2015	\$285	\$310	\$289	\$302	\$304
2016	\$294	\$317	\$296	\$309	\$312
2017	\$296	\$318	\$298	\$311	\$313
2018	\$296	\$318	\$298	\$311	\$312
2019	\$304	\$325	\$305	\$318	\$320
2020	\$308	\$328	\$308	\$321	\$323

10.2.2.3 Toll Operations Maintenance

Table 22 presents the maintenance costs for toll operations and includes items such as utilities, office supplies, and housekeeping. Note that maintenance of the toll operations is not required until Year 2 since the capital investment would cover Year 1.

Table 22: Toll Operations Maintenance Estimates, Mixed Mode

Year	Fiscal Year	Toll Operations Estimate
1	2011	\$
2	2012	\$ 41,900
3	2013	\$ 43,200
4	2014	\$ 44,500
5	2015	\$ 45,800
6	2016	\$ 47,200
7	2017	\$ 48,600
8	2018	\$ 50,100
9	2019	\$ 51,600
10	2020	\$ 53,100

10.2.2.4 Toll Operations Staffing

The toll operation staffing estimate is based on a staff of nine toll collectors based on anticipated needs at the toll plaza. The estimate incorporates current agency wages for comparable positions. The staffing level remains constant throughout the estimate period, but costs are escalated at 3 percent per year.

Table 23: Toll Operations Staffing Estimate, Mixed Mode

Year	Fiscal Year	Toll Operations Staffing Estimate
1	2011	\$ 329,800
2	2012	\$ 339,700
3	2013	\$ 349,900
4	2014	\$ 360,400
5	2015	\$ 371,200
6	2016	\$ 382,300
7	2017	\$ 393,800
8	2018	\$ 405,600
9	2019	\$ 417,800
10	2020	\$ 430,300

10.2.2.5 O&M Summary

The total O&M costs for the mixed-mode toll collection will vary by toll schedule since a portion of the toll collection costs are a function of transactions. Table 24 presents the estimated O&M costs for the Toll Schedule Alternatives analyzed.

Table 24: O&M Cost Summary, Mixed Mode by Toll Schedule Alternative

Fiscal Year	Toll Schedule Alternative (\$000s)				
	1	2	3	4	5
2011	\$718	\$744	\$723	\$736	\$738
2012	\$723	\$749	\$727	\$740	\$743
2013	\$732	\$757	\$736	\$749	\$752
2014	\$746	\$771	\$749	\$762	\$765
2015	\$759	\$783	\$762	\$775	\$777
2016	\$781	\$804	\$784	\$797	\$799
2017	\$798	\$820	\$800	\$813	\$815
2018	\$813	\$835	\$815	\$828	\$830
2019	\$837	\$857	\$837	\$850	\$852
2020	\$857	\$876	\$857	\$870	\$871

10.3 All Electronic Tolling (AET)

In this section, the cost to implement and operate an AET toll collection system is estimated. The same categories from the mixed mode collection scenario are detailed for comparative purposes.

10.3.1 Capital Costs

The first items to be compared are the estimated capital costs. Table 25 presents the estimated capital costs assuming AET. The overall cost is slightly less than compared to the mixed-mode collection, approximately \$200,000 lower. The toll system equipment and installation is approximately twice as expensive but the toll plaza design and construction is significantly less comparing AET to mixed mode collection.

Table 25: Capital Cost Estimate for Mt. Hope Bridge Toll Plaza – AET Collection

Item	Estimated Cost (000s)
Toll System Equipment and Installation	\$1,200
Sub-Total	\$1,200
Toll Plaza Roadway Construction	\$1,000
Toll Utility Building	N/A
Maintenance and Protection of Traffic	\$110
Contract Contingency	\$130
Mobilization	\$130
Construction Inspection	\$220
Sub-Total	\$1,590
Environmental Approval/Preliminary Design	\$140
Final Design	\$140
Sub-Total	\$280
Grand Total	\$3,070

10.3.2 Operations and Maintenance Costs

Similar to the Capital costs, the O&M costs for the AET system are presented in this section with comparison to the mixed mode alternative.

10.3.2.1 Toll System Maintenance

It is estimated that the toll system maintenance will be the same regardless of toll collection alternative implemented.

