



# Impact of Transportation Demand Management (TDM) Elements on Managed Lanes Toll Prices

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FINAL REPORT

PREPARED FOR  
Florida Department of Transportation



## Disclaimer

The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the State of Florida Department of Transportation.”

## Metric Conversion

| SYMBOL                                                              | WHEN YOU KNOW         | MULTIPLY BY                    | TO FIND                         | SYMBOL         |
|---------------------------------------------------------------------|-----------------------|--------------------------------|---------------------------------|----------------|
| <b>LENGTH</b>                                                       |                       |                                |                                 |                |
| <b>in</b>                                                           | inches                | 25.4                           | millimeters                     | mm             |
| <b>ft</b>                                                           | feet                  | 0.305                          | meters                          | m              |
| <b>yd</b>                                                           | yards                 | 0.914                          | meters                          | m              |
| <b>mi</b>                                                           | miles                 | 1.61                           | kilometers                      | km             |
| <b>VOLUME</b>                                                       |                       |                                |                                 |                |
| <b>fl oz</b>                                                        | fluid ounces          | 29.57                          | milliliters                     | mL             |
| <b>gal</b>                                                          | gallons               | 3.785                          | liters                          | L              |
| <b>ft<sup>3</sup></b>                                               | cubic feet            | 0.028                          | cubic meters                    | m <sup>3</sup> |
| <b>yd<sup>3</sup></b>                                               | cubic yards           | 0.765                          | cubic meters                    | m <sup>3</sup> |
| Note: Volumes greater than 1,000 L shall be shown in m <sup>3</sup> |                       |                                |                                 |                |
| <b>MASS</b>                                                         |                       |                                |                                 |                |
| <b>oz</b>                                                           | ounces                | 28.35                          | grams                           | g              |
| <b>lb</b>                                                           | pounds                | 0.454                          | kilograms                       | kg             |
| <b>T</b>                                                            | short tons (2,000 lb) | 0.907                          | megagrams<br>(or metric<br>ton) | Mg (or<br>"t") |
| <b>TEMPERATURE (exact degrees)</b>                                  |                       |                                |                                 |                |
| <b>°F</b>                                                           | Fahrenheit            | $5(F-32)/9$ or<br>$(F-32)/1.8$ | Celsius                         | °C             |

## Technical Report Documentation

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## Executive Summary

This research involved a simulation comparing three days of observed traffic data for the I-95 Express Lanes and General Purpose Lanes in Miami, Florida to a hypothetical scenario where all transportation demand management (TDM) activities and toll exemptions were eliminated. The purpose of the research was to quantify the extent to which carpooling, vanpooling, and transit usage contribute to better traffic flow in the I-95 corridor. The express lane analysis revealed a slight degradation in level of service (LOS) and a moderate increase in tolls in the southbound direction (+\$0.41). It revealed a slight improvement in LOS and a slight decrease in tolls in the northbound direction (-\$0.19). A phenomenon that occurred was that a large number of inherently low-emission vehicles (ILEVs), which are toll exempt, opted out of the express lanes in the hypothetical scenario. The increase in express lane volume from former carpoolers, vanpoolers, and transit riders reverting to single-occupant status was often offset by even larger volumes of ILEVs leaving the express lanes. Although the traffic impact to the express lanes was mild, the impact to the general purpose lanes was more severe. In the hypothetical scenario, the general purpose lanes operated at LOS F 22 percent more of the time in the southbound direction and 30 percent more of the time in the northbound direction. Furthermore, the traffic densities in the general purpose lanes increased 7.00 percent of the time in the southbound direction and 9.4 percent of the time in the northbound direction.

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## Chapter 1 Introduction

The I-95 Express Lanes in Miami, Florida are dynamically tolled managed lanes. Single occupant vehicles (SOVs) must pay a toll to use the lanes. Registered 3+ carpools, vanpools, motorcycles, inherently low emission vehicles (ILEVs), and transit buses are exempt from the tolls. Transit and transportation demand management (TDM) activities play an important role in the operation of both the express and general purpose lanes by increasing person throughput and improving traffic flow.

Initial sketch planning done by the Florida Department of Transportation (FDOT) showed that roadway level of service (LOS) in the general purpose lanes would be degraded were it not for the transit and TDM components in the express lanes. The National Center for Transit Research (NCTR) took this sketch planning a step further. The research approach used was to compare three days of observed traffic and toll data (April 8-10, 2014) to simulated traffic and toll data under a hypothetical scenario where there were no toll exemptions for express bus service.

The research involved several tasks. The first task involved assembling all of the traffic and toll data into 15-minute increments by direction for both the express and general purpose lanes for the three days of analysis. This was relatively easy to do since the FDOT already collects a large amount of traffic and toll data in the I-95 corridor. Each 15-minute increment included data on the average speed, volume, and level of service (LOS), the average toll amount in the express lanes, the number of transit riders, the number of registered high occupancy vehicles (HOVs), and the number of registered ILEVs. The second task involved surveying riders of the I-95 Express Bus Service, registered carpoolers and vanpoolers, and registered ILEVs owners to ask them how they would travel if there was no express bus service or toll exemptions. The third step involved using the survey data to make adjustments to the actual traffic volumes in the express and general purpose lanes. The changes in volumes led to changes in speeds, traffic densities, and in the case of the express lanes, changes in toll amounts. The fourth and final step involves comparing the two datasets (the actual and the hypothetical) to see what impacts occurred.

## Chapter 2 Literature Review

The Federal Highway Administration (FHWA) reports that there are a total of 345 HOV facilities in the United States (Federal Highway Administration, 2008). However, the carpool rate has been dropping for decades. Most recently, carpooling declined from 10.7 percent in 2003 to 9.7 percent in 2012 both in Florida and nationwide (Florida Department of Transportation, 2013). With carpool rates having dropped, HOT lanes have evolved as a way to make better use of unused capacity (Swisher, Eisele, Ungemah, & Goodin, 2003). In HOT lanes, carpools and transit use the facility for free while other vehicles pay a toll to take advantage of the excess capacity. The minimum occupancy requirement can vary. Some HOT facilities allow HOV-2's to use the facility for free while others only allow free access for HOV-3's. Some require HOVs to register, but most do not have this requirement. Table 2-1 shows the HOV policies for 11 HOT facilities in the U.S.

**Table 2-1 HOV Toll Policies on HOT Lanes**

|                          | I-95<br>FL                          | I-15<br>CA                          | I-10<br>CA                          | I-110<br>CA                         | I-15<br>UT                          | I-10<br>TX                          | I-85<br>GA                          | I-394<br>MN                         | I-35W<br>MN                         | I-25 CO<br>CO                       | SR 167<br>WA                        |
|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| HOV-2 toll               | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| HOV-2 free               | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| HOV-3+ toll              | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| HOV-3+ free              | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Registration requirement | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            |

Sources: Agency websites

Note: HOVs on the I-10 Katy Managed Lanes in Houston are allowed to use the lanes for free between 5 and 7:15 am and 2 to 3 pm Monday through Friday. At all other times, they must pay the toll.

Almost all of the HOT facilities allow HOV-2's to use the lanes for free. Other than the I-95 Express Lanes in Miami, the only other HOT lanes that require HOV-2's to pay a toll are the I-10 Express Lanes in Los Angeles, the I-10 Katy Managed Lanes in Houston, and the I-85 Express Lanes in Atlanta. The HOV policy of the I-10 Katy Managed Lanes requires further explanation. All HOVs are allowed to use the HOT lanes for free during the peak hours. They only have to pay a toll during non-peak hours. The peak hours are 5 to 7:15 a.m. and 2 to 3 p.m. Monday through Friday. The only HOT facilities besides the I-95 Express Lanes that have registration requirements for HOVs are the I-110 and I-10 Express Lanes in Los Angeles and the I-85 Express Lanes in Atlanta. A brief history of a few of the HOT lanes in Table 2-1 follows.

In 1996, the San Diego Association of Governments (SANDAG) and Caltrans converted the HOV lanes on an 8-mile stretch of I-15 into HOT lanes. From 1996 to 1998, single occupant drivers were charged a monthly fee for unlimited usage of the I-15 Express Lanes. In 1998, the switch was made to variable dynamic pricing. The Inland Breeze was the name of the bus service initiated on the I-15 Express Lanes and was funded by the toll revenues. This congestion pricing project was formally evaluated by San Diego State University (SDSU). The evaluation reported that ridership on the Inland Breeze increased by 29 percent during the study period while ridership in the entire region increased 23 percent. Surveys showed that most of the Inland Breeze passengers were captive riders who had switched from other bus routes and were

traveling in the reverse commute direction (Supernak, Brownstone, Golob, Kaschade, Kazimi, & Steffey, 2001).

Another early HOT project was the I-394 Mn Pass Lanes in Minneapolis. They opened in 2005, and like the I-15 Express Lanes were an HOV to HOT conversion. Lee Munnich from the Hubert H. Humphrey Institute of Public Affairs at the University of Minnesota and Kenneth Buckeye from the Minnesota Department of Transportation reported on nine issues and outcomes of the I-394 Mn Pass project. Issue 3 was the concern that transit riders and carpoolers might suffer due to the adaptation from HOV to HOT if there was a level of service (LOS) degradation. They reported that the I-394 Mn Pass project had no negative impacts on transit riders or carpoolers. The preliminary data indicated that transit usage in the I-394 corridor had improved more than that of the control corridor on I-35W. They reported also that transit users supported the idea of allowing solo drivers into the lane for a fee (Munnich & Buckeye, 1996).

A 2008 study by Katie Turnbull of the Texas Transportation Institute examined the impacts on transit that resulted from the conversion of HOV lanes into HOT lanes. The paper looked specifically at the experience with HOT lanes on I-15 in San Diego, I-394 in Minneapolis, and I-25 in Denver. Turnbull noted that transit was an important component in the I-394 and I-25 projects but was not as important a component in the I-15 project originally. On I-15 in San Diego, most of the bus ridership was initially in the reverse commute direction. To better serve peak direction commuter trips, the transit service plan was revised in 1999. There are now four express bus routes that operate in the I-15 Express Lanes, and bus riders account for 10 to 12 percent of the Express Lane users. On I-394 in Minneapolis, ridership levels remained relatively constant from 2005 until 2007. The report states that bus ridership growth on I-394 was limited due to constraints at the park and ride lots, most of which were at capacity. In Denver, approximately 10,400 bus passengers use the I-25 HOT lanes daily (at the time of the report). Buses on the I-25 HOT lanes account for only 2 percent of the vehicles but 25 percent of the people (Turnbull, 2008). This fact helps to illustrate why transit is an important component of HOT lane operations.

The I-10 Katy Freeway in Houston is an interesting case study of changes in HOV requirements. The Katy Freeway HOV lane opened in 1984. At first, usage was restricted to buses and vanpools. Between 1984 and 1987, the restrictions were relaxed to include 2+ carpoools, 3+ carpoools, and finally 2+ carpoools; however the HOV lanes were over capacity by 1988. Consequently, the Metropolitan Transit Authority of Harris County (METRO) raised the occupancy requirement to 3+ during the p.m. peak period. Then in 1998, METRO implemented the QuickRide Program that allowed 2+ carpoools to access the Katy HOV lane for a flat \$2 per trip fee. Studies of the new policy conducted by the Texas Transportation Institute showed that half of the 2+ carpoools that enrolled in the QuickRide Program formed from SOVs in the general purpose lanes. In 2003, construction began on the Katy Managed Lanes (KML), which became fully operational in 2009. The KML is two lanes in each direction. They were originally planned as HOT-3+ meaning all vehicles with less than three passengers would have to pay the toll. Six months prior to opening, METRO decided to lower the occupancy requirement due to public pressure. The current policy is that all HOVs may use the KML for free during peak hours from 5

to 7 a.m. and 2 to 3 p.m. Monday through Friday. During non-peak hours, HOVs must pay the toll just like SOVs. There is no registration requirement for HOV vehicles. During the peak periods, the inside managed lane is designated as the HOV lane, and the outside managed lane is designated as the toll lane. Since the KML opened in 2009, traffic volumes have more than doubled in both the peak hour and peak period. Although HOV volumes have increased slightly, the majority of the growth has come from the toll lane (Goodin, Briefing Paper: Toward a Best Practice Model for Managed Lanes in Texas, 2013).

The formal evaluation of the Urban Partnership Agreements (UPAs) has provided the most up-to-date research on the impacts of public transit from priced managed lanes. In 2010, early results of transit user perceptions of the I-95 HOT lanes in Miami were reported in the Journal of the Transportation Research Board. Pre- and post-deployment surveys of the bus riders showed that the I-95 bus service was already highly rated when the Express Lanes were HOV and that the service ratings increased even further after the HOT conversion. Furthermore, the surveys showed that the ratings for travel time and service reliability improved by margins that were statistically significant at the 99 percent and 95 percent confidence levels, respectively (Cain, Van Nostrand, & Flynn, 2010). More recent transit results from the UPA evaluation will be reported in a forthcoming issue of the Journal of the Transportation Research Board. The article, Impacts of Transit from Variably Priced Tolls Lanes by Pessaro, Turnbull, and Zimmerman, reported several findings from the Miami, Minnesota, and Atlanta projects. In Miami and Minneapolis where speed data was available, bus speeds increased by 7 mph and 29 mph respectively. Ridership (a.m. peak period) increased in each of the corridors after tolling: 57 percent in Miami, 38 percent in Minneapolis, and 21 percent in Atlanta. The overall perception of the HOT lanes by bus riders has been positive. In Miami, 53 percent of new riders said they were influenced to take transit because of the HOT lanes. In Minneapolis, it was 23 percent. In Atlanta, it was 45 percent (Pessaro, Turnbull, & Zimmerman, 2013).

