

High Occupancy Toll Lanes with a Refund Option  
A Stated Preference Survey of the Phoenix-Metropolitan Area

by

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A Thesis Presented in Partial Fulfillment  
of the Requirements for the Degree  
Master of Science

Approved April 2015 by the  
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May 2015



## ABSTRACT

Managed Lanes (MLs) have been increasingly advocated as a way to reduce congestion. This study provides an innovative new tolling strategy for MLs called the travel time refund (TTR). The TTR is an “insurance” that ensures the ML user will arrive to their destination within a specified travel time savings, at an additional fee to the toll. If the user fails to arrive to their destination, the user is refunded the toll amount.

To gauge interest in the TTR, a stated preference survey was developed and distributed throughout the Phoenix-metropolitan area. Over 2,200 responses were gathered with about 805 being completed. Exploratory data analysis of the data included a descriptive analysis regarding individual and household demographic variables, HOV usage and satisfaction levels, HOT usage and interests, and TTR interests. Cross-tabulation analysis is further conducted to examine trends and correlations between variables, if any.

Because most survey takers were in Arizona, the majority (53%) of respondents were unfamiliar with HOT lanes and their practices. This may have had an impact on the interest in the TTR, although it was not apparent when looking at the cross-tabulation between HOT knowledge and TTR interest. The concept of the HOT lane and “paying to travel” itself may have turned people away from the TTR option. Therefore, similar surveys implementing new HOT pricing strategies should be deployed where current HOT practices are already in existence. Moreover, introducing the TTR concept to current HOT users may also receive valuable feedback in its future deployment.

Further analysis will include the weighting of data to account for sample bias, an exploration of the stated preference scenarios to determine what factors were significant

in peoples' choices, and a predictive model of those choices based on demographic information.

## ACKNOWLEDGEMENTS

The author would like to thank Dr. Yingyan Lou for the support during this research project through the completion of my master's degree, Kale Aziz and Hannah Housenga for their assistance in the survey development, and Sravani Vadlamani for her contribution to the data analysis and future investigation.

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## 1 INTRODUCTION

In recent years, managed lanes (MLs) have been increasingly advocated as a way to reduce congestion. In the past four years alone, the number of priced ML facilities in the United States has risen from 6 to 17 facilities, an increase of over 450 tolled miles (Federal Highway Administration, 2013a). As defined by the Federal Highway Administration (FHWA), MLs are lanes that use active management by an operating agency to manage demand and maintain a desired level of service (LOS), utilizing either new strategies or modifying existing ones (FHWA, 2013b). One type of MLs apply vehicle restrictions, including bus rapid transit lanes, truck only lanes, and high-occupancy vehicle (HOV) lanes. HOV lanes require a minimum number of generally two or more vehicle occupants to use a dedicated lane on an expressway. Other types of MLs employ pricing for demand management. Priced MLs commonly occur in the form of high-occupancy toll (HOT) lanes. HOT lanes are managed lanes that use tolls or a small fee to regulate access to the facility. High occupancy vehicles (HOVs), public transit buses, and emergency vehicles may all use HOT lanes at no charge.

Currently, 91 toll facilities exist in 21 different states and Puerto Rico (FHWA, 2013b). This results in over 5,400 lane miles of tolled roadway in the United States. Besides HOTs, these priced facilities include freeways where access to all lanes in the facility are tolled. One such example is that of the Dallas North Tollway in Dallas, Texas. In this system, all lanes in the 30 mile stretch are priced (FHWA, 2013a). HOT lanes, however, are dedicated lanes on an existing expressway next to cost-free general purpose lanes (GPLs).

Current HOT lanes invoke two main types of pricing strategies: static, or fixed, variable tolling and dynamic variable tolling. Static tolls set up prices based on time of day. However, they cannot be modified to adjust to real time traffic conditions (Burriss et al., 2012). A typical example of static variable tolling is that of the Katy Freeway in Houston, TX. In 2008, the Katy Freeway expansion project added four MLs to the facility of the same name. The tolls on the MLs vary by time of day: \$4.00 for peak, \$2.00 for shoulder, and \$1.00 for off times (Patil et al., 2011). On the other hand, dynamic tolling allows ML prices to be adjusted to fit current traffic circumstances. However, roadway users only get to know prices upon arriving at MLs (Burriss et al., 2012). Examples of dynamic tolling include the I-15 in San Diego and the I-394 in Minnesota. On the I-15, tolls vary as often as every six minutes, depending on traffic conditions. Similar MLs exist on the I-394 in Minnesota. The I-394 has prices that vary dynamically between \$0.25 and \$4.00, with a maximum of \$8.00, as often as every 3 minutes (Yin and Lou, 2009).

There are a variety of technologies to collect tolls for priced MLs. In recent years, many facilities have given frequent riders the option to purchase electronic reader tags. These tags are mounted in the vehicle and when scanned, the system recognizes the vehicle and charges a small fee to a pre-registered account. Fees for registered vehicles offered by some facilities are even lower than the general toll. Other payment options include standard toll booth, infrared technologies, and pay-by-mail video tolling (FHWA, 2013b).

Although priced MLs are prevalent in the United States, there is generally a negative bias for their implementation. In fact, many HOV to HOT lane conversions have

been halted in metropolitan areas due to perceived public opposition (Ungemah, Swisher, & Tighe, 2005). Reasons for negative public reaction vary. However, one plausible reason is that travelers may not receive expected benefits when using MLs due to uncertainties in traffic. For example, if a traveler on an HOT lane were to come upon a vehicle incident that is not reflected by the time display, travelers may be discouraged.

To further benefit the users and increase public acceptance of priced MLs, innovative pricing strategies are needed to make congestion pricing more appealing. Kockelman and Kalmanje (2005) conducted a survey on one such strategy where people would be offered a travel credit allowance every month in order to use the freeways. If at the end of the month the user did not use all of the credit up, the remaining amount would be given directly to the driver.

This study proposes a different pricing strategy where a travel time refund (TTR) option is available. When choosing to pay to use MLs, a traveler is offered the chance to purchase an additional TTR, or “insurance”. This insurance ensures that the user will arrive to a specified destination within a certain amount of travel time savings. If the user fails to arrive at the specified destination within that time savings due to disturbances in traffic, then the user would be refunded the toll amount, but not the additional cost of the TTR. The TTR cost would always be less than the toll amount.

Aside from the user reliability incentives and potential lower fees, there are numerous possible benefits of the refund option. Firstly, it is anticipated that congestion in GPLs would be reduced if more users are willing to make use of less-congested HOTs. The TTR would also provide an additional source of funding for departments of transportation (DOTs) where lack of financial resources currently exists. Finally, the TTR

option would hope to change negative attitudes towards managed lanes and priced roadways.

The purpose of this study is to investigate travelers' attitudes towards a possible refund option of priced MLs. To gauge general interest and concerns regarding this concept and to elicit travelers' choices of ML usage and refund claims under various situations, a stated preference survey was developed and distributed in the Phoenix, Arizona metropolitan area in the fall of 2014. This thesis describes the design of the questionnaire, administration of the survey, and preliminary results on demographic data and influencing factors.



Because the focus of this study is a stated preference survey to investigate travelers' attitudes towards a possible refund option of priced MLs, the literature review focuses on survey design methods and existing stated preference surveys of ML facilities.

Stated preference (SP) surveys are designed to give respondents hypothetical situations or scenarios in which they must make a choice, thus their preference is stated. Revealed preference (RP) studies, on the other hand, are studies that involved the actual choices users make, from which preferences can be revealed. In transportation, stated preference surveys commonly make people choose between different traveling alternatives, as is the case when choosing to pay for a priced ML or travel in the GPLs. In terms of congestion pricing, many surveys deploy SP surveys and develop models to understand respondents' willingness to pay.

## **2.1 Survey Design Methods**

Patil et al. (2011) evaluated three different stated preference survey designs using the Katy Freeway as their backdrop: D-efficient design, random attribute level generation (random), and adaptive random experiment. To negate the effects of always choosing the cheapest option, adaptive random generation performed the best. Therefore, a variation of this approach, called branching, was used in the survey design of this paper. Hess et al. (2007) also evaluated three survey design methods: orthogonal design with random block, orthogonal design with non-random blocking, and efficient (or D-efficient design). Like Patil et al. (2011), they concluded that the efficient design fell short and a much

better model fit was achieved through non-random blocking methods. Additionally, different survey designs led to differences in results.

## **2.2 Past Stated- and Revealed- Preference Surveys**

An extensive amount of literature exists on stated preference surveys where priced MLs did not exist at the time. One such example is that of the Katy Freeway in Houston, TX. Although the Katy Freeway currently has HOT lanes, surveys were previously deployed before their implementation. Burriss et al. (2007) completed an earlier survey on the Katy Freeway than Patil et al (2011). Some of their results showed that for those interested in MLs, the main reasons were due to travel time savings and travel time reliability. Moreover, it's important to mention that they concluded additional incentives must be given to current carpoolers to remain in a carpool. Otherwise, with tolling costs constant, some HOV users are likely to convert to SOV. Therefore, if converting from an HOV lane to an HOT lane, it is better to allow HOVs to use the ML for free rather than having them pay the full toll amount.

Surveys about existing priced ML provide rich revealed preference data to infer information from choices made by users. Brownstone et al. (2002) used data from the I-15 in San Diego to infer a driver's willingness to pay. They found that the willingness to pay was roughly \$30/hour, a higher estimate than other studies (Calfee and Winston, 1998), which may be due to the demographic in the San Diego area. An even higher willingness to pay estimate derived from the I-15 empirical data is found in Burriss et al. (2012). Median value of travel time, or willingness to pay, was much higher in the afternoon than other times of day at \$71.41/hour. Burriss et al. (2012) also looked at the

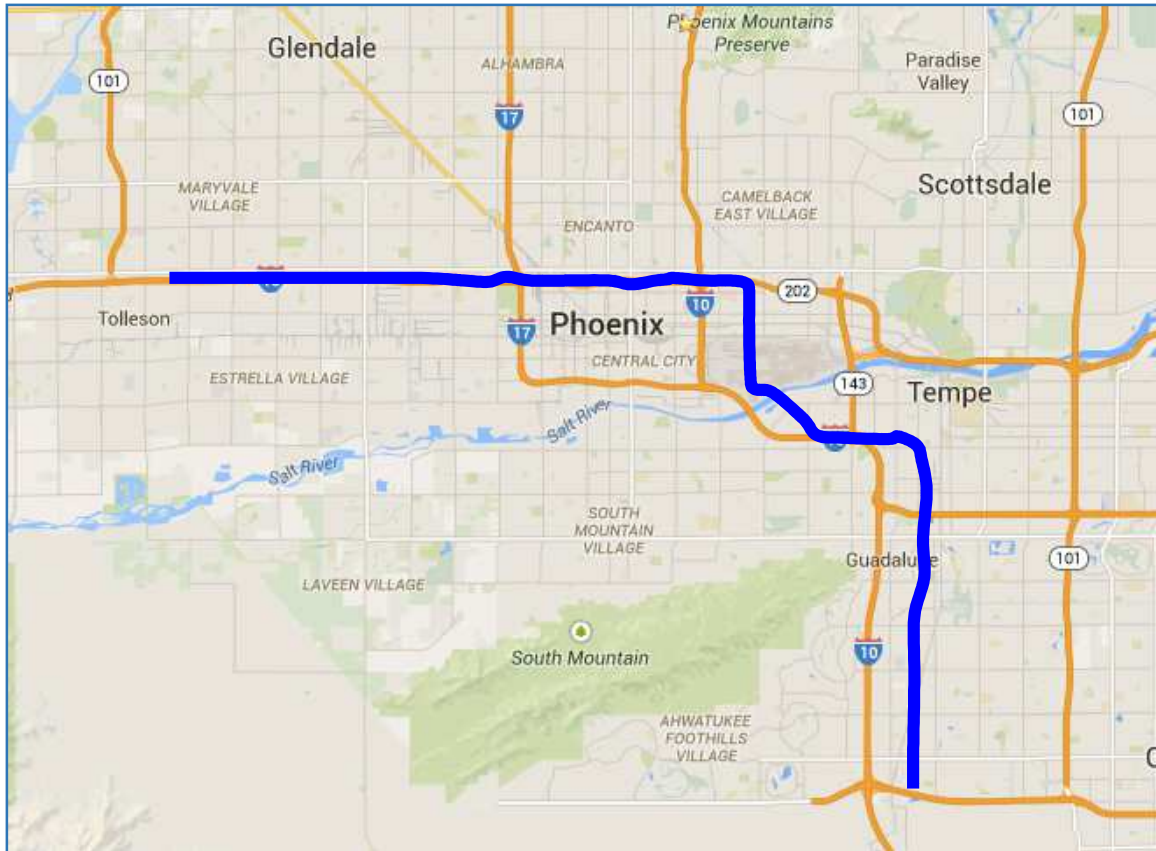
value of travel time for I-394 in Minneapolis, where morning VOT was found to be \$78/hour and afternoon VOT was \$116/hour. Although this VOT estimate is rather high, one plausible explanation could be that since the roadway users who are willing to pay for the premium service of “a fast, safe, and reliable commute every time”, they are on the high end of the VOT spectrum for this particular facility. Devarasetty et al. (2014) analyzed psychological variables to predict priced ML use on the I-15, as well as on the I-25 in Denver and the I-95 Miami.