10.3.2.2 Customer Service Center (CSC) Fees

The CSC and associated processing fees are the most significant cost difference for the AET system versus the mixed mode collection system. The cost to collect transponder, or *E-ZPass*, transactions remains the same between collection alternatives, but the cost to collect video must be added to the AET scenario. Table 26 presents the cost to collect the video transactions for Toll Schedule Alternative 1 using the industry average cost of \$2.00 per video tolling transactions. The fee estimates for the other toll schedules are provided in Table 27. This cost to collect tolls from video patrons replaces the cost of the toll collectors.

Table 26: Customer Service Center Video Collection Fees, AET, Toll Schedule Alternative 1

Year	Fiscal Year	Video Transactions	Fees (\$)
1	2011	1,260,800	\$2,521,700
2	2012	1,267,100	\$2,534,300
3	2013	1,241,600	\$2,483,200
4	2014	1,253,100	\$2,506,200
5	2015	1,264,700	\$2,529,400
6	2016	1,248,900	\$2,497,900
7	2017	1,258,900	\$2,517,700
8	2018	1,268,800	\$2,537,700
9	2019	1,254,800	\$2,509,700
10	2020	1,264,500	\$2,529,000

Table 27: Customer Service Center, Video Collection Fees, AET, All Toll Schedules

Fiscal Year	Toll Schedule Alternative (\$000s)				
	1	2	3	4	5
2011	\$2,522	\$1,040	\$1,929	\$1,485	\$1,189
2012	\$2,534	\$1,046	\$1,938	\$1,492	\$1,195
2013	\$2,483	\$1,031	\$1,875	\$1,471	\$1,170
2014	\$2,506	\$1,039	\$1,896	\$1,483	\$1,181
2015	\$2,529	\$1,048	\$1,918	\$1,495	\$1,192
2016	\$2,498	\$1,039	\$1,940	\$1,482	\$1,190
2017	\$2,518	\$1,046	\$1,949	\$1,493	\$1,198
2018	\$2,538	\$1,054	\$1,959	\$1,504	\$1,205
2019	\$2,510	\$1,046	\$1,910	\$1,492	\$1,188
2020	\$2,529	\$1,053	\$1,929	\$1,503	\$1,198

10.3.2.3 Toll Operations Maintenance

Toll operations maintenance only includes utilities for the AET scenario, offering a slight savings over the mixed mode scenario. Table 28 presents the cost estimates of toll operations for the AET scenario.

Table 28: Toll Operations Maintenance Estimates, AET

Year	Fiscal Year	Toll Operations Estimate
1	2011	\$
2	2012	\$ 30,900
3	2013	\$ 31,800
4	2014	\$ 32,800
5	2015	\$ 33,800
6	2016	\$ 34,800
7	2017	\$ 35,800
8	2018	\$ 36,900
9	2019	\$ 38,000
10	2020	\$ 39,100

10.3.2.4 O&M Summary

The total O&M costs for the AET toll collection is presented in Table 29. Again, these costs are significantly higher than cost to collect via the mixed-mode toll collection option, because of the added costs to collect non-transponder tolls.

Table 29: O&M Cost Summary AET by Toll Schedule Alternative

Fiscal Year	Toll Schedule Alternative (\$000s)				
	1	2	3	4	5
2011	\$2,910	\$1,454	\$2,322	\$1,890	\$1,597
2012	\$2,906	\$1,444	\$2,315	\$1,882	\$1,587
2013	\$2,854	\$1,427	\$2,249	\$1,859	\$1,561
2014	\$2,880	\$1,438	\$2,273	\$1,874	\$1,574
2015	\$2,905	\$1,448	\$2,297	\$1,887	\$1,586
2016	\$2,884	\$1,448	\$2,329	\$1,884	\$1,594
2017	\$2,909	\$1,460	\$2,343	\$1,900	\$1,606
2018	\$2,932	\$1,470	\$2,355	\$1,913	\$1,616
2019	\$2,915	\$1,472	\$2,316	\$1,911	\$1,609
2020	\$2,941	\$1,485	\$2,342	\$1,929	\$1,625

11. Net Toll Revenues

The toll revenues presented in Section 9.3 are gross toll revenues. This is the toll revenue that is estimated to be collected by the Authority in a given fiscal year for the 30-year period. More useful for the Authority is the understanding of the net toll revenue available for either financing of capital projects or current year cash flow for the Authority. The annual costs of operating the Mt. Hope Bridge Toll Facility were developed in Section 10. These costs are unique to each toll schedule because they are a function of a number of variables, including the number of transactions processed electronically.

Table 30 presents the net toll revenue by toll schedule for the mixed mode collection scenario. Additionally, the net present value of the net toll revenue streams is calculated at the bottom of the table to provide a quick comparison across the toll schedule options. The future revenues are discounted at 4 percent per year, representing the most recent interest rates for tolled infrastructure available to date.