Next, the literature review looked at research that addressed defining the role of TDM in priced managed lanes. Both Ungemah and Goodin noted in two separate reports that as more HOV lanes are converted into HOT lanes, there is a need for research and guidance on defining the role of carpools in priced managed lanes and the tradeoffs between carpool exemptions and other project objectives (Ungemah, Goodin, Dusza, & Burris, 2007) (Goodin, 2009). The 2009 report by Goodin used HOV policy data collected from eight metropolitan areas with existing or planned HOT facilities to develop a matrix illustrating the tradeoffs between alternative HOV policies and a variety of managed lane performance objectives. The matrix is shown below in Table 2-2. Determining the right HOV policy depends upon the project objectives. For example, if maximizing person throughput is the primary objective, the HOV policy should be more liberal. The opposite would apply if revenue generation were the primary objective. If enforcement and operations simplicity is the highest priority, the best HOV policy would be for all vehicles to pay the toll.

**Table 2-2 HOV Policy Options for Various Managed Lane Performance Objectives**

| Carpool Policy Scenarios               |                  |                    |                  |                     |                     |                   |
|----------------------------------------|------------------|--------------------|------------------|---------------------|---------------------|-------------------|
| Managed Lanes Performance Objectives   | All Vehicles Pay | HOV3+ 50% HOV2 Pay | All HOV 50% Toll | HOV3+ Free HOV2 Pay | HOV3+ Free HOV2 50% | All Carpools Free |
| Person throughput                      | ○                | ◐                  | ◐                | ●                   | ●                   | ●                 |
| Revenue generation                     | ●                | ●                  | ●                | ◐                   | ◐                   | ○                 |
| Emissions reduction                    | ◐                | ◐                  | ◐                | ◐                   | ◐                   | ◐                 |
| Operational performance                | ◐                | ◐                  | ◐                | ◐                   | ◐                   | ◐                 |
| Enforcement and operational simplicity | ●                | ◐                  | ◐                | ◐                   | ○                   | ◐                 |
| Public perception and support          | ○                | ◐                  | ◐                | ◐                   | ◐                   | ◐                 |

Relative success in achieving performance objective: High ● Medium/Neutral ◐ Low ○

Source: *The Role of Preferential Treatment for Carpools in Managed Lanes*, Texas Transportation Institute, 2009, p. 115.

Finally, the literature review looked for previous research that specifically tried to measure the impacts of TDM on priced managed lanes in a manner similar to what is being proposed for this NCTR project. Only two other pieces of similar research could be found. In 2009, Mark Burris from the Texas Transportation Institute conducted a stated preference survey of travelers in Houston and Dallas. The results were used to develop a mode choice model that would predict the impact of converting the Katy Freeway HOV lane into an electronic toll lane. Three scenarios were tested. In Scenario 1 where HOV-2's paid half the SOV toll, the results showed that there was very little change in HOV-2 volumes even as the toll increased. In Scenario 2 where HOV-2's paid the full toll, the percentage share of HOV-2 volume dropped from 8.9 percent to 7.6 percent as the toll increased. In Scenario 3 where all vehicles paid the toll, the percentage share of HOV-3's dropped from 6.9 percent to 5.3 percent. In terms of absolute numbers, the study concluded that the impacts of the changes in HOV policy were small compared to the entire traffic stream. However, the impact on the percentage of travelers using each mode was measurable (Burris, 2009).

A 2007 NCTR study by Phil Winters used CORSIM to measure the impacts of 189 employer-based TDM programs along an 8.6 mile segment of I-5 in Seattle. The research compared two scenarios. Scenario A: "With TDM" represented existing traffic conditions on the 8.6 mile segment. Scenario B: "Without TDM" represented traffic conditions with the vehicle trips reduced by the employer-based programs added back onto the corridor. Most commuter assistance programs/rideshare agencies use measures of performance such as the number of commuters requesting assistance, the number of vanpools in service, and the number of vehicle trips and vehicle miles eliminated. By using CORSIM, the study sought to measure the impacts of TDM using performance measures more familiar to traffic operations professionals. Some of these performance measures included recurring delay in vehicle-minutes, average speed in miles per hour, spatial extent of congestion, temporal extent of congestion, and fuel

consumption in gallons. The results of the CORSIM analysis showed for example that average speeds in the 3.6 mile corridor were up to 19 miles per hour faster in the a.m. peak period and up to 11 miles per hour faster in the p.m. peak period because of the vehicle trips reduced through the employer programs (Winters, Labib, Rai, & Zhou, 2007).

As stated at the beginning, this objective of this research is to calculate the difference in peak period traffic density, LOS, and toll rates on the I-95 Express Lanes under a hypothetical scenario where there is no transit or TDM component. The literature review revealed that no similar research has been attempted so far other than the research performed by Winters. Therefore, this NCTR research has the potential to add to the body of knowledge on priced managed lanes and TDM.

## Chapter 3 Methodology

The *95 Express Toll Facilities Operations Manual* is the guidebook used by the Florida Department of Transportation (FDOT) to set the parameters for adjusting the tolls on the I-95 Express to maintain a minimum speed of 45 miles per hour. Therefore, the discussion of the proposed methodology for estimating DM and LEV impact on managed lane toll prices begins here. The operations manual states that the tolls are based on traffic density. The formula in the *Highway Capacity Manual* for calculating traffic density is as follows:

$$\text{Traffic Density (vehicles per mile per lane)} = \frac{\text{Volume (vehicles per hour per lane)}}{\text{Speed (miles per hour)}}$$

Table 3-1 shows the relationship between level of service (LOS) and traffic density. Every 15 minutes, the electronic toll calculation system collects real-time speed and volume data from loop detectors in the Express Lanes and calculates the new traffic density.

**Table 3-1 Level of Service (LOS) and Traffic Density**

| Level of Service | Traffic Density (vpmp) | Expected Traffic Conditions |
|------------------|------------------------|-----------------------------|
| A                | 0 - 11                 | Free-Flow                   |
| B                | > 11 - 18              | Free-Flow                   |
| C                | > 18 - 26              | Free-Flow                   |
| D                | > 26 - 35              | Mild Congestion             |
| E                | > 35 - 45              | Moderate Congestion         |
| F                | > 45                   | Severe Congestion           |

After the new traffic density is calculated, the electronic toll calculation system uses a look-up table called the Delta Settings Table to determine the change in toll based on the change in traffic density. The full Delta Table is shown in Appendix A. The toll collection system also incorporates minimum and maximum tolls, which are shown in Table 3-2. The new toll is compared to the minimum and maximum tolls. If the new toll falls within the range, the new toll is applied. If it falls outside the range, the minimum or maximum toll is applied instead.

**Table 3-2 Level of Service Settings Table**

| Level of Service | Traffic Density (vpmp) | Toll Amount |         |
|------------------|------------------------|-------------|---------|
|                  |                        | min         | max     |
| A                | 0 - 11                 | \$0.50      | \$0.50  |
| B                | > 11 - 18              | \$0.50      | \$1.50  |
| C                | > 18 - 26              | \$1.50      | \$4.25  |
| D                | > 26 - 35              | \$4.00      | \$10.50 |
| E                | > 35 - 45              | \$8.50      | \$10.50 |
| F                | > 45                   | \$9.50      | \$10.50 |

Source: FDOT District 5 SunGuide Center

The step-by-step process (algorithm) for calculating the tolls is shown in **Error! Reference source not found.** First, the change in traffic density ( $\Delta TD$ ) is calculated by subtracting the traffic density for the previous 1.5-minute interval ( $TD_{t-1}$ ) from the traffic density for the current 1.5-minute interval ( $TD_t$ ).

**Figure 3-1 Toll Calculation Methodology**

**Step 1: Calculate  $\Delta TD$**

$$\Delta TD = TD_t - TD_{t-1}$$

**Step 2: Find  $\Delta R$  based on  $\Delta TD$  and  $TD_t$**

*Refer to Delta Settings Table (see Table 3)*

**Step 3: Calculate  $R_t$**

$$R_t = R_{t-1} + \Delta R$$

**Step 4: Decide Final  $R_t$**

$$R_t = \begin{cases} \text{Max, if } R_t > \text{Max} \\ \text{Min, if } R_t < \text{Min} \\ R_t, \text{ otherwise} \end{cases}$$

Where:

|                                         |                                       |
|-----------------------------------------|---------------------------------------|
| $R_t$ – Current Toll                    | $R_{t-1}$ – Previous Toll             |
| $TD_t$ – Current Traffic Density        | $TD_{t-1}$ – Previous Traffic Density |
| $\Delta TD$ – Change in Traffic Density | $\Delta R$ – Toll Adjustment          |
| Max – Maximum Toll at a LOS             | Min – Minimum Toll at a LOS           |

Source: 95 Express Toll Facility Operations Manual

Next, the toll adjustment ( $\Delta R$ ) is calculated using the Delta Settings Table (Appendix A). To do that, one locates the appropriate row on the left side of the table for current traffic density and then goes across to find the correct change in toll based on the change in density. The toll adjustment ( $\Delta R$ ) is added to the toll from the previous 1.5-minute interval ( $R_{t-1}$ ) to get the current toll ( $R_t$ ). In the final step, the current toll is compared to the minimum and maximum toll for the current traffic density. If the current toll falls within the minimum and maximum range, the current toll is applied. If the current toll falls outside the minimum or maximum, the minimum or maximum toll is applied. An example is provided below.

### Example

Given:

- Previous toll ( $R_{t-1}$ ) is \$0.25
- Previous traffic density ( $TD_{t-1}$ ) is 12
- Current traffic density ( $TD_t$ ) is 16

Using the process outlined in **Error! Reference source not found.**:

Step 1:  $\Delta TD = TD_t - TD_{t-1} \rightarrow 16 - 12 = 4$

Step 2: Using the Delta Table, a  $TD_t$  of 16 yields a toll change ( $\Delta R$ ) of \$0.50.

Step 3:  $R_t = R_{t-1} + \Delta R \rightarrow \$0.25 + \$0.50 = \$0.75$

Step 4: The current traffic density, 16, falls within the range for LOS B (see Table 2). The minimum toll is \$0.50, and the maximum toll is \$1.50. Since \$0.75 falls within the minimum and maximum, \$0.75 is applied.

### Data Sources

The analysis will use three days' worth of data from April 8 to 10, 2014. These days were selected because they were the days on which DOT conducted its most recent vehicle occupancy surveys of the I-95 HOV lanes. The study will use five sources of data:

1. Traffic Data—Volume, speed, and toll data was provided by Florida's Turnpike Enterprise (FTE) and the DOT SunGuide Center. The data was aggregated by direction and time of day in 15-minute increments. A sample of the data is shown in Appendix B Sample Traffic Data.
2. Toll Exempt Data—FTE tracks the number of toll exempt vehicles in the I-95 Express Lanes by video capturing license plate data and cross-checking it against a registry of toll exempt vehicles. The toll exempt data used in this report included registered + carpools and inherently low emission vehicles (ILEVs). The data was aggregated by direction and time of day in 15-minute increments. A sample of the toll exempt data is shown in Appendix C Sample Toll Exempt Data.

3. Transit Data - Broward County Transit and Miami-Dade Transit provided passenger count data for the eight bus routes that operate on the I-95 Express Lanes. The data was aggregated by direction and by trip. The BCT data was collected manually each day from April 8 to 10. The MDT data was taken from the automated passenger counters (APCs) for the months of March and April. Samples of the transit data are shown in Appendix D Sample Transit Data.

4. Survey Data - Surveys were conducted of three groups of commuters: carpoolers, LEV owners, and bus riders. The first two groups are required to register with South Florida Commuter Services (SFCs) in order to be exempt from the tolls. Because their e-mail addresses are in the SFCs database, they were contacted via e-mail to complete an online survey. For the bus riders, SFCs conducted intercept surveys at the park and ride lots served by the eight bus routes that operate on the I-95 Express Lanes. All of the surveys asked how they would make their trip if there were no toll exemptions and no transit service on the express lanes. The results were used to estimate the percentage of carpoolers and bus riders who would revert to single occupant vehicle (SOV) and pay the toll and the percentage of LEV owners who would opt out of the I-95 Express Lanes if they were no longer toll exempt. The survey questions and results are shown in Appendix E Surveys.

### Assignment of Transit Riders

The transit ridership was aggregated by trip, meaning the departure time from the first stop. However, we had to account for travel time from the first stop to when the bus was physically in the express lanes. Because the traffic data for the express lanes was provided in 15-minute increments, we have to assign the bus riders to the correct 15-minute time analysis period. For example, if the 6:00 a.m. departure had 20 passengers and it takes that bus 30 minutes to reach the start point of the express lanes, those 20 riders should be assigned to the 6:30 to 6:45 a.m. analysis period.