Stated and revealed preference surveys, as well as empirical data, have been used to estimate VOT in ML users. This is shown in both places where MLs currently exist or where MLs have been considered. The literature summarized provides a basis for VOT which respondents are likely to consider. This aids in the designing of the factors and levels given in the survey of interest. Additionally, the survey design methods described allows branching, similar to the adaptive random design, to prevail as the chosen method.

### **3.1 Background**

The HOT Refund survey questionnaire was designed to gauge travelers' interest and concerns in the refund option, and to elicit travelers' choices of ML usage and refund claims under various stated-preference scenarios. Additionally, demographics data was gathered in order to develop a choice model to describe travelers' stated ML usage and TTR purchase.

Ideally, the survey would have been conducted in an area where HOT lane facilities currently exist, such as in San Diego, Minneapolis, or Houston. However, due to limited project scope, Interstate 10 in the Phoenix metropolitan area was identified as the study area. I-10 currently has HOV lanes throughout the study area. The location of interest on the I-10 in the survey is shown in blue in Figure 1. This stretch extends from the Loop 101 Agua Fria Freeway west of Phoenix to the Loop 202 Santan Freeway in southeast of Phoenix.



**Figure 1: Map of Study Area**

Although no HOT lanes currently exist in Arizona, the concept itself is not something newly introduced by this paper. In the fall 2012, the Maricopa Association of Governments (MAG), the regional agency that serves the Phoenix-metropolitan area, completed a Managed Lane Network Development Strategy (MAG, 2012). The purpose of this strategy was to establish feasibility for introducing HOT lanes within the Phoenix area. The Managed Lane Network Development Strategy covers a variety of issues regarding the implementation HOT lanes in the valley. The study goes in depth regarding lane access in MLs and the pros and cons between restricted and continuous access along with how to separate the MLs from the GPLs. It makes pertinent the idea of expanding the hours of operation for the current HOV lanes with the introduction of pricing.

Furthermore, the Managed Lane Network Development Strategy delves into different pricing strategies. It explains the pros and cons of static and dynamic pricing and whether to charge per mile, segment, or facility. The Strategy also brings to light many legal and regulatory issues, such as how the project will be operated and financed. And lastly, provides recommendations for all of these topics to make HOT lanes a reality in the valley.

Although the MAG (MAG, 2012) study led to great discussions on HOT, there are currently no plans to implement them. In order to conduct our survey, a hypothetical HOT lane was presented to respondents. I-10 in the Phoenix area was selected as the HOT lane location due to its use as a major east-west corridor that crosses the state. Additionally, it cuts through the heart of downtown Phoenix where many businesses are located, making it a major daily commuting route.

The survey was distributed mainly through distribution lists in the Phoenix area. It was also shared through social media websites, so those outside of the Phoenix area could also participate in the survey. For this particular group of respondents, Phoenix-specific travel questions were hidden and descriptions of Phoenix freeways were included.

### **3.2 Design**

The survey consisted of a total of 40 questions split into four different sections. The first section collected information on the respondents' last trip on the I-10 in the Phoenix-metro area within the past year, if one existed. The second section introduced and gathered preliminary interest on the refund option. The third section consisted of three or four stated preference scenarios where respondents had the choice to choose

between driving in the GPLs, ML lane without the refund option, or ML with the refund option given different levels of factors. The fourth and final section contained questions regarding demographic data. A copy of the survey script can be found in Appendix A.

Two different versions of the survey were deployed throughout the process: Version A and Version B. Version B includes additional questions and some changes to factors or levels that were conceived during the data gathering process. The differences in these versions are described in the next sections.

### ***3.2.1 Section 1: Last Interstate-10 Trip***

In the first portion of the survey, respondents were asked to give details of their last trip on the I-10. If respondents had not traveled on the I-10 in the Phoenix-metro area within the past year, this section was skipped. If a survey user responded that they had taken such a trip, Version B included additional questions asking the frequency of traveling the I-10 and primary trip purpose.

Users who had taken an I-10 trip in the past year were asked to describe their most recent trip regarding purpose, day of the week the trip occurred, trip start time, zip codes of where the trip started and ended, if the HOV lane was used, type of vehicle used, and number of people in the car. Additionally, respondents were asked to select the entrance and exit ramps on I-10 used in their last trip and to estimate the total travel time. The last I-10 trip is used in the stated-preference section as the first scenario. Therefore, the entrance and exit ramps to the I-10 were mandatory in order to pipe distances into the stated-preference section.

### **3.2.2 Section 2: General Attitude**

The General Attitude section gathered information on people's background knowledge and their general interests and attitudes regarding MLs. In addition, it introduced the concept of the travel time refund (TTR) concept.

First, respondents were asked about their familiarity with HOV lanes. If a respondent was familiar with HOVs, they were then asked their frequency of use and satisfaction with HOV lanes. Similarly, respondents were asked their familiarity with, use, and interest in HOT lanes. Finally, the concept of the TTR was explained and respondents were asked their interest in purchasing the TTR.

### **3.2.3 Section 3: Stated Preference Scenarios**

In the stated-preference section, each survey respondent was presented 4 different scenarios randomly generated from a pool of 288 possible scenarios. Users were asked to choose between the GPL, a hypothetical HOT lane, or the HOT lane with the TTR on the I-10. Figure 2 shows an example of the stated preference question. The text shown in bold in the question are the choice descriptions and the variables related to the trip. Carpooling was not given as an option to respondents, as the focus of this study is travelers' willingness to pay rather than their carpool choices.

Six random variables were presented in each scenario (see Figure 2): trip distance, time of day, GPL time range or congestion level, HOT cost, HOT lane travel time range, and HOT with TTR cost. Two out of the four scenarios displayed that the GPLs were "heavily congested". This is consistent with the practice that most HOT facilities only display HOT lane travel time. The other two scenarios displayed the GPL travel time



range. This was done so that it could be determined if displaying the GPL travel time range alongside the ML travel time range would have an effect on users' choices.

**Scenario 2: You are taking a 15 mile trip on the I-10 freeway during the PM rush hour in the peak direction. Which option would you choose?**

**1. GPL (Total Cost \$0.00):** Drive in the general purpose lanes for free. The average travel time can vary between **16** and **24** minutes.

**2. HOT no refund (Total Cost \$3.00):** Drive in the HOT lane for **\$3.00** and do not purchase a travel time refund. The average travel time can vary between **15** and **18** minutes.

**3. HOT with refund (Total Cost \$3.75):** Drive in the HOT lane for **\$3.00** and purchase the travel time refund at **\$0.75**. The average travel time can vary anywhere between **15** and **18** minutes.

Option 1: GPL

Option 2: HOT no refund

Option 3: HOT with refund

**Figure 2: An Example of Stated-Preference Scenario**

**Table 1: Alternative Specific Factors for Stated Preference Scenarios**

Alternative	Attribute	Levels
<b>All</b>	Trip Distance (miles)	Reported, 10, 15, 25
	Peak Hour	AM, PM
	Travel Speed (mph)	55 (base)
<b>GPLs</b>	Travel Time Index Factor	1.2, 1.3, 1.4
	Travel Time Variability	"Heavily Congested", ±20%
<b>HOT Only and HOT with TTR</b>	Toll Rate (cents/mile)	5, 20, 35
	Travel Time Index Factor	1, 1.1
	Travel Time Variability	±10%
<b>HOT with TTR</b>	TTR Cost (% of Total Toll)	25%, then 10% or 50%

The factors and levels that went into generating the random scenarios for the stated preference questions are presented in Table 1.

The first scenario (Scenario 0) was based off the respondent's last trip, where the distance was calculated from the entrance and exit ramps reported (see Section 3.2.1). The remaining three scenarios (Scenarios 1, 2, and 3) produced hypothetical trips of 10, 15, and 25 miles on the I-10, respectively. The distances were considered reasonable distances currently traversed on the section of the I-10 in question. No scenario was given a distance under 10 miles, as it was assumed that most respondents would not be willing to pay for a trip that short. The distances were fixed with Scenarios 1, 2, and 3 to prevent a random generation of the same scenario to the same respondent.

The peak hour time of day is random in Version B of the survey, while it is always in the PM peak hour in Version A.

Travel speed, travel time index factor, and travel time variability, are used to calculate the displayed travel time range. Although the speed limit on the I-10 in Phoenix is 65 mph, the base travel speed for all scenarios was 55 miles per hour (mph) to provide for a more realistic peak hour travel times. The "travel time index factor" is multiplied to the base travel time first to calculate the mean travel time. The index factor, or congestion factor, is based off of travel time index factors currently found on the I-10 freeway in Phoenix (FHWA 2009). The FHWA commonly publishes urban congestion reports for major cities in the United States. Data from 2009 was used to develop to the different levels of the index factor. The travel time variability is in percentage of the mean travel time. It is then applied to calculate the travel time interval displayed. GPL travel time has a higher variability of 20%, or in other words a larger time window. The HOT travel lane has a lower variability of 10%, which results in smaller time window than that of the GPLs. These percentages are similar to those used in Devarasetty et al. (2012). It is worth

noting that the GPL variability of 20% in this survey actually prevents the lower bound of the travel time interval displayed for GPLs to become significantly lower than that of the MLs.

The toll rates of \$0.05/mile, \$0.20/mile, and \$0.35/mile are random in the scenario generation and are similar to those used in Devarasetty et al. (2012). They vary around \$0.15/mile, the median toll rate per mile paid reported in Burris et al. (2012) from actual afternoon usage of Katy Freeway HOT lanes. Additionally, considering the possible mean travel time presented in the scenarios of this study, \$0.05/mile is equivalent to a value of time ranging from \$2.50/hour to \$2.73/hour; \$0.20/mile a value of travel time between \$10.00/hour to \$10.91/hour; and \$0.35/mile a value of travel time between \$17.50/hour to \$19.09/hour. These values of time vary around the conclusions in Kockelman and Kalmanje (2005), where a respondent's willingness to pay was found to be \$7.95 per hour. Additional literature supports these toll rates by suggesting willingness to pay lies somewhere between \$13 and \$16 per hour (Yan et al., 2002). Although some studies found willingness to pay much higher at \$30/hour, they suggest that the results may be biased due to a perceived higher level of safety on the HOT lane (Brownstone et al., 2012).

TTR cost is initially always 25% of the HOT lane toll rate in each scenario. Each scenario also contains a second branched question. Branching allows the scenarios to adapt to what a user prefers and present factors and levels that help in determining a users thresholds in willingness to pay (WTP), or VOT. In this question, TTR is either lower or higher depending on the first choice in the scenario. If the respondent chooses either the GPL lane or the HOT lane without the TTR in the first question of a scenario, then the

TTR cost is lowered to 10%. Similarly, if the respondent chooses the HOT with TTR, the TTR cost is raised to 50% in the second question of a scenario. Figure 3 shows an example of the branched question presented in Figure 2. As can be seen, the cost of the HOT with refund (\$3.30) decreased from that shown in Figure 2 (\$3.75). This question would appear if the user had chosen either Option 1: GPL or Option 2: HOT no refund in the previous question in the same scenario

Scenario 2, Part 2: Now imagine the same scenario as in the previous question, however the travel time refund cost is lower. Which option would you choose?

**1. GPL (Total Cost \$0.00):** Drive in the general purpose lanes for free. The average travel time can vary between **16** and **24** minutes.

**2. HOT no refund (Total Cost \$3.00):** Drive in the HOT lane for **\$3.00** and do not purchase a travel time refund. The average travel time can vary between **15** and **18** minutes.