All toll schedules provide a positive net toll revenue stream for the entire forecast period. Additionally toll revenue is increasing at a greater rate than costs due to the planned toll increases discussed previously in the analysis.

The same information is presented under the AET collection scenario in Table 31. As predicted from the higher operating costs, the net revenue streams under the AET scenario are significantly less. It should also be noted that it is assumed that under the AET collection scheme the video toll customers are assumed to pay the cash rate, therefore not offering an ability for the Authority to recoup a portion of the additional cost to collect from the motorists without transponders. If higher tolls were charged to this segment of the motorists then some of the costs could be mitigated.

Table 30: Mt. Hope Bridge Estimates of Net Toll Revenue, Mixed Mode Collection

Mt. Hope Toll Feasibility Analysis (000s)															
Fiscal Year	Toll Schedule 1			Toll Schedule 2			Toll Schedule 3			Toll Schedule 4			Toll Schedule 5		
	Toll Revenue	O&M Costs	Net Revenue	Toll Revenue	O&M Costs	Net Revenue	Toll Revenue	O&M Costs	Net Revenue	Toll Revenue	O&M Costs	Net Revenue	Toll Revenue	O&M Costs	Net Revenue
2011	\$919	\$718	\$201	\$5,478	\$744	\$4,734	\$2,093	\$723	\$1,371	\$3,578	\$736	\$2,842	\$4,545	\$738	\$3,807
2012	\$924	\$723	\$201	\$5,505	\$749	\$4,756	\$2,104	\$727	\$1,376	\$3,596	\$740	\$2,855	\$4,568	\$743	\$3,825
2013	\$1,076	\$732	\$344	\$6,329	\$757	\$5,572	\$2,528	\$736	\$1,793	\$4,121	\$749	\$3,372	\$5,326	\$752	\$4,574
2014	\$1,085	\$746	\$339	\$6,380	\$771	\$5,609	\$2,554	\$749	\$1,804	\$4,154	\$762	\$3,392	\$5,371	\$765	\$4,606
2015	\$1,095	\$759	\$336	\$6,431	\$783	\$5,648	\$2,579	\$762	\$1,818	\$4,187	\$775	\$3,412	\$5,417	\$777	\$4,640
2016	\$1,289	\$781	\$508	\$7,521	\$804	\$6,716	\$2,832	\$784	\$2,048	\$4,873	\$797	\$4,076	\$6,231	\$799	\$5,432
2017	\$1,300	\$798	\$502	\$7,578	\$820	\$6,758	\$2,850	\$800	\$2,050	\$4,910	\$813	\$4,097	\$6,275	\$815	\$5,460
2018	\$1,310	\$813	\$497	\$7,636	\$835	\$6,801	\$2,867	\$815	\$2,053	\$4,947	\$828	\$4,119	\$6,319	\$830	\$5,489
2019	\$1,507	\$837	\$670	\$8,741	\$857	\$7,884	\$3,379	\$837	\$2,542	\$5,642	\$850	\$4,791	\$7,302	\$852	\$6,449
2020	\$1,518	\$857	\$662	\$8,804	\$876	\$7,928	\$3,409	\$857	\$2,552	\$5,682	\$870	\$4,812	\$7,358	\$871	\$6,486
2021	\$1,526	\$875	\$651	\$8,845	\$894	\$7,951	\$3,431	\$875	\$2,555	\$5,709	\$888	\$4,821	\$7,396	\$890	\$6,506
2022	\$1,603	\$896	\$707	\$9,182	\$914	\$8,268	\$3,453	\$895	\$2,557	\$5,945	\$908	\$5,037	\$7,603	\$909	\$6,694
2023	\$1,609	\$920	\$689	\$9,213	\$936	\$8,277	\$3,461	\$919	\$2,542	\$5,966	\$931	\$5,034	\$7,625	\$932	\$6,693
2024	\$1,615	\$942	\$674	\$9,244	\$957	\$8,287	\$3,470	\$940	\$2,529	\$5,986	\$953	\$5,034	\$7,648	\$953	\$6,695
2025	\$1,809	\$973	\$837	\$10,332	\$987	\$9,345	\$3,977	\$970	\$3,006	\$6,670	\$983	\$5,687	\$8,616	\$983	\$7,634
2026	\$1,818	\$997	\$821	\$10,379	\$1,010	\$9,368	\$4,000	\$994	\$3,006	\$6,700	\$1,007	\$5,693	\$8,659	\$1,006	\$7,653
2027	\$1,827	\$1,020	\$807	\$10,426	\$1,032	\$9,394	\$4,024	\$1,016	\$3,007	\$6,731	\$1,029	\$5,702	\$8,702	\$1,028	\$7,674
2028	\$1,905	\$1,045	\$860	\$10,769	\$1,055	\$9,714	\$4,047	\$1,040	\$3,007	\$6,971	\$1,053	\$5,918	\$8,914	\$1,052	\$7,862
2029	\$1,912	\$1,072	\$840	\$10,804	\$1,081	\$9,722	\$4,057	\$1,067	\$2,990	\$6,994	\$1,080	\$5,914	\$8,940	\$1,078	\$7,861
2030	\$1,918	\$1,098	\$821	\$10,839	\$1,106	\$9,733	\$4,067	\$1,092	\$2,975	\$7,017	\$1,105	\$5,912	\$8,965	\$1,103	\$7,863
2031	\$1,995	\$1,125	\$870	\$11,170	\$1,132	\$10,038	\$4,346	\$1,119	\$3,227	\$7,250	\$1,131	\$6,119	\$9,327	\$1,129	\$8,198
2032	\$2,002	\$1,155	\$847	\$11,206	\$1,160	\$10,046	\$4,367	\$1,148	\$3,219	\$7,274	\$1,160	\$6,114	\$9,361	\$1,158	\$8,204
2033	\$2,009	\$1,182	\$827	\$11,242	\$1,186	\$10,056	\$4,387	\$1,175	\$3,212	\$7,298	\$1,187	\$6,111	\$9,395	\$1,184	\$8,211
2034	\$2,206	\$1,220	\$986	\$12,350	\$1,223	\$11,127	\$4,643	\$1,212	\$3,431	\$7,994	\$1,224	\$6,770	\$10,221	\$1,220	\$9,001
2035	\$2,216	\$1,250	\$966	\$12,402	\$1,251	\$11,151	\$4,658	\$1,242	\$3,417	\$8,028	\$1,253	\$6,774	\$10,261	\$1,249	\$9,011
2036	\$2,225	\$1,278	\$947	\$12,454	\$1,278	\$11,176	\$4,674	\$1,269	\$3,404	\$8,061	\$1,281	\$6,780	\$10,300	\$1,277	\$9,023
2037	\$2,305	\$1,309	\$996	\$12,804	\$1,307	\$11,497	\$4,960	\$1,299	\$3,661	\$8,306	\$1,310	\$6,995	\$10,677	\$1,306	\$9,372
2038	\$2,313	\$1,343	\$970	\$12,844	\$1,339	\$11,504	\$4,982	\$1,332	\$3,650	\$8,332	\$1,344	\$6,989	\$10,714	\$1,338	\$9,376
2039	\$2,320	\$1,375	\$946	\$12,884	\$1,370	\$11,514	\$5,004	\$1,364	\$3,640	\$8,359	\$1,375	\$6,984	\$10,752	\$1,369	\$9,383
2040	\$2,398	\$1,408	\$990	\$13,222	\$1,401	\$11,822	\$5,025	\$1,396	\$3,630	\$8,597	\$1,407	\$7,190	\$10,959	\$1,400	\$9,559
NPV (4% Flat)			\$10,937			\$139,036			\$43,429			\$84,381			\$113,007