We consulted the route schedules of each bus route and Google Maps to estimate the travel time from the first stop to the entry point of the I-95 Express Lanes. Based on that analysis, the following guidelines were used when assigning the transit ridership figures to the appropriate 15-minute analysis period.

#### Morning

|                                    |                                  |
|------------------------------------|----------------------------------|
| Route 106 (Miramar)                | add 30 minutes to departure time |
| Route 107 (Hollywood)              | add 30 minutes to departure time |
| Route 108 (Pembroke Pines)         | add 30 minutes to departure time |
| Route 109 (Pembroke Pines/Miramar) | add 30 minutes to departure time |
| Route 110 (BB&T Center)            | add 40 minutes to departure time |
| Route 114 (Westgate Square Mall)   | add 40 minutes to departure time |
| Route 95X (Golden Glades)          | add 10 minutes to departure time |
| Route 195X (Dade-Broward Express)  | add 15 minutes to departure time |

Afternoon

|                                    |                                   |
|------------------------------------|-----------------------------------|
| Route 106 (Miramar)                | add 1.5 minutes to departure time |
| Route 107 (Hollywood)              | add 1.5 minutes to departure time |
| Route 108 (Pembroke Pines)         | add 1.5 minutes to departure time |
| Route 109 (Pembroke Pines/Miramar) | add 1.5 minutes to departure time |
| Route 110 (BB&T Center)            | add 1.5 minutes to departure time |
| Route 114 (Westgate Square Mall)   | add 1.5 minutes to departure time |
| Route 95X (Golden Glades)          | add 1.5 minutes to departure time |
| Route 195X (Dade-Broward Express)  | add 1.5 minutes to departure time |

### Sample Calculation of Toll with TDM Activities Removed

To better illustrate the method that was used, we will provide a sample calculation for one of the 15-minute periods. Specifically, we will do a sample calculation for the 7:15 to 7:30 a.m. time period in the southbound direction for April 8, 2014. The following data is given:

**Table 3-3 Given Data for Sample Calculation**

|                     |                        |
|---------------------|------------------------|
| Express Lane Volume | 350 vehicles per lane* |
| Express Lane Speed  | 55 mph                 |
| Toll                | \$3.00                 |
| Traffic Density     | 26 pcphpl              |
| No. of Carpools     | 2.5 per lane*          |
| No. of LEVs         | 8.5 per lane*          |

\*Note: Since the original figures were provided for both lanes, they had to be divided by two to get the necessary per lane data needed for the calculations.

#### Step 1: Calculate the change in Express Lane volume.

The first step is to calculate the change in express lane volume that would result from carpoolers, LEV drivers, and bus riders changing their method of travel in the hypothetical scenario. First, we calculate for the carpoolers. There were 2.5 carpool vehicles per lane for the 7:15 to 7:30 a.m. analysis period. According to FCS, the average vehicle occupancy (AVO) of the registered carpools on the I-95 Express Lanes is 3.1 passengers. An AVO of 3.1 applied to 2.5 carpools equates to 7.8 single occupant vehicles (SOVs). In the survey of registered carpoolers, 27.1 percent said they would drive alone in their own vehicle and pay the toll if they could no longer use the I-95 Express Lanes for free as a carpooler. Applying 27.1 percent to 7.8 SOVs equates to 2.1 SOVs from former carpoolers in the hypothetical scenario. Since there were 2.5 carpool vehicles under actual traffic conditions, there was no net increase in vehicles from former carpoolers (2.1 ≈ 2.5).

Next, we calculated for LEVs. There were 8.5 LEVs per lane in the express lanes from 7:15 to 7:30 a.m. According to the survey data, 78.4 percent of LEV owners would opt out of the I-95 Express Lanes if they could not use it for free. Applying 78.4 percent to 8.5 LEVs yields a reduction of 7.2 vehicles in the express lanes and an equivalent increase in the general purpose lanes.

The calculation for bus riders is more complex. BCT and MDT provided the ridership numbers aggregated by trip. We surveyed the passengers on all eight bus routes to find out how they would make their trip if the I-95 express bus service was not available. The percentage of respondents who said they would opt to drive alone and pay the toll varied by bus route. For example, 22.7 percent of riders on the Route 106 (Miramar) said they would drive alone and pay the toll while on the Route 108 (Pembroke Pines) it was 14.2 percent. For this part of the calculation, we applied the route specific survey percentage to the ridership for that route for each 15-minute time period. For this sample calculation, there were 710 bus riders total (55 riders per lane) in the 7:15 to 7:30 a.m. analysis period who said they would opt to drive alone and pay the toll.

To get the adjusted volume for the hypothetical scenario where there are no TDM activities and no toll exemptions, the additional vehicles from former carpoolers and bus riders are added and the reduction in LEV vehicles are subtracted. The calculation in this example would be: 350 + 103 - 5 - 7 = 398 vehicles.

## Step 2: Calculate the new traffic density.

The tolls on the I-95 express are based on traffic density. Traffic density = volume / speed. To calculate the new density, we must first estimate the new speed with the adjusted volume. To do that, we will use the Highway Capacity Manual's speed flow curves. The equations used for the HCM speed flow curves are shown in Figure 3-2.

| FFS (mi/h) | Breakpoint (pc/h/ln) | Flow Rate Range                 |                                            |
|------------|----------------------|---------------------------------|--------------------------------------------|
|            |                      | $\geq 0 \leq \text{Breakpoint}$ | $> \text{Breakpoint} \leq \text{Capacity}$ |
| 75         | 1,000                | 75                              | $75 - 0.00001107 (v_p - 1,000)^2$          |
| 70         | 1,200                | 70                              | $70 - 0.00001160 (v_p - 1,200)^2$          |
| 65         | 1,400                | 65                              | $65 - 0.00001418 (v_p - 1,400)^2$          |
| 60         | 1,600                | 60                              | $60 - 0.00001816 (v_p - 1,600)^2$          |
| 55         | 1,800                | 55                              | $55 - 0.00002469 (v_p - 1,800)^2$          |

Notes: FFS = free-flow speed,  $v_p$  = demand flow rate (pc/h/ln) under equivalent base conditions. Maximum flow rate for the equations is capacity: 2,400 pc/h/ln for 70- and 75-mph FFS; 2,350 pc/h/ln for 65-mph FFS; 2,300 pc/h/ln for 60-mph FFS; and 2,250 pc/h/ln for 55-mph FFS.

Source: Highway Capacity Manual

Figure 3-2 Speed Flow Curve Equation

Based on conversations with staff from the FDOT SunGuide Center, the free-flow speeds for the I-95 Express Lanes and General Purpose Lanes are shown in Table 3-4.

**Table 3-4: I-95 Free-Flow Speeds**

|                            | Southbound | Northbound |
|----------------------------|------------|------------|
| I-95 Express Lanes         | 65 mph     | 60 mph     |
| I-95 General Purpose Lanes | 55 mph     | 55 mph     |

In order to estimate traffic speed under the hypothetical scenario with the TDM activities and toll exemptions removed, we will use the HCM formulas in Figure 3-2. For example, when estimating the new speed for the I-95 Express Lanes in the Southbound direction, we will use the formula  $5 - 0.00001418 (v_p - 1,400)^2$  where  $v_p$  equals the flow rate under the hypothetical scenario with the TDM activities and toll exemptions removed. For a road with a free-flow speed of 65 mph, the breakpoint volume is 1,400 vehicles per hour per lane. In theory, this means that speeds will only begin to deteriorate after the volume goes over 1,400.

If the hypothetical flow rate ( $v_p$ ) is less than the breakpoint volume, it will be assumed that there is no change from the actual recorded speed that was reported because there is still available roadway capacity. The HCM speed will not be calculated, and the actual recorded speed will be retained to calculate the new density. If the hypothetical flow rate is greater than or equal to the breakpoint volume, the HCM speed will be calculated and compared to the actual recorded speed. The study will default to the lower of the two speeds when calculating the new density.

From Step 1, we know that the new 15-minute volume is 398 vehicles per lane. We have to convert this 15-minute figure into a 1-hour flow rate. The calculation is  $398 \times 4 = 1,592$  vehicles per hour per lane. Since 1,592 vehicles are over the 1,400 breakpoint, we will calculate the HCM speed. The HCM speed is 64 mph. However, the actual recorded speed was 65 mph, and the methodology says we will defer to the lesser of the two speeds. Therefore, 65 mph will be used to calculate the new density. The new density is 29 vehicles per mile per lane ( $1,592 \div 55 = 29$ ).

**Step 3: Calculate the change in density.**

The formula for calculating the change in density is  $\Delta D_t = D_t - D_{t-1}$  where  $D_t$  equals the current traffic density and  $D_{t-1}$  equals the previous traffic density. The current traffic density is the density under the hypothetical scenario (29 pcphpl). The previous traffic density is the traffic density under actual traffic conditions (26 pcphpl). In this sample calculation,  $\Delta D_t = 3$ .

**Step 4: Calculate the change in toll rate.**

The change in toll rate ( $\Delta R$ ) is determined by using the change in traffic density ( $\Delta D$ ), the current traffic density ( $D_t$ ), and the Delta Settings Table. In this case,  $\Delta D = 3$  and  $D_t = 29$ . According to the Delta Settings Table, the change in toll is \$1.00.

**Table 3-5 Sample Delta Settings Table**

| TD <sub>n</sub> | Change in Traffic Density ( $\Delta$ TD) |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|-----------------|------------------------------------------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                 | 1                                        | 2   | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   |
| 29              | .50                                      | .75 | 1.00 | 1.25 | 1.50 | 2.00 | 2.25 | 2.50 | 2.75 | 2.75 | 3.00 | 3.50 | 4.00 | 4.50 | 5.00 | 5.50 | 5.50 | 5.50 |

**Step 5: Calculate the new toll.**

Recall that the toll was originally \$3.00. Under the adjusted traffic volume, the new toll will be \$4.00 (\$3.00 + \$1.00).

**Step 6: Check the new toll against the min and max.**

The current traffic density, 29, falls within the range for LOS D (see Table 3-2). The minimum toll under LOS D is \$4.00, and the maximum toll is \$10.50. Since the calculated toll of \$4.00 falls within the minimum and maximum, \$4.00 is applied.

**Step 7: Summarize the results.**

**Table 3-6 Sample Results**

| Measure                | With TDM | Without TDM |
|------------------------|----------|-------------|
| Volume                 | 350      | 398         |
| Traffic Density (vpmp) | 26       | 29          |
| Level of Service       | D        | D           |
| Toll                   | \$3.00   | \$4.00      |

In this example, there was an increase in volume and density in the hypothetical scenario with the TDM activities and toll exemptions removed. This caused an increase in the toll amount. The LOS remained the same because the increase in volume was not large enough to degrade to the next LOS level. The sample data shown above is only for one, 15-minute segment in the morning peak period in the southbound direction. Furthermore, it was only performed for the express lanes. These same steps will be repeated for each 15-minute segment of the morning and afternoon peak periods for both the express and general purpose lanes.

## Chapter 4 Findings

The analysis compared three days of actual traffic and toll data from April 8-10, 2014 to simulated traffic and toll data under a hypothetical scenario where there were no express bus service or toll exemptions. The data was aggregated into 15-minute increments by peak period and peak direction. The analysis included data from 6:00 to 9:00 a.m. southbound and 4:00 to 7:00 p.m. northbound. The summary tables of the research findings are provided below while the full data tables are located in Appendix F.

Table 4-1 compares the percentage of time the express lanes were at a given LOS under the two scenarios. The columns marked "w/TDM" represent actual traffic conditions from April 8-10. The columns marked "w/o TDM" represent the hypothetical scenario. What Table 4-1 shows is that there was a mild degree of LOS degradation in the southbound direction. Under the hypothetical scenario with all TDM activities and toll exemptions removed, the express lanes operated at LOS B 35 percent less of the time and at LOS C 39 percent more of the time. The average toll was \$0.41 higher. In the northbound direction, there was a surprisingly slight improvement in the LOS. Under the hypothetical scenario, the express lanes operated 3 percent more of the time at LOS C and 3 percent less of the time at LOS D. The average toll would have been \$0.19 lower. The reason for this will be explained in a moment.

**Table 4-1 Express Lane LOS with and without TDM**

| LOS      | Southbound Express<br>(a.m.) |         | Northbound Express<br>(p.m.) |         |
|----------|------------------------------|---------|------------------------------|---------|
|          | w/TDM                        | w/o TDM | w/TDM                        | w/o TDM |
| A        | 8%                           | 8%      | 0%                           | 0%      |
| B        | 11%                          | 6%      | 6%                           | 6%      |
| C        | 47%                          | 56%     | 44%                          | 47%     |
| D        | 33%                          | 31%     | 47%                          | 44%     |
| E        | 0%                           | 0%      | 3%                           | 3%      |
| F        | 0%                           | 0%      | 0%                           | 0%      |
| Avg Toll | \$2.77                       | \$3.18  | \$4.27                       | \$4.08  |

Note: The percentages are the percentage of time the express lanes operated at that LOS during the 3-day analysis period from 6:00 to 9:00 a.m. (southbound) and 4:00 to 7:00 p.m. (northbound). See Appendix F.