**3. HOT with refund (Total Cost \$3.30):** Drive in the HOT lane for **\$3.00** and purchase the travel time refund at **\$0.30**. The average travel time can vary anywhere between **15** and **18** minutes.

Option 1: GPL

Option 2: HOT no refund

Option 3: HOT with refund

**Figure 3: Example of Branched Question in Scenarios**

### **3.2.4 Section 4: Demographics**

The final section consisted of general demographic questions like age, gender, ethnicity, education, number of people and vehicles in the household, and household income. Additionally, it captured the interests in TTR after the scenarios were completed. Version B included additional free-response questions asking under what conditions a respondent would use the HOT land with and without the TTR.

### **3.3 Administration**

Pretesting of the survey was conducted in July 2014. The full survey was deployed on October 13, 2014. Two different versions of the survey, Version A and Version B, were distributed to respondents. Respondents who took the survey before 12:00 PM on November 3<sup>rd</sup>, 2014 received Version A of the survey. Those who submitted their responses after that time until 11:59 PM on December 1<sup>st</sup>, 2014 were given Version B.

The survey was distributed through outlets in the Phoenix-metropolitan area. The majority of responses came from the Arizona State University (ASU) Parking and Transit Services (PTS) bi-weekly newsletter sent out to those who have done transactions with PTS. The PTS bi-weekly newsletter provided a way to reach a wide range of audiences with ease. Reminders were sent out occasionally throughout the deployment time period to encourage users to take the survey. Other responses came from sharing the survey through social media outlets such as Facebook, Twitter, and LinkedIn. Additionally, the survey link was sent out to the Institute of Transportation Engineers (ITE) Arizona Section and the Intelligent Transportation Society of Arizona.

As a way to gather responses, incentives were offered for those who completed the survey. Respondents who completed the survey before November 1<sup>st</sup> were put into a random drawing to receive a Fitbit. Respondents who completed the survey before December 1<sup>st</sup> (including those who had completed it prior to November 1<sup>st</sup>) were put into three other random drawings to receive an additional Fitbit or one of two Kindles.

## 4 RESULTS

A total of 2274 responses were gathered throughout the duration of the survey. Of those 2274 responses, about 80% (1816) were completed. Around 44% (1009) of the responses came from version A and 56% (1265) of the responses resulted from Version B.

### 4.1 General Demographic Data

#### 4.1.1 *Individual Demographics*

All demographic questions were optional. Respondents were reminded that they could opt out of questions by either skipping to the next question or by selecting “Prefer Not to Answer” when given as an option. Table 2 (Appendix B) shows the general individual demographic data of the respondents obtained from the survey results. This subsection provides a brief description of each demographic variable.

About 64% (1118) of the total respondents were female, while 34% (591) of the respondents were male. The gender distribution of the sample is not ideally balanced. One hypothesis for this could be that women were more patient and willing to complete the survey. If weighted, the responses from males would be weighted more heavily in the general population.

The highest percent of the responses, 25% (402), came from the age range between 18 and 24 years of age. This is expected due to the majority of our responses coming from the ASU PTS’s mailing list. The lowest percent of responses came from respondents 55 years of age and older at 14% (231). Again, this is expected because the majority of responses came from a university. Additionally, the older demographic may not be as comfortable or familiar with taking an online survey compared to those who are

younger. 17% (270) of respondents were 25-30 years of age, 22% (361) were 31-40 years of age, and 22% (366) were 41-55 years of age.

In terms of ethnicity, the majority of respondents at 72% reported white/Caucasian. 10% (167) of respondents identified themselves as Hispanic. Asian came in third at 7% (117), which can be expected as a good amount of those who pursue higher education come from foreign countries. 5% (92) of respondents preferred not to answer. African American's came in next at 2% (41) followed by those who identified with "other" (37, 2%). Finally, 23 respondents (1%) identified with Native American and 6 people considered themselves Pacific Islanders. This ethnicity data may differ from the Phoenix population data, since the ethnicity of Phoenix appears to be more diverse than what the survey responses suggest. One would expect the Hispanic, and possibly the African American ethnicity, data of the Phoenix-metropolitan area to be higher. Reasons for the discrepancy could have arisen from the survey demographic being mainly college students and those who work with college students.

Like the ethnicity data, the education data may also be skewed to favor those with higher degrees. The majority of people (86%) responded that they have either completed some college (477, 27%), a four-year degree (535, 31%), or a master's degree (487, 28%). Furthermore, 9% (154) of respondents had completed a doctoral degree and 2% (32) said they had completed some other professional degree such as an MD or JD. Only one person responded that they completed some high school or less and 3% (49) of respondents said they have a high school diploma or GED. Again, because the survey was administered on a platform that was mainly sent out to university students,

employees, and staff, it was expected that a majority of people would have pursued higher-level education.

#### ***4.1.2 Household Demographics***

Household demographic data captured the number of people and vehicles in the household, as well as the estimated gross household income per year. Table 3 in Appendix B shows the general household demographic data obtained from the survey results.

The majority of respondents (33%) had two people living in their household, including themselves. The remaining options were very similar in the percent of respondents: 18% (302) reported they lived alone, another 18% (306) said they had three people in their household, and 19% (307) responded that they have four people living in their household. 11% (187) people said they lived with 5 or more people. This shows that, besides two people living in a household, there is no general trend in the number of people in the household for this sample size.

Most households (722, 43%) reported owning two vehicles. This was followed by one vehicle at 24% (397) and three vehicles at 21% (352). 8% (133) of respondents said that they had four vehicles present in their household and 3% (56) responded that they have five or more vehicles available. 22 people (1%) responded that they have no vehicles in the household.

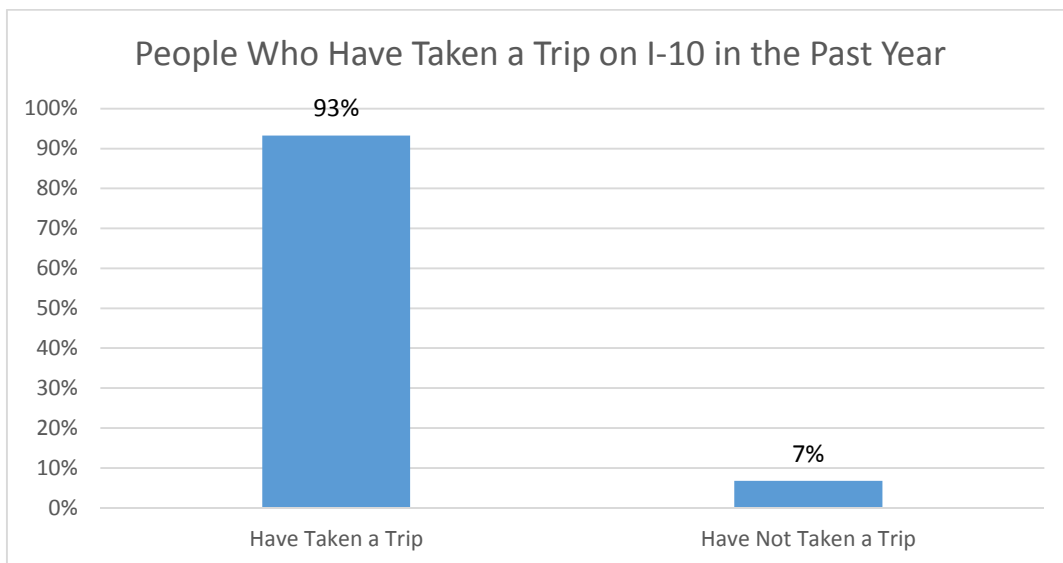
When analyzing household income data, the percentage of respondents seem to favor those with a higher income. 18% (273) of respondents reported that their household income was between \$75,000 and \$100,000. An additional 18% (265) said that their household income was even higher between \$100,000 and \$150,000. 17% (255) reported



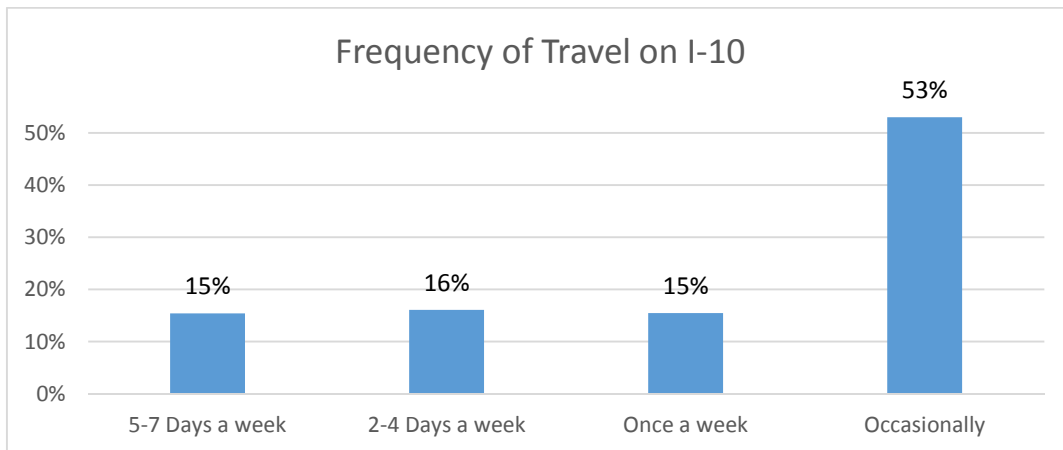
their income to be in between \$30,000 and \$50,000. 15% (224) said their household income was between \$50,000 and \$75,000. 12% (173) reported that their income was below \$30,000 and 10% (155) reported that their income was above \$150,000. 11% of respondents preferred not to answer the question. Although somewhat high, this may be due to the sensitive nature of the household income question or that some respondents simply did not know.

#### 4.2 Last I-10 Trip Data

Besides the check box at the beginning of the tournament to verify the age, the question “Have you taken a trip on the I-10 in the past year?” was the first question in the survey. A total of 2064 respondents answered this question. Of those, 93% (2064) had taken a trip in the past year. Only 7% (149) did not. The strong majority of people who have taken a trip in the past year yields a good sample to interpret the last trip data that follows.



**Figure 4: Percent of Respondents Who Have Taken a Trip on the I-10 in the Past Year**

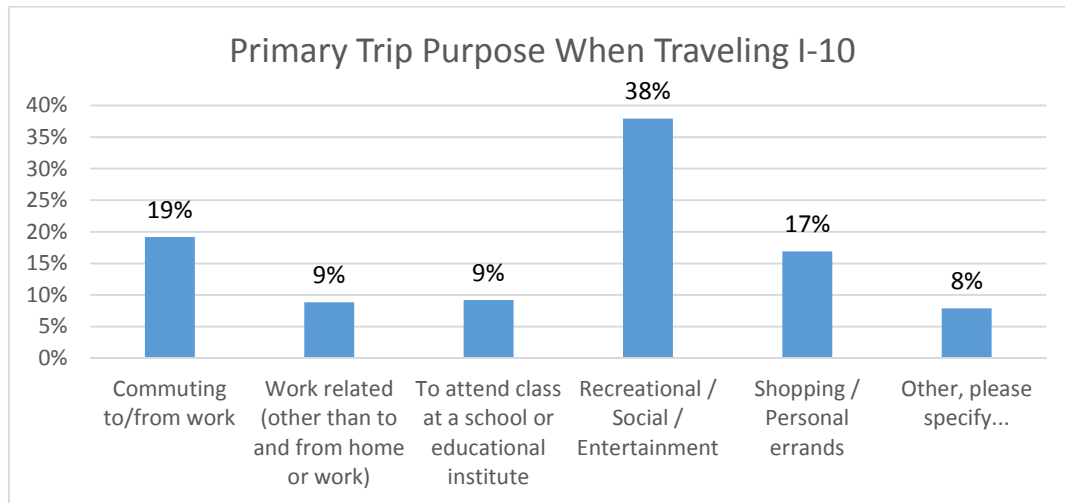


**Figure 5: Frequency of Travel on I-10**

Version B of the survey contained two branched questions off of the first question in the survey: “How often do you travel the I-10?” (Figure 5) and “What is your primary trip purpose when using the I-10?” (Figure 6). These questions were given to respondents if they responded with a “Yes” to the first survey question. In total, 1142 responses were gathered for the question regarding frequency of travel. The majority of respondents (605, 53%) occasionally traveled on the I-10. The rest of the responses were split similarly between once a week (177, 15%), 2-4 days a week (184, 16%), and 5-7 days a week (176, 15%). From this data, it can be determined that the majority of respondents do not use the I-10 to commute to and from work.