Table 31: Mt. Hope Bridge Estimates of Net Toll Revenue, AET Collection

Mt. Hope Toll Feasibility Analysis (000s) - AET Tolling Option															
Fiscal Year	Toll Schedule 1			Toll Schedule 2			Toll Schedule 3			Toll Schedule 4			Toll Schedule 5		
	Toll Revenue	O&M Costs	Net Revenue	Toll Revenue	O&M Costs	Net Revenue	Toll Revenue	O&M Costs	Net Revenue	Toll Revenue	O&M Costs	Net Revenue	Toll Revenue	O&M Costs	Net Revenue
2011	\$919	\$2,910	(\$1,991)	\$5,478	\$1,454	\$4,023	\$2,093	\$2,322	(\$228)	\$3,578	\$1,890	\$1,687	\$4,545	\$1,597	\$2,948
2012	\$924	\$2,906	(\$1,983)	\$5,505	\$1,444	\$4,062	\$2,104	\$2,315	(\$211)	\$3,596	\$1,882	\$1,714	\$4,568	\$1,587	\$2,981
2013	\$1,076	\$2,854	(\$1,778)	\$6,329	\$1,427	\$4,902	\$2,528	\$2,249	\$279	\$4,121	\$1,859	\$2,262	\$5,326	\$1,561	\$3,765
2014	\$1,085	\$2,880	(\$1,795)	\$6,380	\$1,438	\$4,942	\$2,554	\$2,273	\$280	\$4,154	\$1,874	\$2,280	\$5,371	\$1,574	\$3,797
2015	\$1,095	\$2,905	(\$1,810)	\$6,431	\$1,448	\$4,983	\$2,579	\$2,297	\$283	\$4,187	\$1,887	\$2,300	\$5,417	\$1,586	\$3,831
2016	\$1,289	\$2,884	(\$1,595)	\$7,521	\$1,448	\$6,072	\$2,832	\$2,329	\$503	\$4,873	\$1,884	\$2,988	\$6,231	\$1,594	\$4,636
2017	\$1,300	\$2,909	(\$1,609)	\$7,578	\$1,460	\$6,118	\$2,850	\$2,343	\$507	\$4,910	\$1,900	\$3,010	\$6,275	\$1,606	\$4,669
2018	\$1,310	\$2,932	(\$1,622)	\$7,636	\$1,470	\$6,166	\$2,867	\$2,355	\$512	\$4,947	\$1,913	\$3,034	\$6,319	\$1,616	\$4,703
2019	\$1,507	\$2,915	(\$1,408)	\$8,741	\$1,472	\$7,269	\$3,379	\$2,316	\$1,063	\$5,642	\$1,911	\$3,730	\$7,302	\$1,609	\$5,693
2020	\$1,518	\$2,941	(\$1,423)	\$8,804	\$1,485	\$7,319	\$3,409	\$2,342	\$1,067	\$5,682	\$1,929	\$3,754	\$7,358	\$1,625	\$5,733
2021	\$1,526	\$2,960	(\$1,434)	\$8,845	\$1,495	\$7,351	\$3,431	\$2,362	\$1,069	\$5,709	\$1,941	\$3,768	\$7,396	\$1,636	\$5,760
2022	\$1,603	\$2,938	(\$1,334)	\$9,182	\$1,491	\$7,691	\$3,453	\$2,383	\$1,070	\$5,945	\$1,933	\$4,012	\$7,603	\$1,638	\$5,964
2023	\$1,609	\$2,959	(\$1,350)	\$9,213	\$1,504	\$7,709	\$3,461	\$2,397	\$1,064	\$5,966	\$1,949	\$4,017	\$7,625	\$1,651	\$5,974
2024	\$1,615	\$2,979	(\$1,363)	\$9,244	\$1,515	\$7,729	\$3,470	\$2,409	\$1,061	\$5,986	\$1,962	\$4,024	\$7,648	\$1,662	\$5,986