The analysis also looked at changes in traffic density and volumes. Because each LOS covers a range of traffic densities as shown in Table 4-2, it is possible for traffic densities to increase without crossing an LOS threshold. Such increases still represent a degradation of traffic flow because as traffic density increases, it becomes more difficult to change lanes.

**Table 4-2 Level of Service (LOS) and Traffic Density**

| Level of Service | Traffic Density (vpmp) | Expected Traffic Conditions |
|------------------|------------------------|-----------------------------|
| A                | 0 - 11                 | Free-Flow                   |
| B                | >11-18                 | Free-Flow                   |
| C                | >18-26                 | Free-Flow                   |
| D                | >26-35                 | Mild Congestion             |
| E                | >35-45                 | Moderate Congestion         |
| F                | >45                    | Severe Congestion           |

Table 4-3 shows how often the change in density and volume under the hypothetical scenario was the same, better, or worse compared to the actual traffic scenario. What it shows is that 7 percent of the time in the southbound direction and 6 percent of the time in the northbound direction, the traffic density under the hypothetical scenario got worse (i.e., it increased).

**Table 4-3 Change in Density and Volume on I-95 Express Lanes**

|        | Southbound Express (a.m.) |        | Northbound Express (p.m.) |        |
|--------|---------------------------|--------|---------------------------|--------|
|        | Density                   | Volume | Density                   | Volume |
| Equal  | 31%                       | 0%     | 42%                       | 6%     |
| Better | 22%                       | 42%    | 22%                       | 44%    |
| Worse  | 47%                       | 58%    | 36%                       | 50%    |
| Total  | 100%                      | 100%   | 100%                      | 100%   |

Getting back to the question of why was there a slight improvement in the northbound direction, the reason has to do with inherently low emissions vehicles (ILEVs). As shown in Figure 4-1, ILEVs accounted for 64 percent of the toll exempt trips. In contrast, carpools, vanpools, and transit only accounted for 36 percent of the toll exempt trips. Furthermore, a large percentage of ILEV owners (77.3%) stated in the survey that they would opt out of the Express Lanes if there was no toll exemption for them. In contrast, the percentage of carpools/vanpools who said they would revert to SOV and pay the toll if there was no toll exemption for them was low (27.1%). For the bus riders, the percentages varied by route, but the highest was 26.3 percent. What often happened in the hypothetical scenario was that the increase in volume from carpools/vanpools and transit riders reverting to SOV was offset by even larger numbers of ILEV owners opting out of the express lanes.

The findings turn next to the general purpose lanes. Here the impacts were more severe.

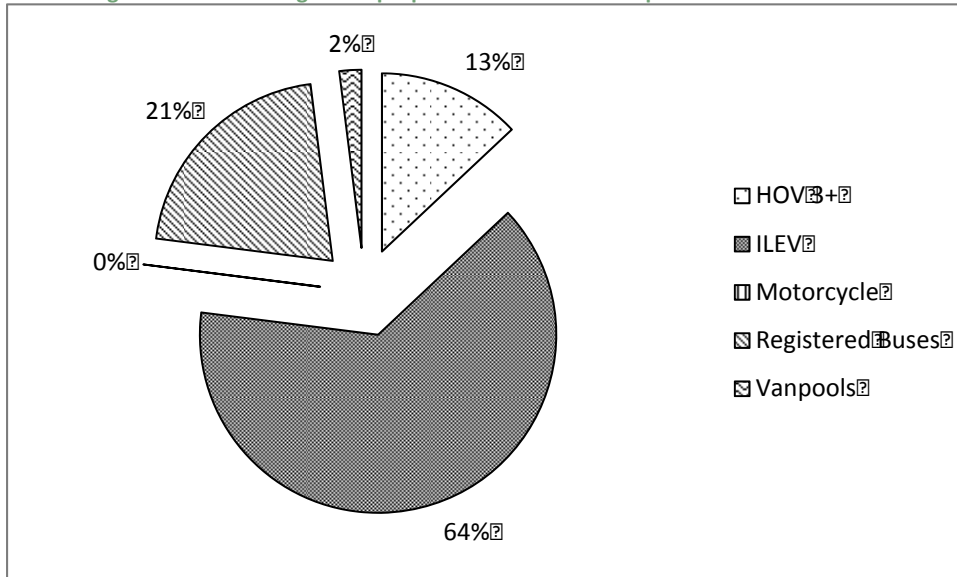


Figure 4-1 Breakdown of Toll Exempt Transactions

Source: 95 Express Monthly Operations Report - April 2014  
[www.sunguide.info/index.php](http://www.sunguide.info/index.php)

Table 4-4 compares the percentage of time the general purpose lanes were at a given LOS under the two scenarios. In the hypothetical scenario with all TDM activities and toll exemptions removed, the general purpose lanes operated at LOS F 22 percent more of the time in the southbound direction and 3 percent more of the time in the northbound direction.

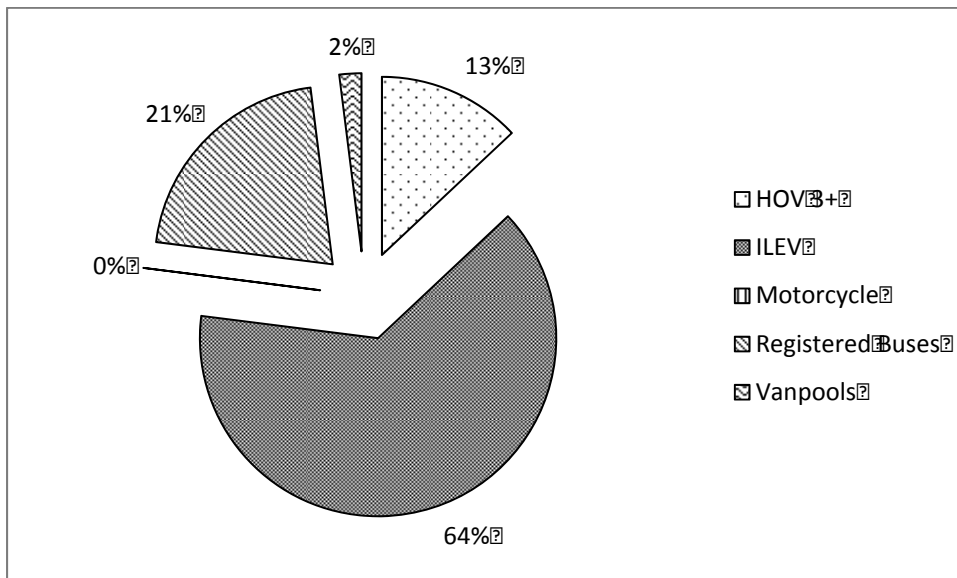


Figure 4-1 Breakdown of Toll Exempt Transactions

Source: 95 Express Monthly Operations Report - April 2014  
[www.sunguide.info/index.php](http://www.sunguide.info/index.php)

**Table 4-4 General Purpose Lane LOS with and without TDM**

| LOS | Southbound GP<br>(a.m.) |         | Northbound GP<br>(p.m.) |         |
|-----|-------------------------|---------|-------------------------|---------|
|     | w/TDM                   | w/o TDM | w/TDM                   | w/o TDM |
| A   | 0%                      | 0%      | 0%                      | 0%      |
| B   | 0%                      | 0%      | 0%                      | 0%      |
| C   | 8%                      | 8%      | 3%                      | 3%      |
| D   | 28%                     | 19%     | 17%                     | 14%     |
| E   | 47%                     | 33%     | 39%                     | 33%     |
| F   | 17%                     | 39%     | 42%                     | 50%     |

As shown in Table 4-5, traffic densities in the general purpose lanes under the hypothetical scenario increased 100 percent of the time in the southbound direction and 94 percent of the time in the northbound direction. In the northbound direction, there were only two instances in all of the 15-minute periods that were analyzed where the traffic density remained the same. In all of the others, the traffic density increased.

**Table 4-5 Change in Density and Volume on I-95 General Purpose Lanes**

|        | Southbound General<br>Purpose<br>(a.m.) |        | Northbound General<br>Purpose<br>(p.m.) |        |
|--------|-----------------------------------------|--------|-----------------------------------------|--------|
|        | Density                                 | Volume | Density                                 | Volume |
| Equal  | 0%                                      | 0%     | 6%                                      | 0%     |
| Better | 0%                                      | 0%     | 0%                                      | 0%     |
| Worse  | 100%                                    | 100%   | 94%                                     | 100%   |
| Total  | 100%                                    | 100%   | 100%                                    | 100%   |

## Chapter 5 Conclusions

The conclusion of this research is that TDM activities do in fact provide a benefit, albeit a minor one, to other commuters in the I-95 Express Lanes in the form of better LOS and lower tolls. They provide a greater benefit to commuters in the general purpose lanes, who would otherwise suffer from even worse traffic congestion. An unanticipated finding from the research was the important role that LEV vehicles in the express lanes play in reducing traffic congestion in the general purpose lanes. This leads to a policy dilemma. As pointed out by Robert Poole from the Reason Foundation, toll exemptions of any kind (1) reduce the power of variable pricing to eliminate congestion in the HOT lane, and (2) reduce the revenue needed to expand from just individual priced lanes to whole networks of lanes (Poole, 2014). On the one hand, the toll exemption for LEVs is keeping these cars out of the general purpose lanes. On the other hand, as LEVs grow in popularity and number on the roadways, they will undermine the power of variable pricing in the express lanes. The Florida Legislature has decided to sunset the toll exemption for LEVs. So this may not be an issue for Florida. However, this research finding is worth pointing out to other states that have toll exemptions for LEVs on their HOT lanes.

**Appendix A Full Delta Settings Table**

| TD | Change in TD |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|----|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|    | 1            | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   |
| 0  | 0.25         | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| 1  | 0.25         | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| 2  | 0.25         | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| 3  | 0.25         | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| 4  | 0.25         | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| 5  | 0.25         | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| 6  | 0.25         | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| 7  | 0.25         | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| 8  | 0.25         | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| 9  | 0.25         | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| 10 | 0.25         | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| 11 | 0.25         | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| 12 | 0.25         | 0.25 | 0.25 | 0.50 | 0.50 | 0.50 | 0.75 | 0.75 | 0.75 | 1.00 | 1.00 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| 13 | 0.25         | 0.25 | 0.25 | 0.50 | 0.50 | 0.50 | 0.75 | 0.75 | 0.75 | 1.00 | 1.00 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| 14 | 0.25         | 0.25 | 0.25 | 0.50 | 0.50 | 0.50 | 0.75 | 0.75 | 0.75 | 1.00 | 1.00 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| 15 | 0.25         | 0.25 | 0.50 | 0.50 | 0.50 | 0.50 | 0.75 | 0.75 | 0.75 | 1.00 | 1.00 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| 16 | 0.25         | 0.25 | 0.50 | 0.50 | 0.50 | 0.50 | 0.75 | 0.75 | 0.75 | 1.00 | 1.00 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| 17 | 0.25         | 0.25 | 0.50 | 0.75 | 1.00 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| 18 | 0.25         | 0.25 | 0.50 | 0.75 | 1.00 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| 19 | 0.25         | 0.25 | 0.50 | 0.75 | 1.00 | 1.25 | 1.50 | 1.75 | 2.00 | 2.25 | 2.50 | 2.75 | 3.25 | 3.75 | 3.75 | 3.75 | 3.75 | 3.75 |
| 20 | 0.25         | 0.25 | 0.50 | 0.75 | 1.00 | 1.25 | 1.50 | 1.75 | 2.00 | 2.25 | 2.50 | 2.75 | 3.25 | 3.75 | 3.75 | 3.75 | 3.75 | 3.75 |
| 21 | 0.25         | 0.25 | 0.50 | 0.75 | 1.00 | 1.25 | 1.50 | 1.75 | 2.00 | 2.25 | 2.50 | 2.75 | 3.25 | 3.75 | 3.75 | 3.75 | 3.75 | 3.75 |
| 22 | 0.25         | 0.25 | 0.50 | 0.75 | 1.00 | 1.25 | 1.50 | 1.75 | 2.00 | 2.25 | 2.50 | 2.75 | 3.25 | 3.75 | 3.75 | 3.75 | 3.75 | 3.75 |
| 23 | 0.25         | 0.25 | 0.50 | 0.75 | 1.00 | 1.25 | 1.50 | 1.75 | 2.00 | 2.25 | 2.50 | 2.75 | 3.25 | 3.75 | 3.75 | 3.75 | 3.75 | 3.75 |
| 24 | 0.25         | 0.50 | 0.75 | 1.00 | 1.25 | 1.50 | 1.75 | 2.00 | 2.25 | 2.50 | 2.75 | 2.75 | 3.25 | 3.75 | 3.75 | 3.75 | 3.75 | 3.75 |
| 25 | 0.25         | 0.50 | 0.75 | 1.00 | 1.25 | 1.50 | 1.75 | 2.00 | 2.25 | 2.50 | 2.75 | 3.00 | 3.25 | 3.75 | 3.75 | 3.75 | 3.75 | 3.75 |
| 26 | 0.25         | 0.50 | 0.75 | 1.00 | 1.25 | 1.50 | 1.75 | 2.00 | 2.25 | 2.50 | 2.75 | 3.00 | 3.50 | 3.75 | 3.75 | 3.75 | 3.75 | 3.75 |
| 27 | 0.25         | 0.75 | 1.00 | 1.25 | 1.50 | 2.00 | 2.25 | 2.25 | 2.50 | 2.75 | 3.00 | 3.50 | 4.00 | 4.50 | 5.00 | 5.00 | 5.00 | 5.00 |
| 28 | 0.50         | 0.75 | 1.00 | 1.25 | 1.50 | 2.00 | 2.25 | 2.50 | 2.50 | 2.75 | 3.00 | 3.50 | 4.00 | 4.50 | 5.00 | 5.00 | 5.00 | 5.00 |
| 29 | 0.50         | 0.75 | 1.00 | 1.25 | 1.50 | 2.00 | 2.25 | 2.50 | 2.75 | 2.75 | 3.00 | 3.50 | 4.00 | 4.50 | 5.00 | 5.00 | 5.00 | 5.00 |
| 30 | 0.50         | 0.75 | 1.00 | 1.25 | 1.50 | 2.00 | 2.25 | 2.50 | 2.75 | 3.00 | 3.00 | 3.50 | 4.00 | 4.50 | 5.00 | 5.00 | 5.00 | 5.00 |
| 31 | 0.50         | 0.75 | 1.00 | 1.25 | 1.50 | 2.00 | 2.25 | 2.50 | 2.75 | 3.00 | 3.25 | 3.50 | 4.00 | 4.50 | 5.00 | 5.00 | 5.00 | 5.00 |
| 32 | 0.50         | 0.75 | 1.00 | 1.25 | 1.50 | 2.00 | 2.25 | 2.50 | 2.75 | 3.00 | 3.25 | 3.50 | 4.00 | 4.50 | 5.00 | 5.00 | 5.00 | 5.00 |