The second question added to Version B is shown in Figure 6. 1141 people responded. The majority of respondents at 38% (433) said when they used the I-10, they generally traveled for recreational, social, or entertainment purposes. The second highest percentage of respondents at 19% (219) reported that they used to I-10 to commute to and from work, followed by shopping or personal errands at 17% (193), to attend an educational institute at 9% (105), work related 9% (101), and other at 8% (90). In terms

of the HOT with TTR concept, commuters are the targeted audience. Because almost 20% of those who answered the survey are commuters on the I-10, it is an ideal freeway in Arizona to test the TTR concept or HOT lanes in general.



**Figure 6: Percentage of Respondents Primary Trip Purpose When Traveling the I-10**

Table 4 in Appendix shows information obtained about the respondents’ last trips on the I-10.

The first category in Table 4 is the purpose of the last trip on the I-10, not to be confused with the primary trip purpose when traveling on the I-10 shown in Figure 6. However, the results are similar to Figure 6. 40% (739) of people traveled for social or recreational purposes. Second was commuting at 20% (370). This was followed by shopping and personal errands at 11% (208) and work related activities also at 11% (200). Lastly, 9% (157) used the I-10 on their last trip to attend class or an educational institute and 9% (170) of respondents’ trip purposes were for other reasons.

For when the last trip occurred, the majority of respondents (1092, 59%) said that their trip occurred during a weekday, Monday through Friday. 41% (756) of respondents

said their trip occurred on the weekend. However, because the weekend is only two days out of seven, the number of respondents whose last trip happened on a weekend is relatively high, as could be seen if this data were weighted. Additionally, the data could be skewed depending on what day of the week a respondent happened to access the survey.

For HOV lane use during the last trip, a surprising number of people did happen to use the HOV lane. 686 (37%) respondents said they accessed the HOV lane on their last trip. This contradicts previously displayed data (Figure 8) where 44% of respondents said that they very rarely use the HOV lane. 63% (1149) of respondents said they did not use the HOV lane on their last trip.

95% (1771) of respondents said that they used a car, SUV, or pick-up truck to travel on the I-10. Motorcycles (14, 1%), Buses (43, 2%), and other modes (30, 2%) had a small number of respondents who answered.

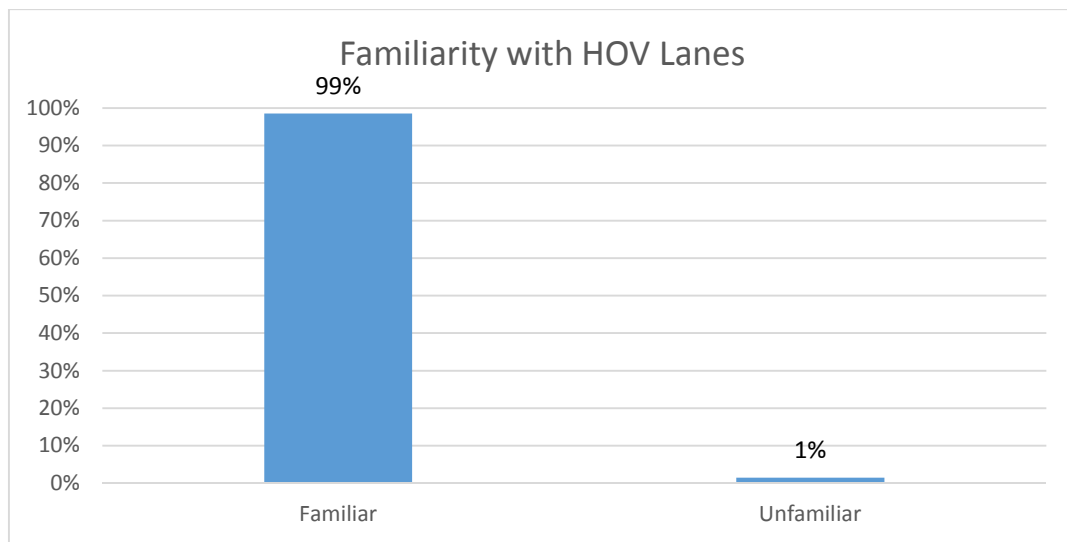
The majority of people on their last trip were solo-drivers (743, 40%), followed by two people in the vehicle during the trip (552, 30%). The frequency of number of people who took the trip dropped with the increase in the number of people reported in the car, as seen in three people (256, 14%), four people (142, 8%), five people (74, 4%), and greater than five people (86, 5%).

### **4.3 General Attitude Data**

The following graphs display the general attitude data obtained from the survey sample. These questions, except for the last, were asked prior to the scenarios to gain an

understanding of what previous knowledge the respondent had on common ML practices in existence.

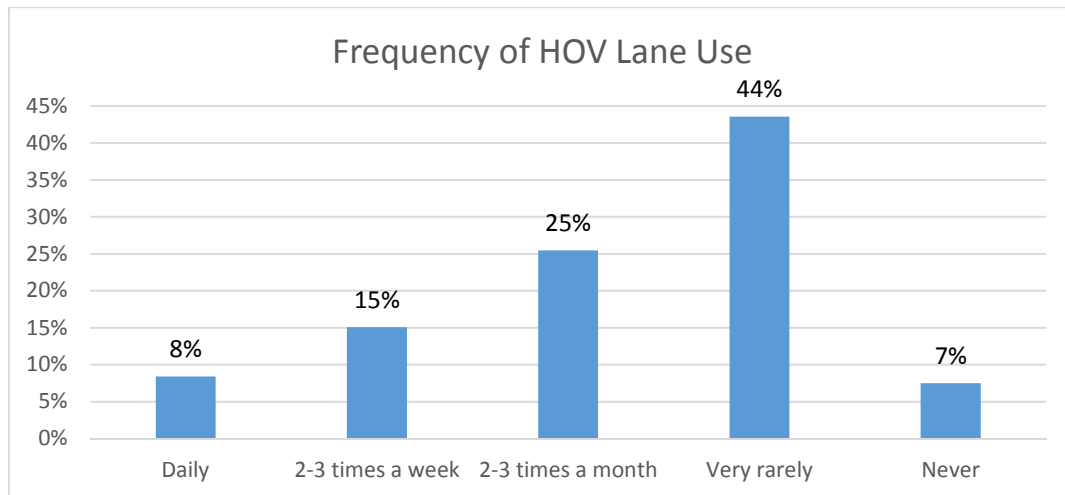
Figure 7 shows the percent of respondents familiar with the concept of HOV lanes. A total of 1956 people answered the question, “Do you know what a High Occupancy Vehicle (HOV) lane is?” Out of the people that responded, 1927 (99%) responded with an answer of “Yes”. Only 29 respondents (1%) said that they did not know what an HOV lane was. Because the majority of respondents came from the Phoenix-metropolitan area where HOVs are prevalent, the data shows what was expected.



**Figure 7: Percent of Respondents Familiar with HOV Lanes**

Figure 8 shows the percentage of respondent’s HOV lane use frequency. Those who took the survey were asked to pick how often they used the HOV lane. A total of 1951 people responded to this general attitude question. The majority of respondents (850, 44%) said they took the HOV lane very rarely. 25% (497) of people who answered

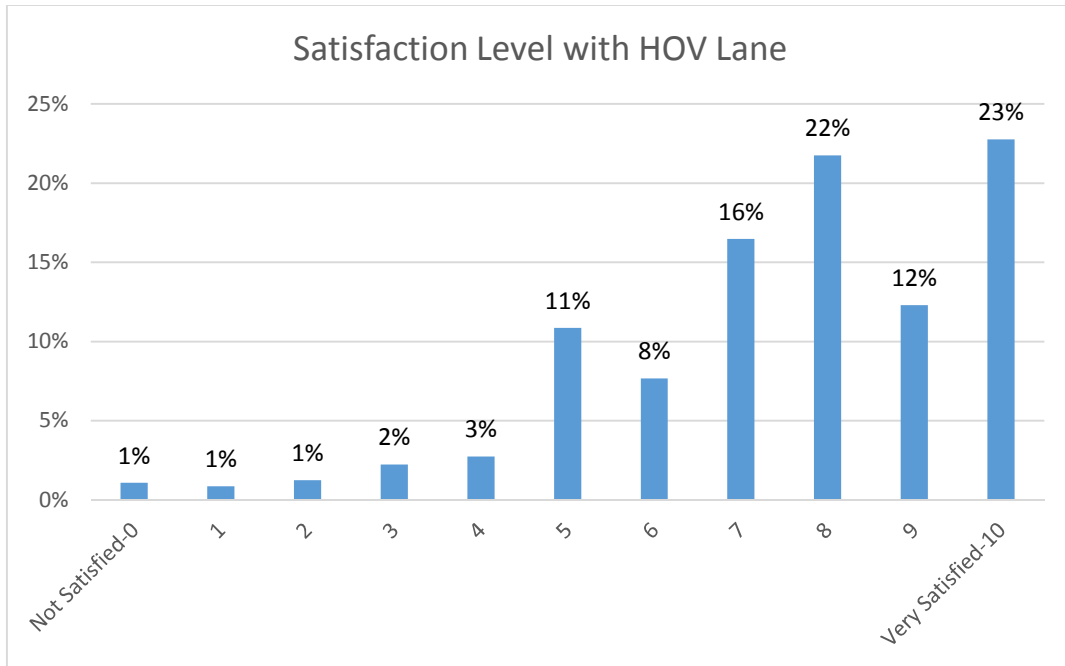
this question said that they use the HOV lane two to three times a month, followed by 15% (294) who said they used the HOV 2-3 times a week. 8% (164) of people that responded said they used the HOV lane daily. Only 7% (146) of respondents said that they never use the HOV lane.



**Figure 8: Percentage of Respondent Frequency of HOV Lane Use**

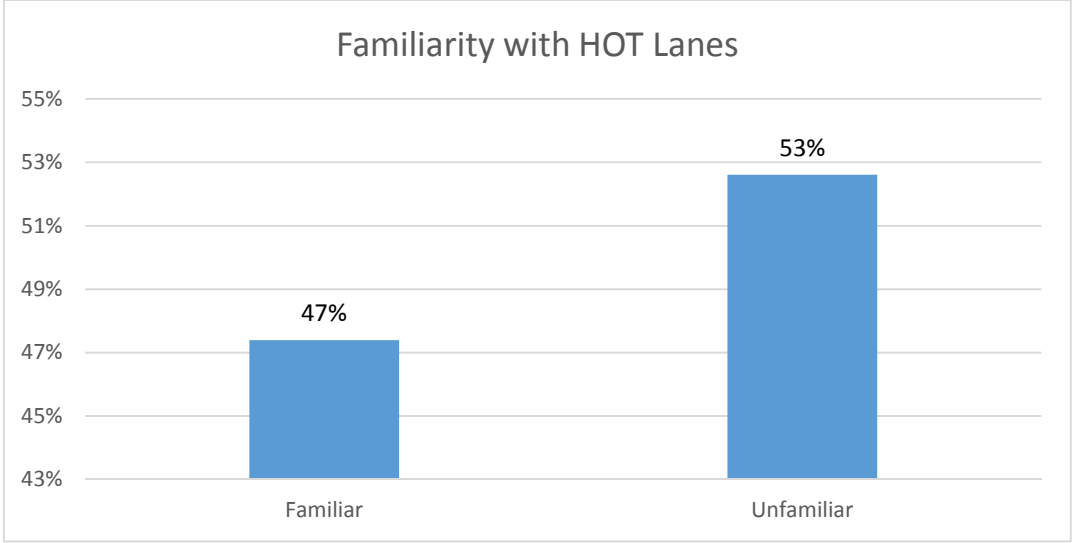
If a respondent said that they had used an HOV lane before, the follow-up question, “On a scale of 1 to 10, how satisfied were you with the HOV lane?” was asked. Figure 9 shows the results of this question, where 0 represents “Not Satisfied” and 10 represents “Very Satisfied”. A total of 1142 responses were gathered for this particular question. Generally, the majority of people (398, 23%) responded with a 10, showing that they were very satisfied. In fact, 81% (1415) of people who used the HOV lane reported that they had a satisfaction level of 6 or higher. Although this question is an indication of how much people like using the HOV lane, it is important to note that the rating is subjective depending on the respondent. For example, reasons behind a particular

individual's choice when rating a 7 may be different than a different individual who also chose to rate their satisfaction a 7.