2025	\$1,809	\$2,969	(\$1,159)	\$10,332	\$1,521	\$8,810	\$3,977	\$2,379	\$1,598	\$6,670	\$1,965	\$4,705	\$8,616	\$1,661	\$6,956
2026	\$1,818	\$2,989	(\$1,171)	\$10,379	\$1,534	\$8,845	\$4,000	\$2,401	\$1,599	\$6,700	\$1,980	\$4,720	\$8,659	\$1,675	\$6,984
2027	\$1,827	\$3,008	(\$1,181)	\$10,426	\$1,544	\$8,882	\$4,024	\$2,420	\$1,604	\$6,731	\$1,993	\$4,738	\$8,702	\$1,687	\$7,015
2028	\$1,905	\$2,993	(\$1,088)	\$10,769	\$1,543	\$9,226	\$4,047	\$2,441	\$1,607	\$6,971	\$1,989	\$4,982	\$8,914	\$1,691	\$7,223
2029	\$1,912	\$3,015	(\$1,103)	\$10,804	\$1,557	\$9,247	\$4,057	\$2,456	\$1,602	\$6,994	\$2,005	\$4,989	\$8,940	\$1,705	\$7,235
2030	\$1,918	\$3,034	(\$1,116)	\$10,839	\$1,568	\$9,271	\$4,067	\$2,468	\$1,599	\$7,017	\$2,019	\$4,998	\$8,965	\$1,716	\$7,249
2031	\$1,995	\$3,024	(\$1,029)	\$11,170	\$1,569	\$9,601	\$4,346	\$2,440	\$1,907	\$7,250	\$2,018	\$5,233	\$9,327	\$1,711	\$7,616
2032	\$2,002	\$3,045	(\$1,043)	\$11,206	\$1,583	\$9,623	\$4,367	\$2,462	\$1,905	\$7,274	\$2,034	\$5,240	\$9,361	\$1,727	\$7,634
2033	\$2,009	\$3,064	(\$1,055)	\$11,242	\$1,595	\$9,648	\$4,387	\$2,482	\$1,905	\$7,298	\$2,048	\$5,250	\$9,395	\$1,740	\$7,655
2034	\$2,206	\$3,064	(\$858)	\$12,350	\$1,605	\$10,745	\$4,643	\$2,511	\$2,131	\$7,994	\$2,056	\$5,938	\$10,221	\$1,755	\$8,466
2035	\$2,216	\$3,085	(\$869)	\$12,402	\$1,618	\$10,784	\$4,658	\$2,526	\$2,133	\$8,028	\$2,072	\$5,956	\$10,261	\$1,767	\$8,493
2036	\$2,225	\$3,103	(\$877)	\$12,454	\$1,628	\$10,826	\$4,674	\$2,538	\$2,136	\$8,061	\$2,084	\$5,977	\$10,300	\$1,778	\$8,522
2037	\$2,305	\$3,095	(\$790)	\$12,804	\$1,629	\$11,174	\$4,960	\$2,513	\$2,447	\$8,306	\$2,084	\$6,222	\$10,677	\$1,774	\$8,903
2038	\$2,313	\$3,117	(\$804)	\$12,844	\$1,644	\$11,200	\$4,982	\$2,536	\$2,446	\$8,332	\$2,101	\$6,231	\$10,714	\$1,790	\$8,925
2039	\$2,320	\$3,136	(\$816)	\$12,884	\$1,655	\$11,228	\$5,004	\$2,555	\$2,448	\$8,359	\$2,115	\$6,243	\$10,752	\$1,803	\$8,948
2040	\$2,398	\$3,131	(\$732)	\$13,222	\$1,658	\$11,564	\$5,025	\$2,575	\$2,450	\$8,597	\$2,116	\$6,481	\$10,959	\$1,810	\$9,150
NPV (4% Flat)			(\$24,105)			\$129,434			\$18,412			\$67,023			\$100,852