## Appendix B Sample Traffic Data

### Toll Data



### SOUTHBOUND

|                     | 4/8/2014 | 4/9/2014 | 4/10/2014 |
|---------------------|----------|----------|-----------|
| Time                | Toll     | Toll     | Toll      |
| 06:00:00 - 06:14:59 | \$0.50   | \$0.50   | \$0.50    |
| 06:15:00 - 06:29:59 | \$0.50   | \$1.00   | \$0.50    |
| 06:30:00 - 06:44:59 | \$2.25   | \$2.50   | \$1.50    |
| 06:45:00 - 06:59:59 | \$0.00   | \$3.25   | \$3.00    |
| 07:00:00 - 07:14:59 | \$0.00   | \$3.00   | \$0.00    |
| 07:15:00 - 07:29:59 | \$3.00   | \$3.75   | \$0.00    |
| 07:30:00 - 07:44:59 | \$5.00   | \$4.25   | \$3.00    |
| 07:45:00 - 07:59:59 | \$5.50   | \$5.00   | \$4.25    |
| 08:00:00 - 08:14:59 | \$5.50   | \$5.50   | \$4.25    |
| 08:15:00 - 08:29:59 | \$5.00   | \$5.00   | \$4.00    |
| 08:30:00 - 08:44:59 | \$4.75   | \$0.00   | \$3.75    |
| 08:45:00 - 08:59:59 | \$5.50   | \$0.00   | \$3.75    |
| 09:00:00 - 09:14:59 | \$4.75   | \$5.00   | \$3.75    |
| 09:15:00 - 09:29:59 | \$3.25   | \$3.75   | \$3.25    |
| 09:30:00 - 09:44:59 | \$3.25   | \$2.75   | \$3.00    |
| 09:45:00 - 09:59:59 | \$3.25   | \$2.75   | \$3.00    |

Source: FDOT SunGuide Center

Traffic Count Data



**Florida's Turnpike Enterprise  
Daily Traffic Counts Report  
(109620) I-95 NW 144th St  
For 15 Minute Intervals**

| Facility ID | Plaza Traffic Group Name       | Period From            | Period To              | Traffic Count |
|-------------|--------------------------------|------------------------|------------------------|---------------|
| 109620      | 95 Express South (NW 144th St) | Apr 8, 2014 6:00:00 AM | Apr 8, 2014 6:14:59 AM | 362           |
| 109620      | 95 Express South (NW 144th St) | Apr 8, 2014 6:15:00 AM | Apr 8, 2014 6:29:59 AM | 628           |
| 109620      | 95 Express South (NW 144th St) | Apr 8, 2014 6:30:00 AM | Apr 8, 2014 6:44:59 AM | 775           |
| 109620      | 95 Express South (NW 144th St) | Apr 8, 2014 6:45:00 AM | Apr 8, 2014 6:59:59 AM | 805           |
| 109620      | 95 Express South (NW 144th St) | Apr 8, 2014 7:00:00 AM | Apr 8, 2014 7:14:59 AM | 534           |
| 109620      | 95 Express South (NW 144th St) | Apr 8, 2014 7:15:00 AM | Apr 8, 2014 7:29:59 AM | 700           |
| 109620      | 95 Express South (NW 144th St) | Apr 8, 2014 7:30:00 AM | Apr 8, 2014 7:44:59 AM | 891           |
| 109620      | 95 Express South (NW 144th St) | Apr 8, 2014 7:45:00 AM | Apr 8, 2014 7:59:59 AM | 933           |
| 109620      | 95 Express South (NW 144th St) | Apr 8, 2014 8:00:00 AM | Apr 8, 2014 8:14:59 AM | 985           |
| 109620      | 95 Express South (NW 144th St) | Apr 8, 2014 8:15:00 AM | Apr 8, 2014 8:29:59 AM | 926           |
| 109620      | 95 Express South (NW 144th St) | Apr 8, 2014 8:30:00 AM | Apr 8, 2014 8:44:59 AM | 988           |
| 109620      | 95 Express South (NW 144th St) | Apr 8, 2014 8:45:00 AM | Apr 8, 2014 8:59:59 AM | 877           |
| 109620      | 95 Express South (NW 144th St) | Apr 8, 2014 9:00:00 AM | Apr 8, 2014 9:14:59 AM | 664           |
| 109620      | 95 Express South (NW 144th St) | Apr 8, 2014 9:15:00 AM | Apr 8, 2014 9:29:59 AM | 702           |
| 109620      | 95 Express South (NW 144th St) | Apr 8, 2014 9:30:00 AM | Apr 8, 2014 9:44:59 AM | 693           |
| 109620      | 95 Express South (NW 144th St) | Apr 8, 2014 9:45:00 AM | Apr 8, 2014 9:59:59 AM | 592           |

SpeedData

| Date     | Time       | NB            |                |               |                | SB            |                |               |                |
|----------|------------|---------------|----------------|---------------|----------------|---------------|----------------|---------------|----------------|
|          |            | EL            |                | GPL           |                | EL            |                | GPL           |                |
|          |            | Average Speed | Average Volume | Average Speed | Average Volume | Average Speed | Average Volume | Average Speed | Average Volume |
| 4/8/2014 | 6:00:00AM  | 67            | 103            | 60            | 716            | 67            | 327            | 58            | 1234           |
| 4/8/2014 | 6:15:00AM  | 67            | 181            | 59            | 889            | 65            | 581            | 56            | 1594           |
| 4/8/2014 | 6:30:00AM  | 68            | 236            | 59            | 1024           | 64            | 703            | 50            | 1740           |
| 4/8/2014 | 6:45:00AM  | 67            | 269            | 59            | 1148           | 61            | 647            | 45            | 1708           |
| 4/8/2014 | 7:00:00AM  | 68            | 310            | 60            | 1215           | 52            | 479            | 39            | 1588           |
| 4/8/2014 | 7:15:00AM  | 68            | 394            | 59            | 1362           | 55            | 691            | 31            | 1323           |
| 4/8/2014 | 7:30:00AM  | 69            | 435            | 59            | 1431           | 56            | 837            | 26            | 1252           |
| 4/8/2014 | 7:45:00AM  | 69            | 411            | 58            | 1583           | 60            | 863            | 29            | 1373           |
| 4/8/2014 | 8:00:00AM  | 70            | 455            | 59            | 1539           | 61            | 873            | 29            | 1371           |
| 4/8/2014 | 8:15:00AM  | 68            | 519            | 58            | 1489           | 61            | 834            | 28            | 1291           |
| 4/8/2014 | 8:30:00AM  | 68            | 490            | 59            | 1392           | 62            | 871            | 31            | 1321           |
| 4/8/2014 | 8:45:00AM  | 69            | 411            | 59            | 1369           | 60            | 829            | 33            | 1391           |
| 4/8/2014 | 9:00:00AM  | 68            | 381            | 60            | 1181           | 63            | 653            | 33            | 1348           |
| 4/8/2014 | 9:15:00AM  | 67            | 333            | 59            | 1216           | 65            | 656            | 38            | 1423           |
| 4/8/2014 | 9:30:00AM  | 67            | 255            | 60            | 1371           | 65            | 661            | 40            | 1454           |
| 4/8/2014 | 9:45:00AM  | 67            | 341            | 59            | 1219           | 65            | 602            | 42            | 1473           |
| 4/8/2014 | 10:00:00AM | 67            | 335            | 59            | 1191           | 67            | 498            | 44            | 1489           |

Source: FDOT SunGuide Center

## Appendix C Sample Toll Exempt Data

### ILEVs

ILEVs

| Hour              | NORTHBOUND |          |           | SOUTHBOUND |          |           |
|-------------------|------------|----------|-----------|------------|----------|-----------|
|                   | 4/8/2014   | 4/9/2014 | 4/10/2014 | 4/8/2014   | 4/9/2014 | 4/10/2014 |
| <b>6</b> 00 - 15  |            | 1        |           | 10         | 9        | 6         |
| 15 - 30           | 7          | 4        | 4         | 11         | 6        | 7         |
| 31 - 45           | 4          | 1        | 3         | 18         | 18       | 18        |
| 46 - 59           |            | 1        | 1         | 1          | 23       | 20        |
| <b>7</b> 00 - 15  | 8          | 3        | 1         |            | 25       | 16        |
| 15 - 30           | 4          | 4        | 5         | 17         | 25       |           |
| 31 - 45           |            | 5        | 8         | 50         | 60       | 26        |
| 46 - 59           |            | 4        | 3         | 58         | 52       | 67        |
| <b>8</b> 00 - 15  | 2          | 4        |           | 54         | 73       | 60        |
| 15 - 30           | 2          | 7        |           | 73         | 62       | 62        |
| 31 - 45           | 9          | 4        | 5         | 60         | 28       | 50        |
| 46 - 59           | 4          | 4        |           | 33         |          | 49        |
| <b>9</b> 00 - 15  | 1          | 3        |           | 26         | 25       | 23        |
| 15 - 30           |            | 3        | 1         | 28         | 31       | 30        |
| 31 - 45           |            | 3        | 6         | 20         | 23       | 26        |
| 46 - 59           | 1          | 2        |           | 16         | 10       | 14        |
| <b>10</b> 00 - 15 | 5          | 1        | 3         | 8          | 9        | 7         |
| 15 - 30           | 3          | 4        | 2         | 7          | 9        | 7         |
| 31 - 45           | 3          | 3        | 4         | 2          | 5        | 4         |
| 46 - 59           | 2          | 2        | 3         | 5          | 5        | 6         |

Source: Florida's Turnpike Enterprise

**Registered 3+ Carpools**

**3+ Carpools**

| Hour              | NORTHBOUND |          |           | SOUTHBOUND |          |           |
|-------------------|------------|----------|-----------|------------|----------|-----------|
|                   | 4/8/2014   | 4/9/2014 | 4/10/2014 | 4/8/2014   | 4/9/2014 | 4/10/2014 |
| <b>6</b> 00 - 15  |            |          |           | 3          | 3        | 2         |
| 15 - 30           |            |          |           | 2          | 2        | 3         |
| 31 - 45           |            | 1        |           | 4          | 4        | 3         |
| 46 - 59           |            |          |           |            | 4        | 6         |
| <b>7</b> 00 - 15  |            |          |           |            | 13       | 4         |
| 15 - 30           | 1          | 1        | 1         | 5          | 9        |           |
| 31 - 45           |            |          | 1         | 15         | 22       | 12        |
| 46 - 59           |            | 1        | 1         | 10         | 14       | 14        |
| <b>8</b> 00 - 15  |            |          |           | 20         | 18       | 21        |
| 15 - 30           |            | 1        |           | 19         | 12       | 12        |
| 31 - 45           |            |          |           | 13         | 6        | 9         |
| 46 - 59           |            |          |           | 6          |          | 10        |
| <b>9</b> 00 - 15  |            |          |           | 8          | 8        | 5         |
| 15 - 30           |            |          |           | 2          | 5        | 3         |
| 31 - 45           |            |          |           | 2          | 2        | 7         |
| 46 - 59           |            |          |           | 3          | 2        | 7         |
| <b>10</b> 00 - 15 |            |          |           | 2          | 1        |           |
| 15 - 30           | 1          |          |           | 2          | 3        | 1         |
| 31 - 45           |            |          |           |            | 3        | 1         |
| 46 - 59           |            |          |           |            | 1        |           |