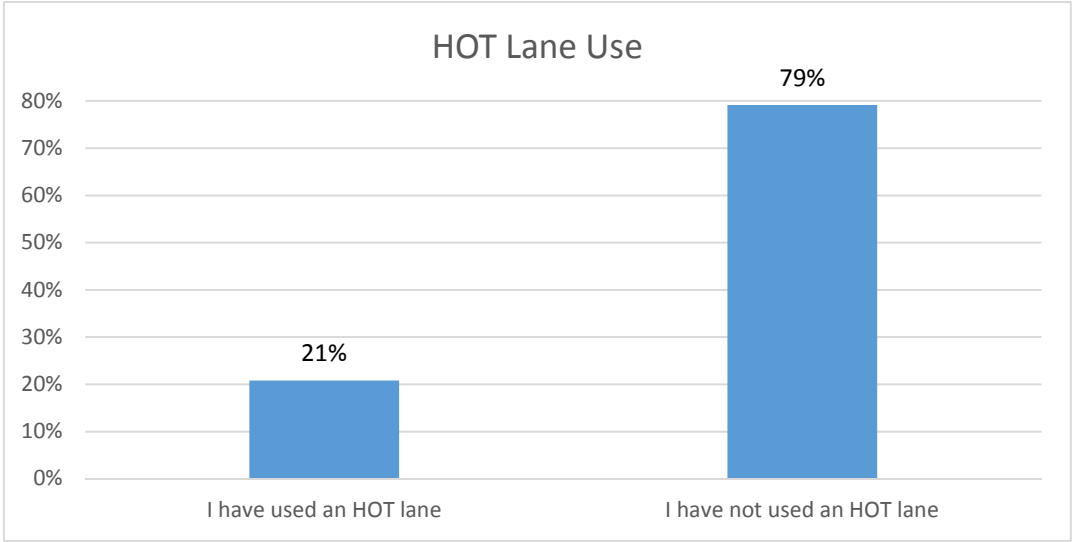


**Figure 9: Percentage of Respondents Satisfied with the HOV Lane**

Figure 10 shows the percentage of respondents familiar with HOT lanes. A total of 1956 people answered this question. Unexpectedly, 47% (927) reported that they in fact know what an HOT lane is. The percentage seems rather high considering there are currently no HOT lanes in existence in Arizona. However, because Arizona is known for being a melting pot of people from all over the country due to its temperate climate, it is possible that respondents could be from other parts of the country where toll lanes, and in particular HOT lanes, are present. Additionally, respondents could have traveled to a particular area of the country where HOT lanes are prevalent. 53% (1029) of people reported that they do not know what an HOT lanes is.



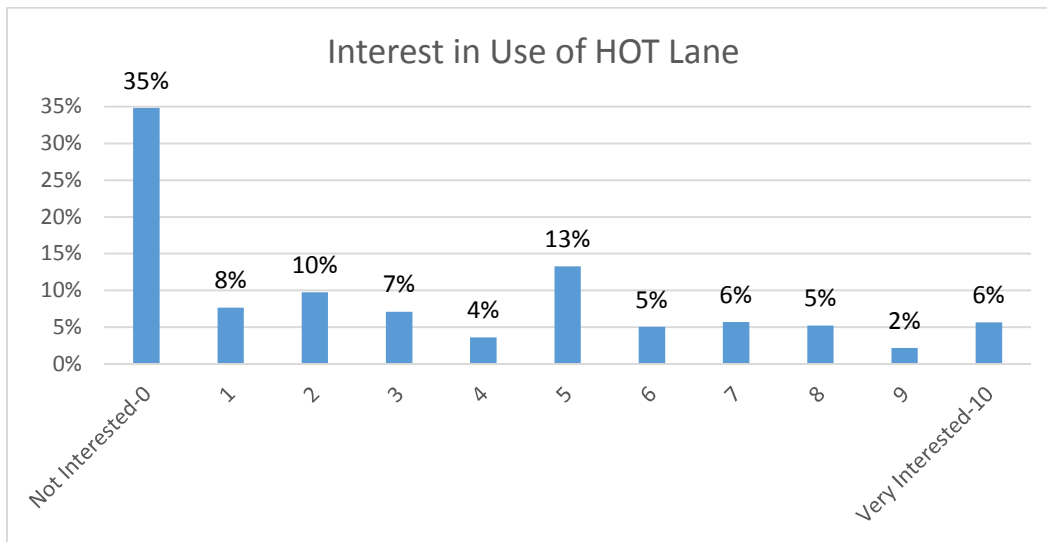
**Figure 10: Percentage of Respondents Familiar with HOT Lanes**



**Figure 11: Percentage of Respondents Who Have/Have Not Used an HOT Lane**

Figure 11 shows the data from the question “Have you ever used an HOT lane?” In all, 1947 people answered this question. Although 47% (Figure 9) of respondents were familiar with the concept of an HOT lane, only 21% (406) had actually used an HOT lane. 79% (1541) of respondents said they have never used an HOT lane. Again, this is expected because there are no HOT lanes in Arizona.





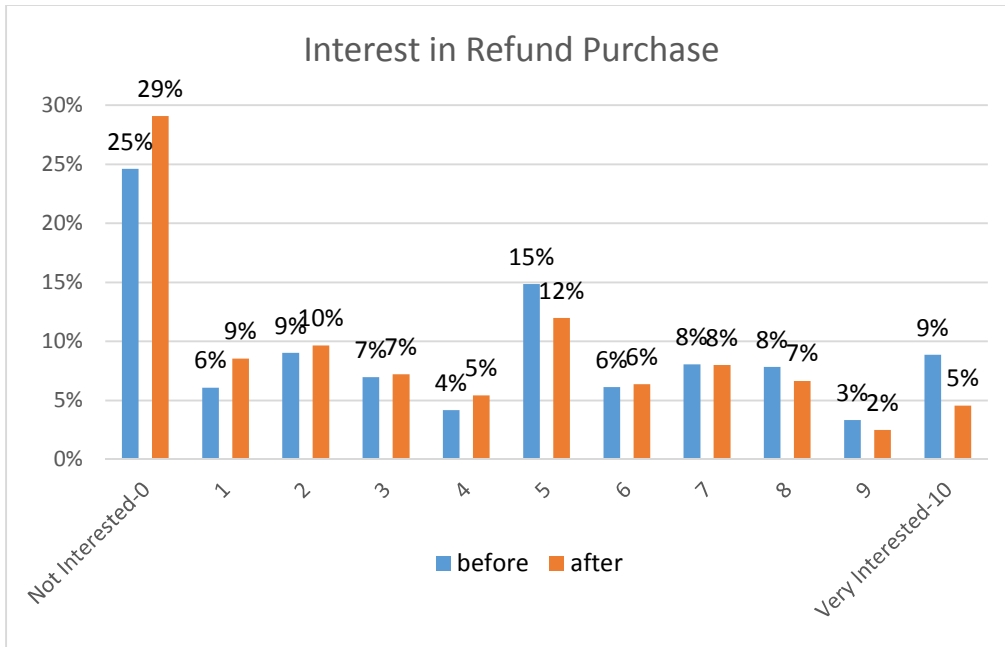
**Figure 12: Percentage of Respondents Interested in Using an HOT Lane**

Figure 12 shows the percentage of people who are interested in using an HOT lane, on a scale of 0 to 10, where 0 is “Not Interested” and 10 is “Very Interested”. Overall, 1942 people responded to this question, where the majority at 35% (676) said they were not interested in using the HOT lane. As explained in the introduction, people generally have a negative bias towards paying for their travel using personal vehicles. Therefore, the large amount of people who were not interested in the HOT lane is not a surprise. 6% (110) of people said they were very interested in using the HOT lane. 13% (258) responded with a 5, somewhere in the middle between “Not Interested” and “Very Interested”, depending on the interpretation of the respondent.

After the TTR concept was explained to respondents, they were asked to report their interest in the TTR option before and after they went through the different stated preference scenarios. Figure 13 shows a histogram of the interest levels before and after the scenarios. A total of 1938 respondents answered the “Before Scenarios” interest question and 1802 answered the “After Scenarios” question. Before the scenarios, 25%

(477) of respondents showed no interest in the TRR, 15% (288) showed somewhat of an interest with an answer of 5, and 9% (172) respondents were very interested. After the scenarios, 29% (524) of respondents showed no interest in the TTR, 12% (216) showed somewhat of an interest with an answer of 5, and 5% (82) of respondents were very interested in the TTR. Before the scenarios, 66% (1274) of people gave an interest level of 0 to 5 and 34% (664) of people responded with an interest level from 6 to 10. After the scenarios, 72% (1296) of people responded with an interest level of 0 to 5 and 28% (506) responded with an interest level from 6 to 10. Although it appears as though there was a significant drop in interest in the TTR after the scenarios, it was only a change of 6%.

The observed general negative attitude towards HOT and TTR is in line with expectation. However, comparing Figure 12 and Figure 13, it can be observed that users are less negative about TTR than HOT (lower percentage of rating “0” and higher percentage of rates “6” to “8”), supporting the idea that TTR could make HOT facilities more appealing.



**Figure 13: Percentage of Respondents Interested in the Refund Option**

#### 4.4 Cross-Tabulation Analysis of General Attitude

To further understand travelers’ general attitude and examine potential influence factors, cross-tabulation analysis is performed. The cross-tabulation tables of general attitude data and demographic data can be found in Appendix C. In these tables, the ratings were scaled from 0-10 to 0-6 to gain a better understanding of the data. This scaling binned ratings “1” and “2” together, “3” and “4” together, “6” and “7” together, and “8” and “9” together.

##### 4.4.1 Age

Table 5 shows age vs. HOV use. 34% of those aged 18-24 very rarely used the HOV lane, which is the lowest compared to the rest of the age groups. Only about 6% of

those aged 25-30 used the HOV lane daily. 15% of people aged 31-40 used the HOV lane two to three times a week.

As can be seen from Table 6, the majority of people under the age of 41 did not know what an HOT lane was, this includes 65% of 18-24 year olds, 58% of 25-30 year olds, and 55% of 31-50 year olds. On the contrary, 58% of 41-54 year olds and 64% of those 55 and older knew what an HOT lane was.

While the TTR interest of other age groups remained mostly constant before and after the stated preference scenarios, the percent of those aged 18-24 that responded that their interest rate in the TTR option was a “4” in the binned scale (“6” or “7” in the original 0-10 Likert scale) increased slightly after the scenarios were presented from 18% to 21% (Table 7 and Table 8).

#### **4.4.2 Gender**

11% of males use the HOV lane daily compared to 7% of females (Table 9). In general, men appeared to use the HOV slightly more often than women. Additionally, a greater proportion of men (55%) are aware of HOT lanes compared to women (43%) (Table 10). However, although more men know what an HOT lane is, slightly more women (21%) have used an HOT lane before than men (19%) (Table 11). Men are also slightly more interested in the TTR than women (Table 12 and Table 13).

#### **4.4.3 Education**

The majority of people who had a Master’s degree or higher knew what an HOT lane was (Table 14), including 54% of master degree holders, 55% of doctoral degrees, and 59% of those who had some other type of professional degree like a MD or JD. There

was no significant trend in HOV knowledge, HOV Use, HOT interest, or TTR interest with respect to education level.

#### **4.4.4 Income**

Table 15 shows that the majority of those whose household income was under \$50,000 per year did not know what an HOT lane was at 65%. On the other hand, the majority of people who said their income was over \$50,000 per year were familiar with HOT lanes.

Only 10% of people whose income was between \$20,000 and \$30,000 per year said they have used an HOT lane. However, 21% of people whose income was between \$75,000 and \$100,000 and 29% of people whose incomes were greater than \$150,000 had used an HOT lane before (Table 16).

Additionally, those who had a higher income showed more interest in using an HOT lane. For example, Table 17 shows that 18% of those whose income was greater than \$150,000 responded that their interest rate in HOT lanes was either a “6” or a “7” on a 0-10 Likert scale (a “4” in Table 17), while only 10% of those whose income was \$20,000 to \$30,000 reported the same interest. This may show a correlation between income level and HOT interest and use in future modeling.