12. Limits, Disclaimers and Caveats

It is Jacobs' opinion that the estimates of traffic, gross toll revenue, net toll revenue, capital costs and O&M costs provided herein are reasonable and that they have been prepared in accordance with accepted industry-wide practice for this preliminary level of analysis. However, given the uncertainties within the current economic climate, it is important to note the following assumptions which, in our opinion, are reasonable:

- This report presents the results of Jacobs' consideration of the information available as of the date hereof and the application of our experience and professional judgment to that information. It is not a guarantee of any future events or trends.
- The estimates of traffic, gross toll revenue, net toll revenue, capital costs and O&M will be subject to future economic and social conditions, demographic developments and regional transportation construction activities that cannot be predicted with certainty.
- The estimates contained in this report, while presented with numeric specificity, are based on a number of estimates and assumptions which, though considered reasonable to us, are inherently subject to economic and competitive uncertainties and contingencies, most of which are beyond the control of the RITBA and cannot be predicted with certainty. In many instances, a broad range of alternative assumptions could be considered reasonable. Changes in the assumptions used could result in material differences in estimated outcomes.
- Jacobs' estimations only represent our best judgment and we do not warrant or represent that the actual gross toll revenues, net toll revenues and all costs will not vary from our estimates.
- We do not express any opinion on the following items: socioeconomic and demographic forecasts, proposed land use development projects and potential improvements to the regional transportation network.
- The standards of operation and maintenance on all of the system will be maintained as planned within the business rules and practices.
- The general configuration and location of the system and its interchanges will remain as discussed in this report.
- Access to and from the system will remain as discussed in this report.

- No other competing highway projects, tolled or non-tolled are assumed to be constructed or significantly improved in the project corridor during the project period, except those identified within this report.
- Major highway improvements that are currently underway or fully funded will be completed as planned.
- The system will be well maintained, efficiently operated, and effectively signed to encourage maximum usage.
- No reduced growth initiatives or related controls that would significantly inhibit normal development patterns will be introduced during the estimate period.
- There will be no future serious protracted recession during the estimate period.
- There will be no protracted fuel shortage during the estimate period.
- No local, regional, or national emergency will arise that will abnormally restrict the use of motor vehicles.