Source: Florida's Turnpike Enterprise

## Appendix D Sample Transit Data

### Broward County Transit Sample Data

#### 95 EXPRESS SERVICE PASSENGER BOARDINGS

#### Route 106 - Miramar Regional Park to Civic Center

| SOUTHBOUND   |     |     |      |     |
|--------------|-----|-----|------|-----|
| Trip         | Tue | Wed | Thu  | Avg |
|              | 4/8 | 4/9 | 4/10 |     |
| 5:40         | 59  | 54  | 42   | 52  |
| 6:05         | 52  | 53  | 38   | 48  |
| 6:30         | 52  | 50  | 70   | 57  |
| 6:55         | 44  | 47  | 48   | 46  |
| 7:20         | 30  | 24  | 23   | 26  |
| 7:45         | 16  | 27  | 19   | 21  |
| 8:10         | 13  | 11  | 18   | 14  |
| 8:40         | 3   | 8   | 11   | 7   |
| <b>TOTAL</b> | 269 | 274 | 269  | 271 |

| NORTHBOUND   |     |     |      |     |
|--------------|-----|-----|------|-----|
| Trip         | Tue | Wed | Thu  | Avg |
|              | 4/8 | 4/9 | 4/10 |     |
| 3:07         | 12  | 17  | 13   | 14  |
| 3:37         | 25  | 34  | 23   | 27  |
| 4:07         | 45  | 46  | 50   | 47  |
| 4:37         | 50  | 39  | 43   | 44  |
| 5:07         | 43  | 41  | 33   | 39  |
| 5:37         | 23  | 23  | 25   | 24  |
| 6:07         | 18  | 24  | 22   | 21  |
| 6:37         | 15  | 11  | 13   | 13  |
| 7:07         | 4   | 10  | 11   | 8   |
| 7:37         | 30  | 23  | 9    | 21  |
| 8:07         | 8   | 1   | 4    | 4   |
| <b>TOTAL</b> | 273 | 269 | 246  | 263 |

Note: The BCT data also included the Routes 107, 108, 109, 110, and 114.

**Miami-Dade Transit Sample Data**

**ROUTE 95X TRIP SUMMARY**

APRIL - 11, 2014

| TRIP DEPART TIME | BLOCK   | PATTERN | RIDERS | NUMBER OF SAMPLES |
|------------------|---------|---------|--------|-------------------|
| 08:03            | 950064  | SB08    | 31     | 8                 |
| 08:13            | 950003  | SB16    | 17     | 8                 |
| 08:13            | 950066  | SB04    | 23     | 6                 |
| 08:28            | 950057  | SB04    | 26     | 5                 |
| 08:38            | 950051  | SB04    | 24     | 8                 |
| 08:58            | 950060  | SB04    | 27     | 6                 |
| 09:28            | 950052  | SB04    | 29     | 5                 |
|                  |         |         |        |                   |
| 16:03            | 950070  | NB04    | 20     | 2                 |
| 16:10            | 950075  | NB14    | 23     | 1                 |
| 16:13            | 950076  | NB04    | 20     | 5                 |
| 16:15            | 950011  | NB08    | 24     | 5                 |
| 16:23            | 950073  | NB02    | 56     | 7                 |
| 16:27            | 950074  | NB08    | 37     | 3                 |
| 16:30            | 2071004 | NB14    | 40     | 1                 |

Note: The data shown above is only a partial sample. The full dataset included more departure times as well as data from the Route 95X (Dade-Broward Express).

## Appendix E Surveys

### ILEV/Hybrid Survey

If you did not own a hybrid vehicle which gave you free access to the I-95 Express Lanes, how would you travel to work/school? (select one)

|                                                              | Response Count | Response Percent |
|--------------------------------------------------------------|----------------|------------------|
| I would drive in the Express Lanes and pay the toll.         | 188            | 21.5%            |
| I would drive on I-95 in the General Lanes.                  | 478            | 54.7%            |
| I would form 3+ carpool to continue using the Express Lanes. | 10             | 1.1%             |
| I would take a different route to work/school.               | 146            | 16.7%            |
| I would switch to Tri-Rail.                                  | 15             | 1.7%             |
| I would not make the trip.                                   | 37             | 4.2%             |
| Total                                                        | 874            | 100.0%           |

874 out of 2,391 registered ILEV/Hybrid owners responded to the online survey (37%).

### 3+ Carpool Survey

If carpoolers and vanpoolers were charged the same toll as everyone else to use the I-95 Express Lanes how would you travel to work/school? Please select one.

|                                                                               | Response Count | Response Percent |
|-------------------------------------------------------------------------------|----------------|------------------|
| I would continue to carpool or vanpool in the Express Lanes and pay the toll. | 199            | 23.2%            |
| I would drive alone in my own car in the Express Lanes and pay the toll.      | 232            | 27.1%            |
| I would drive on I-95 in the General Lanes.                                   | 266            | 31.0%            |
| I would switch to Tri-Rail.                                                   | 33             | 3.9%             |
| I would take a different route to work/school.                                | 86             | 10.0%            |
| I would not make the trip.                                                    | 41             | 4.8%             |
| Total                                                                         | 857            | 100.0%           |

857 out of 1,764 registered carpoolers (49%) registered carpoolers responded to the online survey.

## Transit Survey

From the end of March to the end of April 2014, staff from South Florida Commuter Services (SFCS) conducted intercept surveys of 95 Express bus passengers at the park and ride lots. The purpose of the survey was to ask bus riders how they would make their trip if they did not take the 95 Express bus. The responses will be used to estimate the percentage of bus riders who would switch to driving their own vehicle either in the express lanes or the general purpose lanes if there were no TDM activities in the 95 Express Lanes. A copy of the survey questionnaire is shown at the end of this summary. Surveys were conducted at the park and ride lots of each bus route that uses the 95 Express Lanes. The routes and their associated park and ride lots routes are shown in **Error! Reference source not found.** table below.

| Survey Location                                 | Route Number- Name                      | Operating Agency |
|-------------------------------------------------|-----------------------------------------|------------------|
| Miramar Regional                                | 106 - 95 Express Miramar                | BCT              |
| Pembroke Commons<br>Hollywood Hills             | 107 - 95 Express Hollywood              | BCT              |
| Perry Airport                                   | 108 - 95 Express Pembroke Pines         | BCT              |
| CB Smith<br>Ansin Sports Complex                | 109 - 95 Express Pembroke Pines/Miramar | BCT              |
| BB&T Center<br>FLL Airport Tri-Rail Station     | 110 - 595 Express BB&T Center           | BCT              |
| Westgate Square<br>FLL Airport Tri-Rail Station | 114 - 595 Express Westgate Square       | BCT              |
| Golden Glades                                   | 95X - Route 95 Golden Glades            | MDT              |
| Sheridan Street<br>Broward Boulevard            | 195X - Route 95 Dade-Broward Express    | MDT              |

Note: BCT = Broward County Transit; MDT = Miami-Dade Transit

The table below shows the number of completed surveys that were collected by individual route and the margin of error. The morning ridership of each route was used as the population size for calculating the margin of error. The confidence level is 95 percent. This means that one can be 95 percent certain that the true population would pick the same responses as the survey participants did within the margin of error.

| Route No. | Surveys Collected | Average A.M. Ridership | Margin of Error |
|-----------|-------------------|------------------------|-----------------|
| 106       | 161               | 271                    | +4.9%           |
| 107       | 88                | 122                    | +5.5%           |
| 108       | 162               | 199                    | +3.3%           |
| 109       | 305               | 376                    | +2.4%           |
| 110       | 137               | 157                    | +3.0%           |
| 114       | 148               | 173                    | +3.1%           |
| 95X       | 817               | 1,041                  | +1.6%           |
| 195X      | 561               | 691                    | +1.8%           |

Note: Average a.m. ridership for BCT routes based on data collected by BCT April 8-10, 2014.  
Average a.m. ridership for MDT routes based on data collected by MDT in March 2014.

The following question was posed to the bus riders:

If you did not take the I-95 Express Bus today, how would you have gotten to your destination?  
(please check one)

- I would drive in the Express Lanes.
- I would drive in the I-95 General Lanes.
- I would drive some other route.
- I would take a local bus route.
- I would switch to Tri-Rail.
- I would not make the trip.
- Other

They were also provided with the following sample toll data to help them answer the survey question.

| Typical Toll Amounts          |                   |
|-------------------------------|-------------------|
| Southbound I-95 Express       |                   |
| Week of March 17 to 23, 2014  |                   |
| 6:00 to 9:00 a.m. Peak Period |                   |
| Lowest Toll                   | \$0.50            |
| Highest Toll                  | \$9.00            |
| Express Lane Speed Benefit    | 19 mph faster     |
| 6:00-7:00                     | \$0.50 on average |
| 7:00-8:00                     | \$3.25 on average |
| 8:00-9:00                     | \$4.00 on average |

The results of the bus riders survey were as follows:

| Route | Response                           |                                         |                                |                                |                            |                           |
|-------|------------------------------------|-----------------------------------------|--------------------------------|--------------------------------|----------------------------|---------------------------|
|       | I would drive in the Express Lanes | I would drive in the I-95 General Lanes | I would drive some other route | I would take a local bus route | I would switch to Tri-Rail | I would not make the trip |
| 106   | 8.7%                               | 39.1%                                   | 50.9%                          | 0.6%                           | 0.0%                       | 0.6%                      |
| 107   | 22.7%                              | 48.9%                                   | 9.1%                           | 6.8%                           | 9.1%                       | 3.4%                      |
| 108   | 14.2%                              | 51.2%                                   | 29.0%                          | 3.7%                           | 0.6%                       | 1.2%                      |
| 109   | 17.7%                              | 54.8%                                   | 21.0%                          | 2.3%                           | 0.0%                       | 4.3%                      |
| 110   | 26.3%                              | 51.1%                                   | 8.8%                           | 0.0%                           | 10.9%                      | 2.9%                      |
| 114   | 18.9%                              | 43.2%                                   | 14.9%                          | 0.7%                           | 18.9%                      | 3.4%                      |
| 95X   | 13.7%                              | 42.4%                                   | 9.2%                           | 30.0%                          | 4.7%                       | 0.1%                      |
| 195X  | 20.5%                              | 36.7%                                   | 4.8%                           | 1.8%                           | 32.4%                      | 3.7%                      |

## Appendix F Analysis Data

### Southbound Express

| Date  | Time Period   | With TDM |                   |                 |     |        | Without TDM |                   |                 |     |        | Difference |                        |               |
|-------|---------------|----------|-------------------|-----------------|-----|--------|-------------|-------------------|-----------------|-----|--------|------------|------------------------|---------------|
|       |               | Speed    | Volume (per Lane) | Traffic Density | LOS | Toll   | Speed       | Volume (per Lane) | Traffic Density | LOS | Toll   | LOS Change | Traffic Density Change | Volume Change |
| 8-Apr | 6:00 - 6:15am | 67       | 164               | 9               | A   | \$0.50 | 67          | 185               | 11              | A   | \$0.75 | Equal      | Worse                  | Worse         |
| 8-Apr | 6:16 - 6:30am | 65       | 290               | 17              | B   | \$0.50 | 65          | 313               | 19              | C   | \$1.50 | Worse      | Worse                  | Worse         |
| 8-Apr | 6:31 - 6:45am | 64       | 352               | 22              | C   | \$2.25 | 64          | 358               | 22              | C   | \$2.25 | Equal      | Equal                  | Worse         |
| 8-Apr | 6:46 - 7:00am | 61       | 323               | 21              | C   | -      | 61          | 354               | 23              | C   | \$1.50 | Equal      | Worse                  | Worse         |
| 8-Apr | 7:01 - 7:15am | 52       | 239               | 18              | B   | -      | 52          | 267               | 20              | C   | \$1.50 | Worse      | Worse                  | Worse         |
| 8-Apr | 7:16 - 7:30am | 55       | 346               | 25              | C   | \$3.00 | 55          | 394               | 28              | D   | \$4.00 | Worse      | Worse                  | Worse         |
| 8-Apr | 7:31 - 7:45am | 56       | 419               | 29              | D   | \$5.00 | 56          | 415               | 29              | D   | \$5.00 | Equal      | Equal                  | Better        |
| 8-Apr | 7:46 - 8:00am | 60       | 432               | 28              | D   | \$5.50 | 60          | 423               | 28              | D   | \$5.50 | Equal      | Equal                  | Better        |
| 8-Apr | 8:01 - 8:15am | 61       | 437               | 28              | D   | \$5.50 | 61          | 431               | 28              | D   | \$5.50 | Equal      | Equal                  | Better        |
| 8-Apr | 8:16 - 8:30am | 61       | 417               | 27              | D   | \$5.00 | 61          | 394               | 25              | C   | \$4.25 | Better     | Better                 | Better        |
| 8-Apr | 8:31 - 8:45am | 62       | 435               | 28              | D   | \$4.75 | 62          | 417               | 26              | C   | \$4.25 | Better     | Better                 | Better        |
| 8-Apr | 8:46 - 9:00am | 60       | 415               | 27              | D   | \$5.50 | 60          | 417               | 27              | D   | \$5.50 | Equal      | Equal                  | Worse         |
| 9-Apr | 6:00 - 6:15am | 67       | 174               | 10              | A   | \$0.50 | 67          | 195               | 11              | A   | \$0.75 | Equal      | Worse                  | Worse         |
| 9-Apr | 6:16 - 6:30am | 67       | 285               | 17              | B   | \$1.00 | 67          | 309               | 18              | B   | \$1.25 | Equal      | Worse                  | Worse         |
| 9-Apr | 6:31 - 6:45am | 65       | 362               | 22              | C   | \$2.50 | 65          | 368               | 22              | C   | \$2.50 | Equal      | Equal                  | Worse         |
| 9-Apr | 6:46 - 7:00am | 63       | 341               | 21              | C   | \$3.25 | 63          | 366               | 23              | C   | \$3.50 | Equal      | Worse                  | Worse         |
| 9-Apr | 7:01 - 7:15am | 63       | 356               | 22              | C   | \$3.00 | 63          | 371               | 23              | C   | \$3.25 | Equal      | Worse                  | Worse         |
| 9-Apr | 7:16 - 7:30am | 64       | 403               | 25              | C   | \$3.75 | 63          | 443               | 28              | D   | \$4.75 | Worse      | Worse                  | Worse         |
| 9-Apr | 7:31 - 7:45am | 63       | 441               | 28              | D   | \$4.25 | 63          | 431               | 27              | D   | \$4.00 | Equal      | Better                 | Better        |
| 9-Apr | 7:46 - 8:00am | 61       | 444               | 28              | D   | \$5.00 | 61          | 438               | 28              | D   | \$5.00 | Equal      | Equal                  | Better        |
| 9-Apr | 8:01 - 8:15am | 62       | 437               | 28              | D   | \$5.50 | 62          | 424               | 27              | D   | \$5.25 | Equal      | Better                 | Better        |
| 9-Apr | 8:16 - 8:30am | 60       | 417               | 27              | D   | \$5.00 | 60          | 400               | 26              | C   | \$4.25 | Better     | Better                 | Better        |
| 9-Apr | 8:31 - 8:45am | 62       | 417               | 26              | C   | -      | 62          | 415               | 26              | C   | \$1.50 | Equal      | Equal                  | Better        |