In terms of TTR interest, certain income groups tended to be more interested in the TTR option (Table 18). 19% of those whose income was \$40,000 to \$50,000 reported after the stated-preference scenarios were presented that their interest in the TTR option was either a “6” or a “7” (on a 0-10 Likert scale, a “4” in Table 18), the highest among all income groups. Furthermore, 18% of those whose income was over \$150,000 also

responded with a “6” or “7”. On the other hand, among those who reported income between \$20,000 and \$30,000, only 10% of people responded with a “6” or “7”.

There is no significant trend in HOV knowledge or HOV use with respect to household income.

#### ***4.4.5 Number of People in the Household***

As expected, those who had more people living in their household were inclined to use the HOV lane more frequently than those who had less (Table 19). 24% of people who had four members in their household and 22% of people who had five or more members in their household responded that they use the HOV lane two to three times a week. Only 9% of people who lived by themselves and 12% of people who lived with one other person responded similar usage frequency. Moreover, 51% of those who lived by themselves responded that they use the HOV lane very rarely while 32% of those with five or more people in their household said the same.

There is no significant trend in the household and HOV knowledge, HOT knowledge, HOT interest or TTR interest with respect to the number of people in a household.

#### ***4.4.6 Primary I-10 Trip Purpose***

Interaction effects for people who commonly traveled the I-10 freeway and their trip purpose were compared to interest in HOT lanes and the TTR. Table 20 shows the interaction between the primary trip purpose and the interest in the HOT lane. Again, the ratings were scaled from 0-10 to 0-6 to gain a better understanding of the data. This scaling binned ratings “1” and “2” together, “3” and “4” together, “6” and “7” together,

and “8” and “9” together. Those who said they used the I-10 to attend classes showed the highest interest in using an HOT lane at “10” at 8%. This was followed by work related trips who responded with an interest level of a “10” at 7%. This may be because employers might be able to subsidize the costs associated with travel on an HOT lane. 27% of commuters said they had an interest level in the HOT lane of at least a “6” or higher”. Those who primarily used the I-10 to travel for social and recreational purposes showed the lowest interest in the HOT lane, with 42% responding with an interest level of a “1” or a “2”. It is assumed that those who use the I-10 to travel to entertainment activities do not take the I-10 on a regular basis. Thus, they would be less likely to pay for a faster commute and instead just plan for it.

Table 21 and Table 22 display the primary I-10 trip purpose compared to the interest in the TTR option before and after the scenarios. Before the scenarios, 18% of people who travel on the I-10 to attend class said that they were extremely interested in the TTR (rated “10”). This was followed by work related at 13% and commuting at 10%. Those who used the I-10 to shop or for recreational purposes showed the lowest interest in TTR with the majority of respondents giving a rating of a “4” or lower at 60% and 53%, respectively. After the scenarios, only 8% of people who traveled on the I-10 to attend class said they were extremely interested in the TTR (rated “10”). The percent of commuters who also rated the interest in TTR a “10” also dropped to 6%.

#### ***4.4.7 HOT Interest and Usage***

Those who were interested in the HOT lane were generally interested about the same in using the TTR option, as can be seen in Table 23. 65% of people who said they

were very interested in HOT lanes said they were also as interested in the TTR option before stated-preference scenarios were presented. Additionally, 29% of people who reported their HOT interest as a “6” or “7” also reported their TTR interest as higher at either an “8” or “9”.

Table 24 shows the interaction between the use of an HOT lane and the interest in the HOT. Those who had used an HOT lane previously were generally found to be more interested in using it. For example, 36% of people who had never used an HOT lane said they were not interested in using one. However, 30% of those who had used an HOT lane prior felt the same. Similarly, 29% of those who had used an HOT lane before had a positive rating of HOT lane interested while 22% of those who had never used an HOT lane said the same. This may indicate that people who had previously used an HOT are more likely to be interested in using one in the future.

Table 25 compares the interest in the TTR option before the scenarios to those who had and had not used an HOT lane prior. Slightly more people who had previously used an HOT lane prior showed interest in the TTR. For example, 25% of those who had used an HOT lane before showed interest of an “8” or higher on the Likert scale (5 or higher in the bins) compared to those who had not used an HOT lane at 19%.

After the scenarios were presented, the attitudes of the TTR for those who had used an HOT before tended to resemble those who had not used an HOT lane prior, as can be seen in Table 26. About 5% of both groups were extremely interested in the TTR (bin group 6, Likert scale 10) and 15% were neutral. 23% of those who had used an HOT lane and 25% of those who had not used an HOT lane showed no interest in the TTR after the scenarios were presented.



#### ***4.4.8 Interest in TTR Before and After Scenarios***

Table 27 is a cross-tabulation of the interest before the TTR compared to the interest after the TTR. 1791 Respondents answered both questions in the survey regarding interest before and after the scenarios. About 42% of people's interest in the TTR did not change after completing the scenarios.

Of the people who responded that they were uninterested (rated "0") in the TTR option before the scenarios (447 people), 80% remained uninterested after the scenarios were presented to them. 12% increased their interest to that of a "1" or a "2" value. Of the people who responded that they were very interested (rated "10") in the survey, only 36% of them remained as interested as before. 10% of these people's interest dropped to "0" after completing the scenarios. 18% of people increased their interest from a "5" to that of a "6" or "7" after the scenarios. Similarly, 16% of people increased their TTR interest from a "6" or "7" to an "8" or "9". 27% of people who responded with an interest of an "8" or "9" before the scenarios, then reported with a "6" or "7" after. Likewise, 27% of people who responded with an interest of a "3" or "4" pre-scenarios, responded with a "1" or "2" after the scenarios.

As can be seen in Table 27, the majority of people's interest in the TTR option did not change before and after the scenarios. This is shown in the table by the diagonal line of green squares. Where changes in interest were seen, they were slightly more positive or slightly more negative rather than jumping from one extreme to the other. This can be seen by the lighter green or yellow squares to the right and left of the diagonal green line. However, it appears that slightly more people responded that their interest in the TTR option decreased rather than increased. Reasons for the decrease in

interest could be that respondents were presented higher costs in the stated preference questions than they were willing to pay. Additionally, the stated preference scenarios did not give respondents all factors considered if this were a real-life situation. For example, respondents were told if they were in a hurry to arrive at their destination which, in theory, would have had an impact on their travel time compared to the value of their money.

## 5 CONCLUSIONS

Presenting the TTR through a stated preference survey in the Phoenix area gave valuable insight into drivers' attitudes towards priced MLs. The TTR provides an additional incentive for drivers to pay to use priced MLs. Through the TTR, drivers can have their freeway travel time "insured". Insuring their travel time allows the HOT user to receive a refund if they do not arrive to their destination within the travel time savings displayed. Perceived benefits of the TTR include additional funding for state departments of transportation, an increase in underutilized HOV/HOT lanes, reducing overall congestion of highways, and changing negative attitudes toward priced MLs by adding additional insurances.

The HOT Refund Survey, a four section survey with stated preference scenarios, gained an understanding of how people react and respond to priced MLs and the TTR in a place where HOT lanes currently do not exist. Survey takers answered questions regarding their last trip on the I-10, ML opinions, hypothetical TTR scenarios, and demographics. In all, over 2,200 responses were gathered through the ASU PTS newsletters, Arizona ITE and ITS Arizona email lists, and social media platforms. Furthermore, the opportunity to win a prize in a random drawing incentivized people to complete the survey.

It is observed from our exploratory data analysis that there is a general negative attitude towards HOT and TTR. This is in line with expectation. However, comparing Figure 12 to Figure 13, it can be seen that users are less negative about TTR than HOT (lower percentage of rating "0" and higher percentage of rates "6" to "8" on a 0-10 Likert scale), supporting the idea that TTR could make HOT facilities more appealing.

Results showed that the majority of survey takers came from the ASU PTS email list, which were able to reach a broad range of ASU students, faculty, and staff. Therefore, the un-weighted results of the survey were skewed towards this demographic. For example, most of the responses came from people between the ages of 18 and 24 years, around the general age as the average college student. Additionally, because most survey takers were in Arizona, the majority (53%) of respondents were unfamiliar with HOT lanes and their practices. This may have had an impact on the interest in the TTR, although it was not apparent when looking at the cross-tabulation analysis between HOT knowledge and TTR interest. The concept of the HOT lane and “paying to travel” itself may have turned people away from the TTR option. Therefore, similar surveys implementing new HOT pricing strategies should be deployed where current HOT practices are already in existence. Moreover, introducing the TTR concept to current HOT users may also receive valuable feedback in its future deployment.

The general attitude data collected indicates that the stated preference scenarios presented influenced respondents’ TTR interests in both positive and negative ways. Before the scenarios were presented, 34% of respondents had a positive opinion of the TTR (a 6 or higher on the Likert scale). After the scenarios, that number dropped to 28%. Reasons for the drop in interest could vary. Some respondents may have found the costs presented in the hypothetical scenarios too high for their willingness to pay. Further investigation into the scenario data will reveal more information on the relationship between the factors, levels, choices made, and HOT/TTR opinions. It is important to note that although stated preference scenarios provide insight on people’s decision, limitations exist in that people may not actually do what they will say (Patil et al., 2011).

In all, the TTR is an option that may be easier to introduce to demographics that generally travel on a specified freeway often, such as commuters or those who use a freeway to attend classes. Additionally, those interested in using the HOT lane tend to be more willing to use the TTR option. This may be because the population that uses the HOT lanes already has a lower VOT, or they value their time more than their money. However, the TTR may also introduce new users to HOT lanes if implemented.

Future analysis will include weighting the data to account for sample bias, an exploration of the stated preference scenarios to determine what factors were significant in peoples' choices, and a predictive model of those choices based on demographic information, trip characteristics, and toll and TTR rates. The thought is that the model will be able to estimate people's WTP based on factors presented to respondents in the scenarios. Ideally, the WTP will be within the thresholds described in the literature.

Another interesting aspect of any follow-up studies is the incorporation of psychological and economic theories to possibly model HOT and TTR usage. For example, Hogarth and Kunreuther (1989) found in their study on why consumer purchase insurance is that consumers' decisions will be affected by "(a) attitudes toward risk as expressed in their utility functions and (b) the means of their probability distributions over the probability of experiencing the known loss". A more in-depth review of the literature on this topic will be performed in our future studies to establish plausible model structures.

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APPENDIX A  
SURVEY SCRIPT



## Page 1: Pre-Survey

### Refund Option for Toll Lanes Conducted by Researchers at Arizona State University

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Thank you for your interest in partaking in the following survey. This survey, conducted by graduate student, Melissa Archer, under the direction of Dr. Lou at Arizona State University, is about freeway managed lanes. Freeway managed lanes are designated lanes on a freeway where demand and available capacity are controlled. Participation in this survey includes answering questions regarding your reactions to various traffic scenarios. Your responses will be used in research to understand community reactions to freeway managed lanes and pricing strategies.

The survey is voluntary. The questions are optional and your responses will remain anonymous. You may opt out at any time. The results may be used in reports, presentations, or publications in aggregate form. If you choose to complete the survey, your total time commitment will be approximately 10 to 15 minutes.

Upon completion of the survey, you have the opportunity to enter your information into raffle prizes drawings as an appreciation of your participation. Two Kindles and a Fitbit will be given away following the closing of the survey on December 1st. If you complete the survey by October 31st, you will be entered into an additional drawing for a second Fitbit. Winners of the drawings will be notified by November 15, 2014 for the first selection and by December 15, 2014 for the overall selection. The raffle prizes are purchased and given away by Arizona State University. Amazon and Fitbit are not sponsors of this survey.

If you have any questions concerning the research study, please contact the research team at: [melissa.archer@asu.edu](mailto:melissa.archer@asu.edu) or [yingyan.lou@asu.edu](mailto:yingyan.lou@asu.edu). If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.

\* = Required

\* By checking the box below, you verify that you are 18 years or older and give consent to contribute your answers to research purposes.

Yes, I certify that I am 18 years or older and agree to participate in this research.

## Page 2: I-10 Trip or No I-10 Trip

In Arizona, Interstate 10 (or I-10) is a major east-west highway that connects Phoenix to the major cities of Los Angeles, CA and Tucson, AZ.



Image taken from <http://www.I10phoenix.com/>

\* Have you taken a trip that included the I-10 in the Phoenix-metro area within the past year?

- Yes
- No

How often do you travel the I-10?