**Southbound Express**

|        |               | With TDM |     |    |   |        | Without TDM |     |    |   |        | Difference |        |        |
|--------|---------------|----------|-----|----|---|--------|-------------|-----|----|---|--------|------------|--------|--------|
|        |               |          |     |    |   |        |             |     |    |   |        |            |        |        |
| 9-Apr  | 8:46 - 9:00am | 54       | 352 | 26 | C | -      | 54          | 368 | 27 | D | \$4.00 | Worse      | Worse  | Worse  |
| 10-Apr | 6:00 - 6:15am | 61       | 153 | 10 | A | \$0.50 | 61          | 175 | 11 | A | \$0.75 | Equal      | Worse  | Worse  |
| 10-Apr | 6:16 - 6:30am | 60       | 252 | 16 | B | \$0.50 | 60          | 277 | 18 | B | \$0.75 | Equal      | Worse  | Worse  |
| 10-Apr | 6:31 - 6:45am | 59       | 349 | 23 | C | \$1.50 | 59          | 355 | 24 | C | \$1.75 | Equal      | Worse  | Worse  |
| 10-Apr | 6:46 - 7:00am | 59       | 336 | 22 | C | \$3.00 | 59          | 361 | 24 | C | \$3.50 | Equal      | Worse  | Worse  |
| 10-Apr | 7:01 - 7:15am | 58       | 348 | 23 | C | \$0.00 | 58          | 367 | 25 | C | \$1.50 | Equal      | Worse  | Worse  |
| 10-Apr | 7:16 - 7:30am | 50       | 275 | 21 | C | \$0.00 | 50          | 328 | 26 | C | \$1.50 | Equal      | Worse  | Worse  |
| 10-Apr | 7:31 - 7:45am | 52       | 377 | 29 | D | \$3.00 | 52          | 381 | 29 | D | \$4.00 | Equal      | Equal  | Worse  |
| 10-Apr | 7:46 - 8:00am | 57       | 392 | 27 | D | \$4.25 | 57          | 380 | 26 | C | \$4.00 | Better     | Better | Better |
| 10-Apr | 8:01 - 8:15am | 63       | 408 | 25 | C | \$4.25 | 63          | 398 | 25 | C | \$4.25 | Equal      | Equal  | Better |
| 10-Apr | 8:16 - 8:30am | 64       | 418 | 26 | C | \$4.00 | 64          | 401 | 25 | C | \$3.75 | Equal      | Better | Better |
| 10-Apr | 8:31 - 8:45am | 64       | 391 | 24 | C | \$3.75 | 64          | 379 | 23 | C | \$3.50 | Equal      | Better | Better |
| 10-Apr | 8:46 - 9:00am | 57       | 378 | 26 | C | \$3.75 | 57          | 373 | 26 | C | \$3.75 | Equal      | Equal  | Better |

Average Toll w/ TDM \$2.77

Average Toll w/o TDM \$3.18

**Northbound Express**

|        |               | With TDM |                   |                 |     |         | Without TDM |                   |                 |     |         | Difference |                        |               |
|--------|---------------|----------|-------------------|-----------------|-----|---------|-------------|-------------------|-----------------|-----|---------|------------|------------------------|---------------|
| Date   | Time Period   | Speed    | Volume (per Lane) | Traffic Density | LOS | Toll    | Speed       | Volume (per Lane) | Traffic Density | LOS | Toll    | LOS Change | Traffic Density Change | Volume Change |
| 8-Apr  | 4:01 - 4:15pm | 60       | 367               | 24              | C   | \$2.50  | 60          | 365               | 24              | C   | \$2.50  | Equal      | Equal                  | Better        |
| 8-Apr  | 4:16 - 4:30pm | 63       | 370               | 23              | C   | \$2.50  | 63          | 378               | 24              | C   | \$2.75  | Equal      | Worse                  | Worse         |
| 8-Apr  | 4:31 - 4:45pm | 61       | 361               | 23              | C   | \$2.75  | 61          | 369               | 24              | C   | \$3.00  | Equal      | Worse                  | Worse         |
| 8-Apr  | 4:46 - 5:00pm | 59       | 368               | 24              | C   | \$2.50  | 59          | 376               | 25              | C   | \$2.75  | Equal      | Worse                  | Worse         |
| 8-Apr  | 5:01 - 5:15pm | 51       | 367               | 28              | D   | \$2.75  | 51          | 362               | 28              | D   | \$4.00  | Equal      | Equal                  | Better        |
| 8-Apr  | 5:16 - 5:30pm | 39       | 318               | 32              | D   | \$4.00  | 39          | 323               | 33              | D   | \$4.50  | Equal      | Worse                  | Worse         |
| 8-Apr  | 5:31 - 5:45pm | 30       | 279               | 37              | E   | \$8.50  | 30          | 275               | 36              | E   | \$8.50  | Equal      | Better                 | Better        |
| 8-Apr  | 5:46 - 6:00pm | 37       | 301               | 32              | D   | \$10.50 | 37          | 299               | 32              | D   | \$10.50 | Equal      | Equal                  | Better        |
| 8-Apr  | 6:01 - 6:15pm | 48       | 301               | 25              | C   | \$9.50  | 48          | 289               | 24              | C   | \$4.25  | Equal      | Better                 | Better        |
| 8-Apr  | 6:16 - 6:30pm | 49       | 276               | 22              | C   | \$4.00  | 49          | 276               | 22              | C   | \$4.00  | Equal      | Equal                  | Equal         |
| 8-Apr  | 6:31 - 6:45pm | 55       | 324               | 23              | C   | \$3.00  | 55          | 313               | 22              | C   | \$2.75  | Equal      | Better                 | Better        |
| 8-Apr  | 6:46 - 7:00pm | 62       | 327               | 21              | C   | \$2.50  | 62          | 322               | 20              | C   | \$2.25  | Equal      | Better                 | Better        |
| 9-Apr  | 4:01 - 4:15pm | 60       | 423               | 28              | D   | \$3.00  | 60          | 422               | 28              | D   | \$4.00  | Equal      | Equal                  | Better        |
| 9-Apr  | 4:16 - 4:30pm | 61       | 418               | 27              | D   | \$4.00  | 60          | 426               | 28              | D   | \$4.50  | Equal      | Worse                  | Worse         |
| 9-Apr  | 4:31 - 4:45pm | 60       | 394               | 26              | C   | \$3.75  | 60          | 404               | 26              | C   | \$3.75  | Equal      | Equal                  | Worse         |
| 9-Apr  | 4:46 - 5:00pm | 57       | 433               | 30              | D   | \$3.75  | 57          | 443               | 31              | D   | \$4.25  | Equal      | Worse                  | Worse         |
| 9-Apr  | 5:01 - 5:15pm | 52       | 394               | 30              | D   | \$4.50  | 52          | 396               | 30              | D   | \$4.50  | Equal      | Equal                  | Worse         |
| 9-Apr  | 5:16 - 5:30pm | 47       | 385               | 32              | D   | \$5.50  | 47          | 393               | 33              | D   | \$6.00  | Equal      | Worse                  | Worse         |
| 9-Apr  | 5:31 - 5:45pm | 50       | 334               | 26              | C   | \$8.50  | 50          | 335               | 26              | C   | \$4.25  | Equal      | Equal                  | Worse         |
| 9-Apr  | 5:46 - 6:00pm | 56       | 317               | 22              | C   | \$0.00  | 56          | 327               | 23              | C   | \$1.50  | Equal      | Worse                  | Worse         |
| 9-Apr  | 6:01 - 6:15pm | 51       | 244               | 19              | C   | \$0.00  | 51          | 247               | 19              | C   | \$1.50  | Equal      | Equal                  | Worse         |
| 9-Apr  | 6:16 - 6:30pm | 47       | 227               | 19              | C   | \$0.00  | 47          | 240               | 20              | C   | \$1.50  | Equal      | Worse                  | Worse         |
| 9-Apr  | 6:31 - 6:45pm | 56       | 377               | 27              | D   | \$4.25  | 56          | 372               | 26              | C   | \$4.00  | Better     | Better                 | Better        |
| 9-Apr  | 6:46 - 7:00pm | 65       | 277               | 17              | B   | \$5.50  | 65          | 272               | 16              | B   | \$1.50  | Equal      | Better                 | Better        |
| 10-Apr | 4:01 - 4:15pm | 54       | 375               | 27              | D   | \$2.75  | 54          | 372               | 27              | D   | \$4.00  | Equal      | Equal                  | Better        |

**Northbound Express**

|        |               | With TDM |     |    |   |        | Without TDM |     |    |   |        | Difference |        |        |
|--------|---------------|----------|-----|----|---|--------|-------------|-----|----|---|--------|------------|--------|--------|
| 10-Apr | 4:16 - 4:30pm | 49       | 383 | 31 | D | \$3.25 | 49          | 395 | 32 | D | \$4.00 | Equal      | Worse  | Worse  |
| 10-Apr | 4:31 - 4:45pm | 47       | 361 | 30 | D | \$4.75 | 47          | 368 | 31 | D | \$5.25 | Equal      | Worse  | Worse  |
| 10-Apr | 4:46 - 5:00pm | 51       | 360 | 28 | D | \$5.50 | 51          | 369 | 28 | D | \$5.50 | Equal      | Equal  | Worse  |
| 10-Apr | 5:01 - 5:15pm | 48       | 377 | 31 | D | \$4.75 | 48          | 376 | 31 | D | \$4.75 | Equal      | Equal  | Better |
| 10-Apr | 5:16 - 5:30pm | 44       | 359 | 32 | D | \$5.75 | 44          | 363 | 33 | D | \$6.25 | Equal      | Worse  | Worse  |
| 10-Apr | 5:31 - 5:45pm | 40       | 349 | 35 | D | \$5.75 | 40          | 347 | 34 | D | \$5.25 | Equal      | Better | Better |
| 10-Apr | 5:46 - 6:00pm | 49       | 352 | 28 | D | \$8.50 | 49          | 347 | 28 | D | \$8.50 | Equal      | Equal  | Better |
| 10-Apr | 6:01 - 6:15pm | 56       | 311 | 22 | C | \$9.00 | 56          | 299 | 21 | C | \$4.25 | Equal      | Better | Better |
| 10-Apr | 6:16 - 6:30pm | 64       | 304 | 19 | C | \$6.00 | 64          | 304 | 19 | C | \$4.25 | Equal      | Equal  | Equal  |
| 10-Apr | 6:31 - 6:45pm | 60       | 317 | 21 | C | \$0.00 | 60          | 315 | 21 | C | \$1.50 | Equal      | Equal  | Better |
| 10-Apr | 6:46 - 7:00pm | 63       | 246 | 15 | B | \$0.00 | 63          | 252 | 16 | B | \$0.50 | Equal      | Worse  | Worse  |

Average Toll w/ TDM \$4.27

Average Toll w/o TDM \$4.08

**Southbound General Purpose**

|       |               | With TDM |                   |                 |     | Without TDM |                   |                 |     | Difference |                        |               |
|-------|---------------|----------|-------------------|-----------------|-----|-------------|-------------------|-----------------|-----|------------|------------------------|---------------|
| Date  | Time Period   | Speed    | Volume (per lane) | Traffic Density | LOS | Speed       | Volume (per lane) | Traffic Density | LOS | LOS Change | Traffic Density Change | Volume Change |
| 8-Apr | 6:00 - 6:15am | 58       | 308               | 21              | C   | 58          | 339               | 23              | C   | Equal      | Worse                  | Worse         |
| 8-Apr | 6:16 - 6:30am | 56       | 398               | 28              | D   | 56          | 432               | 31              | D   | Equal      | Worse                  | Worse         |
| 8-Apr | 6:31 - 6:45am | 50       | 435               | 34              | D   | 50          | 459               | 36              | E   | Worse      | Worse                  | Worse         |
| 8-Apr | 6:46 - 7:00am | 45       | 427               | 37              | E   | 45          | 462               | 41              | E   | Equal      | Worse                  | Worse         |
| 8-Apr | 7:01 - 7:15am | 39       | 397               | 40              | E   | 39          | 434               | 44              | E   | Equal      | Worse                  | Worse         |
| 8-Apr | 7:16 - 7:30am | 31       | 331               | 42              | E   | 31          | 393               | 50              | F   | Worse      | Worse                  | Worse         |
| 8-Apr | 7:31 - 7:45am | 26       | 313               | 47              | F   | 26          | 349               | 53              | F   | Equal      | Worse                  | Worse         |
| 8-Apr | 7:46 - 8:00am | 29       | 343               | 47              | F   | 29          | 372               | 51              | F   | Equal      | Worse                  | Worse         |
| 8-Apr | 8:01 - 8:15am | 29       | 343               | 47              | F   | 29          | 373               | 52              | F   | Equal      | Worse                  | Worse         |
| 8-Apr | 8:16 - 8:30am | 28       | 323               | 45              | E   | 28          | 348               | 49              | F   | Worse      | Worse                  | Worse         |
| 8-Apr | 8:31 - 8:45am | 31       | 330               | 42              | E   | 31          | 349               | 45              | E   | Equal      | Worse                  | Worse         |
| 8-Apr | 8:46 - 9:00am | 33       | 348               | 42              | E   | 33          | 369               | 45              | E   | Equal      | Worse                  | Worse         |
| 9-Apr | 6:00 - 6:15am | 59       | 306               | 20              | C   | 59          | 336               | 22              | C   | Equal      | Worse                  | Worse         |
| 9-Apr | 6:16 - 6:30am | 57       | 415               | 29              | D   | 57          | 446               | 31              | D   | Equal      | Worse                  | Worse         |
| 9-Apr | 6:31 - 6:45am | 52       | 435               | 33              | D   | 52          | 460               | 35              | D   | Equal      | Worse                  | Worse         |
| 9-Apr | 6:46 - 7:00am | 35       | 343               | 39              | E   | 35          | 386               | 44              | E   | Equal      | Worse                  | Worse         |
| 9-Apr | 7:01 - 7:15am | 30       | 316               | 42              | E   | 30          | 357               | 48              | F   | Worse      | Worse                  | Worse         |
| 9-Apr | 7:16 - 7:30am | 31       | 345               | 44              | E   | 31          | 407               | 52              | F   | Worse      | Worse                  | Worse         |
| 9-Apr | 7:31 - 7:45am | 32       | 379               | 47              | F   | 32          | 415               | 51              | F   | Equal      | Worse                  | Worse         |
| 9-Apr | 7:46 - 8:00am | 30       | 346               | 45              | E   | 30          | 374               | 49              | F   | Worse      | Worse                  | Worse         |
| 9-Apr | 8:01 - 8:15am | 28       | 323               | 45              | E   | 28          | 356               | 50              | F   | Worse      | Worse                  | Worse         |
| 9-Apr | 8:16 - 8:30am | 28       | 335               | 48              | F   | 28          | 356               | 51              | F   | Equal      | Worse                  | Worse         |
| 9-Apr | 8:31 - 8:45am | 30       | 352               | 47              | F   | 30          | 365               | 48              | F   | Equal      | Worse                  | Worse         |
| 9-Apr | 8:46 - 9:00am | 32       | 353               | 44              | E   | 32          | 368               | 46              | F   | Worse      | Worse                  | Worse         |

**Southbound General Purpose**

|        |               | With TDM |     |    |   | Without TDM |     |    |   | Equal | Difference |       |
|--------|---------------|----------|-----|----|---|-------------|-----|----|---|-------|------------|-------|
| 10-Apr | Time          | 54       | 281 | 20 | C | 54          | 309 | 23 | C |       | Worse      | Worse |
| 10-Apr | 6:00 - 6:15am | 51       | 377 | 29 | D | 51          | 409 | 31 | D | Equal | Worse      | Worse |
| 10-Apr | 6:16 - 6:30am | 46       | 402 | 34 | D | 46          | 426 | 36 | E | Worse | Worse      | Worse |
| 10-Apr | 6:31 - 6:45am | 44       | 394 | 36 | E | 44          | 437 | 40 | E | Equal | Worse      | Worse |
| 10-Apr | 6:46 - 7:00am | 40       | 374 | 37 | E | 40          | 410 | 41 | E | Equal | Worse      | Worse |
| 10-Apr | 7:01 - 7:15am | 36       | 362 | 39 | E | 36          | 419 | 46 | F | Worse | Worse      | Worse |
| 10-Apr | 7:16 - 7:30am | 35       | 351 | 40 | E | 35          | 379 | 43 | E | Equal | Worse      | Worse |
| 10-Apr | 7:31 - 7:45am | 36       | 337 | 37 | E | 36          | 368 | 40 | E | Equal | Worse      | Worse |
| 10-Apr | 7:46 - 8:00am | 42       | 338 | 32 | D | 42          | 370 | 35 | D | Equal | Worse      | Worse |
| 10-Apr | 8:01 - 8:15am | 40       | 352 | 35 | D | 40          | 373 | 37 | E | Worse | Worse      | Worse |
| 10-Apr | 8:16 - 8:30am | 40       | 334 | 33 | D | 40          | 352 | 35 | D | Equal | Worse      | Worse |
| 10-Apr | 8:31 - 8:45am | 44       | 331 | 30 | D | 44          | 355 | 32 | D | Equal | Worse      | Worse |

**Northbound General Purpose**

| Date   | Time Period   | With TDM |        |                 |     | Without TDM |        |                 |     | Difference |                        |               |
|--------|---------------|----------|--------|-----------------|-----|-------------|--------|-----------------|-----|------------|------------------------|---------------|
|        |               | Speed    | Volume | Traffic Density | LOS | Speed       | Volume | Traffic Density | LOS | LOS Change | Traffic Density Change | Volume Change |
| 8-Apr  | 4:01 - 4:15pm | 40       | 379    | 38              | E   | 40          | 389    | 39              | E   | Equal      | Worse                  | Worse         |
| 8-Apr  | 4:16 - 4:30pm | 40       | 392    | 39              | E   | 40          | 429    | 42              | E   | Equal      | Worse                  | Worse         |
| 8-Apr  | 4:31 - 4:45pm | 41       | 382    | 37              | E   | 41          | 413    | 40              | E   | Equal      | Worse                  | Worse         |
| 8-Apr  | 4:46 - 5:00pm | 42       | 384    | 36              | E   | 42          | 427    | 40              | E   | Equal      | Worse                  | Worse         |
| 8-Apr  | 5:01 - 5:15pm | 40       | 373    | 37              | E   | 40          | 408    | 40              | E   | Equal      | Worse                  | Worse         |
| 8-Apr  | 5:16 - 5:30pm | 33       | 352    | 43              | E   | 33          | 398    | 48              | F   | Worse      | Worse                  | Worse         |
| 8-Apr  | 5:31 - 5:45pm | 25       | 305    | 48              | F   | 25          | 324    | 51              | F   | Equal      | Worse                  | Worse         |
| 8-Apr  | 5:46 - 6:00pm | 24       | 314    | 52              | F   | 24          | 338    | 56              | F   | Equal      | Worse                  | Worse         |
| 8-Apr  | 6:01 - 6:15pm | 24       | 335    | 55              | F   | 24          | 347    | 57              | F   | Equal      | Worse                  | Worse         |
| 8-Apr  | 6:16 - 6:30pm | 20       | 273    | 55              | F   | 20          | 295    | 60              | F   | Equal      | Worse                  | Worse         |
| 8-Apr  | 6:31 - 6:45pm | 22       | 295    | 53              | F   | 22          | 300    | 54              | F   | Equal      | Worse                  | Worse         |
| 8-Apr  | 6:46 - 7:00pm | 32       | 377    | 47              | F   | 32          | 391    | 48              | F   | Equal      | Worse                  | Worse         |
| 9-Apr  | 4:01 - 4:15pm | 49       | 278    | 22              | C   | 45          | 288    | 25              | C   | Equal      | Worse                  | Worse         |
| 9-Apr  | 4:16 - 4:30pm | 46       | 349    | 30              | D   | 46          | 390    | 33              | D   | Equal      | Worse                  | Worse         |
| 9-Apr  | 4:31 - 4:45pm | 39       | 402    | 41              | E   | 39          | 430    | 44              | E   | Equal      | Worse                  | Worse         |
| 9-Apr  | 4:46 - 5:00pm | 38       | 355    | 36              | E   | 38          | 396    | 41              | E   | Equal      | Worse                  | Worse         |
| 9-Apr  | 5:01 - 5:15pm | 44       | 339    | 31              | D   | 44          | 370    | 33              | D   | Equal      | Worse                  | Worse         |
| 9-Apr  | 5:16 - 5:30pm | 42       | 369    | 35              | D   | 42          | 411    | 39              | E   | Worse      | Worse                  | Worse         |
| 9-Apr  | 5:31 - 5:45pm | 35       | 396    | 44              | E   | 35          | 415    | 47              | F   | Worse      | Worse                  | Worse         |
| 9-Apr  | 5:46 - 6:00pm | 32       | 389    | 48              | F   | 32          | 403    | 50              | F   | Equal      | Worse                  | Worse         |
| 9-Apr  | 6:01 - 6:15pm | 33       | 380    | 46              | F   | 33          | 383    | 46              | F   | Equal      | Equal                  | Worse         |
| 9-Apr  | 6:16 - 6:30pm | 39       | 393    | 40              | E   | 39          | 412    | 42              | E   | Equal      | Worse                  | Worse         |
| 9-Apr  | 6:31 - 6:45pm | 49       | 401    | 32              | D   | 49          | 405    | 33              | D   | Equal      | Worse                  | Worse         |
| 9-Apr  | 6:46 - 7:00pm | 54       | 369    | 27              | D   | 53          | 383    | 28              | D   | Equal      | Worse                  | Worse         |
| 10-Apr | 4:01 - 4:15pm | 32       | 370    | 45              | E   | 32          | 380    | 47              | F   | Worse      | Worse                  | Worse         |

**Northbound General Purpose**

|        |               | With TDM |     |    |   | Without TDM |     |    |   | Difference |       |       |
|--------|---------------|----------|-----|----|---|-------------|-----|----|---|------------|-------|-------|
| 10-Apr | 4:16 - 4:30pm | 31       | 370 | 48 | F | 31          | 411 | 53 | F | Equal      | Worse | Worse |
| 10-Apr | 4:31 - 4:45pm | 31       | 371 | 48 | F | 31          | 403 | 52 | F | Equal      | Worse | Worse |
| 10-Apr | 4:46 - 5:00pm | 31       | 373 | 47 | F | 31          | 411 | 52 | F | Equal      | Worse | Worse |
| 10-Apr | 5:01 - 5:15pm | 31       | 374 | 48 | F | 31          | 406 | 53 | F | Equal      | Worse | Worse |
| 10-Apr | 5:16 - 5:30pm | 29       | 369 | 50 | F | 29          | 408 | 55 | F | Equal      | Worse | Worse |
| 10-Apr | 5:31 - 5:45pm | 29       | 363 | 50 | F | 29          | 384 | 53 | F | Equal      | Worse | Worse |
| 10-Apr | 5:46 - 6:00pm | 31       | 371 | 48 | F | 31          | 393 | 51 | F | Equal      | Worse | Worse |
| 10-Apr | 6:01 - 6:15pm | 35       | 383 | 43 | E | 35          | 395 | 44 | E | Equal      | Worse | Worse |
| 10-Apr | 6:16 - 6:30pm | 38       | 380 | 40 | E | 38          | 407 | 43 | E | Equal      | Worse | Worse |
| 10-Apr | 6:31 - 6:45pm | 39       | 385 | 39 | E | 39          | 387 | 39 | E | Equal      | Equal | Worse |
| 10-Apr | 6:46 - 7:00pm | 48       | 389 | 32 | D | 48          | 398 | 33 | D | Equal      | Worse | Worse |

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