- 5-7 Days a week
- 2-4 Days a week
- Once a week
- Occasionally

What is your primary trip purpose when using the I-10?

- Commuting to/from work
- Work related (other than to and from home or work)
- To attend class at a school or educational institute
- Recreational / Social / Entertainment
- Shopping / Personal errands
- Other, please specify... \_\_\_\_\_

**Page 3: Most Recent I-10 Trip**

Last Trip on I-10

The next questions refer to the last trip you took on the I-10 in the Phoenix area, as indicated on the previous page. If you do not remember the answer to a question asked, you may skip it.

What was the purpose of the trip?

- Commuting to/from work
- Work related (other than to and from home or work)
- To attend class at a school or educational institute
- Recreational / Social / Entertainment
- Shopping / Personal errands
- Other, please specify... \_\_\_\_\_

What day of the week did your last trip take place?

- Weekday
- Weekend

Approximately what time did you start your trip?

Time \_\_\_\_\_

What is the zip code of where the trip started?

\_\_\_\_\_

What is the zip code of where the trip ended?

\_\_\_\_\_

Did you use the high occupancy vehicle (HOV) lane during this trip?

- Yes
- No

What type of vehicle did you use?

- Passenger car / SUV / Pick-up truck
- Motorcycle
- Bus
- Other, please specify... \_\_\_\_\_

How many people, other than yourself, were in the vehicle with you?

- 0
- 1
- 2
- 3
- 4
- Greater than 4

\* Where did you get ON the I-10 on your last trip?

- ◇ An exit east of Loop 202 (Santan Fwy) / Pecos Rd)
- ◇ Loop 202 (Santan Fwy) / Pecos Rd
- ◇ Chandler Blvd
- ◇ Ray Rd
- ◇ Warner Rd
- ◇ Elliot Rd
- ◇ US 60 (Superstition Fwy)
- ◇ Broadway Rd
- ◇ SR 143 (Hohokam Expy)
- ◇ 40<sup>th</sup> St
- ◇ 32<sup>nd</sup> St / University Dr
- ◇ 24<sup>th</sup> St
- ◇ I-17 / US-60 (Maricopa Fwy)
- ◇ Buckeye Rd
- ◇ Jefferson St / Washington St
- ◇ SR 51 (Piestewa Fwy) / Loop 202 (Red Mountain Fwy)
- ◇ 16<sup>th</sup> St
- ◇ 7<sup>th</sup> St
- ◇ 7<sup>th</sup> Ave
- ◇ 19<sup>th</sup> Ave
- ◇ I-17 (Black Canyon Fwy)
- ◇ 27<sup>th</sup> Ave
- ◇ 35<sup>th</sup> Ave
- ◇ 43<sup>rd</sup> Ave
- ◇ 51<sup>st</sup> Ave
- ◇ 59<sup>th</sup> Ave
- ◇ 67<sup>th</sup> Ave

- ◇ 75<sup>th</sup> Ave
- ◇ 83<sup>rd</sup> Ave
- ◇ 91<sup>st</sup> Ave
- ◇ Loop 101 (Agua Fria Fwy)
- ◇ An exit west of the Loop 101 (Agua Fria Fwy)

\* Where did you get OFF the I-10 on your last trip?

- ◇ An exit east of Loop 202 (Santan Fwy) / Pecos Rd)
- ◇ Loop 202 (Santan Fwy) / Pecos Rd
- ◇ Chandler Blvd
- ◇ Ray Rd
- ◇ Warner Rd
- ◇ Elliot Rd
- ◇ US 60 (Superstition Fwy)
- ◇ Broadway Rd
- ◇ SR 143 (Hohokam Expy)
- ◇ 40th St
- ◇ 32nd St / University Dr
- ◇ 24th St
- ◇ I-17 / US-60 (Maricopa Fwy)
- ◇ Buckeye Rd
- ◇ Jefferson St / Washington St
- ◇ SR 51 (Piestewa Fwy) / Loop 202 (Red Mountain Fwy)
- ◇ 16th St
- ◇ 7th St
- ◇ 7th Ave
- ◇ 19th Ave
- ◇ I-17 (Black Canyon Fwy)
- ◇ 27th Ave
- ◇ 35th Ave
- ◇ 43rd Ave
- ◇ 51st Ave
- ◇ 59th Ave
- ◇ 67th Ave
- ◇ 75th Ave
- ◇ 83rd Ave
- ◇ 91st Ave
- ◇ Loop 101 (Agua Fria Fwy)
- ◇ An exit west of the Loop 101 (Agua Fria Fwy)

Estimate your total travel time (in minutes) on the I-10 on your last trip.

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#### Page 4: General Preference Questions

\* Do you know what a High Occupancy Vehicle (HOV) lane is?

Yes

No



Images taken from <http://phoenix.about.com/od/highwaysroads/a/HOV.htm> and <http://blogs.kcrw.com/shortcuts/soon-solo-drivers-will-be-able-to-drive-in-car-pool-lanes-no-hybrid-required>

An HOV lane is a freeway or expressway lane restricted to vehicles with the required occupancy, typically two or more people, during specified peak hours of the day. HOV lanes are a type of freeway managed lane.

How often do you use an HOV lane?

Daily

2-3 times a week

2-3 times a month

Very rarely

Never

How satisfied were you with the HOV lane?

0

1

2

3

4

5

6

7

8

9

10

Not Satisfied

Very Satisfied

\* Do you know what a High Occupancy Toll (HOT) lane is?





An example of a dynamic message sign time window in Oregon.

([http://otrec.us/news/entry/report\\_travel\\_time\\_data\\_lacking\\_at\\_key\\_spots\\_on\\_portland\\_area\\_freeways](http://otrec.us/news/entry/report_travel_time_data_lacking_at_key_spots_on_portland_area_freeways))

Imagine an HOT exists that provides similar time window displays as seen above.

Additionally, imagine the HOT lane includes an option to buy a travel time refund (TTR) or “insurance”. The TTR allows HOT users to pay an additional cost, or premium, on top of the toll amount to insure their travel time will be within the time window. The TTR will always cost less than the toll amount. If you do not arrive to your exit ramp within the provided time window, the toll amount will be refunded but not the TTR cost.

Assume all technologies required for implementing HOT with a TTR exist.

If there was a refund option, how interested would you be in purchasing it?

0    1    2    3    4    5    6    7    8    9    10

Not Satisfied

Very Satisfied



## Page 5: Stated Preference – Most Recent Trip

For the hypothetical scenario below, the HOT lane includes an option to buy a travel time refund (TTR), or “insurance”.

This cost of the TTR, or "insurance", will always be less than the toll. When the TTR is bought and you do not arrive to your exiting ramp within the provided time window, the toll will be refunded but not the TTR amount. Assume all technologies necessary to use the HOT lane with TTR (such as vehicle tag readers) exist.

Refund, travel time refund, and TTR are synonymous in the following examples.

Scenario: You are taking the same **25.5** mile trip from an exit east of Loop 202 (Santan Fwy) / Pecos Rd to an exit west of the Loop 101 (Agua Fria Fwy) on the I-10 freeway. Which option would you choose?

- 1. GPL (Total Cost \$0.00):** Drive in the general purpose lanes for free. The general purpose lanes appear heavily congested.
- 2. HOT no refund (Total Cost \$1.28):** Drive in the HOT lane for **\$1.28** and do not purchase a travel time refund. The average travel time can vary between **25** and **31** minutes.
- 3. HOT with refund (Total Cost \$1.59):** Drive in the HOT lane for **\$1.28** and purchase the travel time refund at **\$0.32**. The average travel time can vary anywhere between **25** and **31** minutes.

- Option 1: GPL
- Option 2: HOT no refund
- Option 3: HOT with refund

Part 2: Now imagine the same scenario as in the previous question, however the travel time refund cost is lower. Which option would you choose?

- 1. GPL (Total Cost \$0.00):** Drive in the general purpose lanes for free. The general purpose lanes appear heavily congested.
- 2. HOT no refund (Total Cost \$1.28):** Drive in the HOT lane for **\$1.28** and do not purchase a travel time refund. The average travel time can vary between **25** and **31** minutes.

**3. HOT with refund (Total Cost \$1.40):** Drive in the HOT lane for **\$1.28** and purchase the travel time refund at **\$0.13**. The average travel time can vary anywhere between **25** and **31** minutes.

- Option 1: GPL
- Option 2: HOT no refund
- Option 3: HOT with refund

### Page 6: Stated Preference – Scenario 1

For the hypothetical scenario below, the HOT lane includes an option to buy a travel time refund (TTR), or “insurance”.

This cost of the TTR, or "insurance", will always be less than the toll. When the TTR is bought and you do not arrive to your exiting ramp within the provided time window, the toll will be refunded but not the TTR amount. Assume all technologies necessary to use the HOT lane with TTR (such as vehicle tag readers) exist.

Refund, travel time refund, and TTR are synonymous in the following examples.

Scenario 1: You are taking a **10 mile** trip on the I-10 freeway during the **PM** rush hour in the peak direction. Which option would you choose?

**1. GPL (Total Cost \$0.00):** Drive in the general purpose lanes for free. The general purpose lanes appear heavily congested.

**2. HOT no refund (Total Cost \$2.00):** Drive in the HOT lane for **\$2.00** and do not purchase a travel time refund. The average travel time can vary between **10** and **12** minutes.

**3. HOT with refund (Total Cost \$2.50):** Drive in the HOT lane for **\$2.00** and purchase the travel time refund at **\$0.50**. The average travel time can vary anywhere between **10** and **12** minutes.

- Option 1: GPL
- Option 2: HOT no refund
- Option 3: HOT with refund

Scenario 1, Part 2: Now imagine the same scenario as in the previous question, however the travel time refund cost is higher. Which option would you choose?

**1. GPL (Total Cost \$0.00):** Drive in the general purpose lanes for free. The general purpose lanes appear heavily congested.

**2. HOT no refund (Total Cost \$2.00):** Drive in the HOT lane for **\$2.00** and do not purchase a travel time refund. The average travel time can vary between **10** and **12** minutes.

**3. HOT with refund (Total Cost \$3.00):** Drive in the HOT lane for **\$2.00** and purchase the travel time refund at **\$1.00**. The average travel time can vary anywhere between **10** and **12** minutes.

- Option 1: GPL
- Option 2: HOT no refund
- Option 3: HOT with refund

## **Page 7: Stated Preference – Scenario 2**

For the hypothetical scenario below, the HOT lane includes an option to buy a travel time refund (TTR), or “insurance”.

This cost of the TTR, or "insurance", will always be less than the toll. When the TTR is bought and you do not arrive to your exiting ramp within the provided time window, the toll will be refunded but not the TTR amount. Assume all technologies necessary to use the HOT lane with TTR (such as vehicle tag readers) exist.

Refund, travel time refund, and TTR are synonymous in the following examples.

Scenario 2: You are taking a **15 mile** trip on the I-10 freeway during the **AM** rush hour in the peak direction. Which option would you choose?

**1. GPL (Total Cost \$0.00):** Drive in the general purpose lanes for free. The average travel time can vary between **17** and **26** minutes.

**2. HOT no refund (Total Cost \$5.25):** Drive in the HOT lane for **\$5.25** and do not purchase a travel time refund. The average travel time can vary between **17** and **20** minutes.

**3. HOT with refund (Total Cost \$6.56):** Drive in the HOT lane for **\$5.25** and purchase the travel time refund at **\$1.31**. The average travel time can vary anywhere between **17** and **20** minutes.

- Option 1: GPL

- Option 2: HOT no refund
- Option 3: HOT with refund

Scenario 2, Part 2: Now imagine the same scenario as in the previous question, however the travel time refund cost is lower. Which option would you choose?

- 1. GPL (Total Cost \$0.00):** Drive in the general purpose lanes for free. The average travel time can vary between **17** and **26** minutes.
- 2. HOT no refund (Total Cost \$5.25):** Drive in the HOT lane for **\$5.25** and do not purchase a travel time refund. The average travel time can vary between **17** and **20** minutes.
- 3. HOT with refund (Total Cost \$5.78):** Drive in the HOT lane for **\$5.25** and purchase the travel time refund at **\$0.53**. The average travel time can vary anywhere between **17** and **20** minutes.

- Option 1: GPL
- Option 2: HOT no refund
- Option 3: HOT with refund

### Page 8: Stated Preference – Scenario 3

For the hypothetical scenario below, the HOT lane includes an option to buy a travel time refund (TTR), or “insurance”.

This cost of the TTR, or "insurance", will always be less than the toll. When the TTR is bought and you do not arrive to your exiting ramp within the provided time window, the toll will be refunded but not the TTR amount. Assume all technologies necessary to use the HOT lane with TTR (such as vehicle tag readers) exist.

Refund, travel time refund, and TTR are synonymous in the following examples.

Scenario 3: You are taking a **25 mile** trip on the I-10 freeway during the **PM** rush hour in the peak direction. Which option would you choose?

- 1. GPL (Total Cost \$0.00):** Drive in the general purpose lanes for free. The average travel time can vary between **31** and **46** minutes.
- 2. HOT no refund (Total Cost \$8.75):** Drive in the HOT lane for **\$8.75** and do not purchase a travel time refund. The average travel time can vary

between 25 and 30 minutes.

**3. HOT with refund (Total Cost \$10.94):** Drive in the HOT lane for \$8.75 and purchase the travel time refund at \$2.19. The average travel time can vary anywhere between 25 and 30 minutes.

- Option 1: GPL
- Option 2: HOT no refund
- Option 3: HOT with refund

Scenario 3, Part 2: Now imagine the same scenario as in the previous question, however the travel time refund cost is lower. Which option would you choose?

**1. GPL (Total Cost \$0.00):** Drive in the general purpose lanes for free. The average travel time can vary between 31 and 46 minutes.

**2. HOT no refund (Total Cost \$8.75):** Drive in the HOT lane for \$8.75 and do not purchase a travel time refund. The average travel time can vary between 25 and 30 minutes.

**3. HOT with refund (Total Cost \$9.63):** Drive in the HOT lane for \$8.75 and purchase the travel time refund at \$0.88. The average travel time can vary anywhere between 25 and 30 minutes.

- Option 1: GPL
- Option 2: HOT no refund
- Option 3: HOT with refund

**Page 9: General Preference – After Scenarios**

Now that you have completed all of the scenarios, if there was a refund option, how interested would you be in purchasing it?

0      1      2      3      4      5      6      7      8      9      10  
Not Satisfied                          Very Satisfied

Under what circumstances are you most likely to use the following:  
HOT without TTR \_\_\_\_\_  
HOT with TTR \_\_\_\_\_

If you have any additional comments, please add them below.

\_\_\_\_\_

**Page 10: Demographics**

You may skip any question you prefer not to answer.

What is your age?

\_\_\_\_\_

What is your gender?

- Male
- Female
- Prefer Not to Answer

What is your ethnicity?

- White / Caucasian
- Spanish / Hispanic / Latino
- Black / African American
- Asian
- Pacific Islander
- Native American
- Other
- Prefer Not to Answer

What is the highest level of education you have completed?

- Some High School or Less
- High School Diploma / GED
- Some College
- 4-Year College Degree (Bachelor's)
- Master's Degree
- Doctoral Degree
- Professional Degree (MD, JD)

Including yourself, how many people are in your household?

\_\_\_\_\_

How many vehicles are in your household?

\_\_\_\_\_

Estimate your gross annual household income in 2013.

- Under \$20,000
- \$20,000 - \$30,000

- \$30,000 - \$40,000
- \$40,000 - \$50,000
- \$50,000 - \$75,000
- \$75,000 - \$100,000
- \$100,000 - \$150,000
- \$150,000 or more
- MPrefer Not to Answer

APPENDIX B  
SIMPLE DESCRIPTIVE TABLES



**Table 2: Person Demographic Data**

<b>Gender</b>		
	Count	Percent
Male	591	34%
Female	1118	64%
<b>Total</b>	<b>1709</b>	
<b>Age</b>		
18-24	402	25%
25-30	270	17%
31-40	361	22%
41-54	366	22%
55 and Older	231	14%
<b>Total</b>	<b>1630</b>	
<b>Ethnicity</b>		
White/Caucasian	1248	72%
Spanish/Hispanic/Latino	167	10%
Black/African American	41	2%
Asian	117	7%
Pacific Islander	6	0%
Native American	23	1%
Other	37	2%
Prefer Not to Answer	92	5%
<b>Total</b>	<b>1731</b>	
<b>Education</b>		
Some High School or Less	1	0%
High School Diploma/GED	49	3%
Some College	477	27%
4-Year College Degree (Bachelor's)	535	31%
Master's Degree	487	28%
Doctoral Degree	154	9%
Professional Degree (MD,JD)	32	2%
<b>Total</b>	<b>1735</b>	

**Table 3: Household Demographic Data**

<b>Total Number of People in household</b>		
	Count	Percent
1	302	18%
2	554	33%
3	306	18%
4	307	19%
5 or More	187	11%
<b>Total</b>	<b>1656</b>	
<b>Total Number of Vehicles in Household</b>		
0	22	1%
1	397	24%
2	722	43%
3	352	21%
4	133	8%
5 or More	56	3%
<b>Total</b>	<b>1682</b>	
<b>Estimated Gross Yearly Household Income</b>		
Under \$30,000	173	12%
\$30,000-\$50,000	255	17%
\$50,000-\$75,000	224	15%
\$75,000-\$100,000	273	18%
\$100,000-\$150,000	265	18%
\$150,000 or More	155	10%
Prefer Not to Answer	159	11%
<b>Total</b>	<b>1504</b>	

**Table 4: Last I-10 Trip Data**

<b>Purpose of Last I-10 Trip</b>		
	Count	Percent
Commuting to/from work	370	20%
Work related (other than to and from home or work)	200	11%
To attend class at a school or educational institute	157	9%
Recreational/Social/Entertainment	739	40%
Shopping/Personal errands	208	11%
Other	170	9%
<b>Total</b>	<b>1844</b>	
<b>Day of the Week Last I-10 Trip Occurred</b>		
Weekday	1092	59%
Weekend	756	41%
<b>Total</b>	<b>1848</b>	
<b>HOV Use During Last I-10 Trip</b>		
Used HOV Lane	686	37%
Did Not Use HOV Lane	1149	63%
<b>Total</b>	<b>1835</b>	
<b>Travel Mode</b>		
Passenger car/SUV/Pick-up truck	1771	95%
Motorcycle	14	1%
Bus	43	2%
Other	30	2%
<b>Total</b>	<b>1858</b>	
<b>Vehicle Occupancy</b>		
1	743	40%
2	552	30%
3	256	14%
4	142	8%
5	74	4%
Greater than 5	86	5%
<b>Total</b>	<b>1853</b>	

APPENDIX C  
CROSS-TABULATION TABLES

# Age

**Table 5: Age vs. HOV Use**

		How often do you use an HOV lane?						
		Daily	2-3 times a week	2-3 times a month	Very rarely	Never	Total	
Age	Missing	Count	25	35	75	164	25	324
		% within Age	7.70%	10.80%	23.10%	50.60%	7.70%	100.00%
		% within HOV Use	15.20%	11.90%	15.10%	19.30%	17.10%	16.60%
		% of Total	1.30%	1.80%	3.80%	8.40%	1.30%	16.60%
	18-24	Count	37	95	99	138	33	402
		% within Age	9.20%	23.60%	24.60%	34.30%	8.20%	100.00%
		% within HOV Use	22.60%	32.30%	19.90%	16.20%	22.60%	20.60%
		% of Total	1.90%	4.90%	5.10%	7.10%	1.70%	20.60%
	25-30	Count	16	35	58	133	27	269
		% within Age	5.90%	13.00%	21.60%	49.40%	10.00%	100.00%
		% within HOV Use	9.80%	11.90%	11.70%	15.60%	18.50%	13.80%
		% of Total	0.80%	1.80%	3.00%	6.80%	1.40%	13.80%
	31-40	Count	33	55	109	145	19	361
		% within Age	9.10%	15.20%	30.20%	40.20%	5.30%	100.00%
		% within HOV Use	20.10%	18.70%	21.90%	17.10%	13.00%	18.50%
		% of Total	1.70%	2.80%	5.60%	7.40%	1.00%	18.50%
	41-54	Count	35	51	100	161	17	364
		% within Age	9.60%	14.00%	27.50%	44.20%	4.70%	100.00%
		% within HOV Use	21.30%	17.30%	20.10%	18.90%	11.60%	18.70%
		% of Total	1.80%	2.60%	5.10%	8.30%	0.90%	18.70%

		How often do you use an HOV lane?						
Age			Daily	2-3 times a week	2-3 times a month	Very rarely	Never	Total
55 and Over	Count	18	23	56	109	25	231	
	% within Age	7.80%	10.00%	24.20%	47.20%	10.80%	100.00%	
	% within HOV Use	11.00%	7.80%	11.30%	12.80%	17.10%	11.80%	
	% of Total	0.90%	1.20%	2.90%	5.60%	1.30%	11.80%	
Total	Count	164	294	497	850	146	1951	
	% within Age	8.40%	15.10%	25.50%	43.60%	7.50%	100.00%	
	% within HOV Use	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	
	% of Total	8.40%	15.10%	25.50%	43.60%	7.50%	100.00%	

**Table 6: Age vs. HOT Knowledge**

Do you know what a High Occupancy Toll (HOT) lane is?					
Age			Yes	No	Total
			Missing	Count	151
	% within Age	46.30%	53.70%	100.00%	
	% within HOT Knowledge	16.30%	17.00%	16.70%	
	% of Total	7.70%	8.90%	16.70%	
18-24	Count	140	262	402	
	% within Age	34.80%	65.20%	100.00%	
	% within HOT Knowledge	15.10%	25.50%	20.60%	
	% of Total	7.20%	13.40%	20.60%	
25-30	Count	114	156	270	
	% within Age	42.20%	57.80%	100.00%	
	% within HOT Knowledge	12.30%	15.20%	13.80%	
	% of Total	5.80%	8.00%	13.80%	
31-40	Count	164	197	361	
	% within Age	45.40%	54.60%	100.00%	
	% within HOT Knowledge	17.70%	19.10%	18.50%	
	% of Total	8.40%	10.10%	18.50%	
41-54	Count	210	156	366	
	% within Age	57.40%	42.60%	100.00%	
	% within HOT Knowledge	22.70%	15.20%	18.70%	
	% of Total	10.70%	8.00%	18.70%	
55 and Over	Count	148	83	231	
	% within Age	64.10%	35.90%	100.00%	
	% within HOT Knowledge	16.00%	8.10%	11.80%	
	% of Total	7.60%	4.20%	11.80%	
Total	Count	927	1029	1956	
	% within Age	47.40%	52.60%	100.00%	
	% within HOT Knowledge	100.00%	100.00%	100.00%	
	% of Total	47.40%	52.60%	100.00%	

**Table 7: Age vs. Interest in TTR Before Scenarios**

		Interest in TTR Before Scenarios							
Age		0	1	2	3	4	5	6	Total
18-24	Count	86	42	48	52	75	55	42	400
	% within Age	21.50%	10.50%	12.00%	13.00%	18.80%	13.80%	10.50%	100.00%
	% within TTR Before	18.00%	14.30%	22.20%	18.10%	27.30%	25.30%	24.40%	20.60%
	% of Total	4.40%	2.20%	2.50%	2.70%	3.90%	2.80%	2.20%	20.60%
25-30	Count	64	43	25	38	41	28	27	266
	% within Age	24.10%	16.20%	9.40%	14.30%	15.40%	10.50%	10.20%	100.00%
	% within TTR Before	13.40%	14.70%	11.60%	13.20%	14.90%	12.90%	15.70%	13.70%
	% of Total	3.30%	2.20%	1.30%	2.00%	2.10%	1.40%	1.40%	13.70%
31-40	Count	75	58	37	56	50	44	38	358
	% within Age	20.90%	16.20%	10.30%	15.60%	14.00%	12.30%	10.60%	100.00%
	% within TTR Before	15.70%	19.80%	17.10%	19.40%	18.20%	20.30%	22.10%	18.50%
	% of Total	3.90%	3.00%	1.90%	2.90%	2.60%	2.30%	2.00%	18.50%
41-54	Count	100	67	35	58	39	37	28	364
	% within Age	27.50%	18.40%	9.60%	15.90%	10.70%	10.20%	7.70%	100.00%
	% within TTR Before	21.00%	22.90%	16.20%	20.10%	14.20%	17.10%	16.30%	18.80%
	% of Total	5.20%	3.50%	1.80%	3.00%	2.00%	1.90%	1.40%	18.80%



Interest in TTR Before Scenarios										
Age		0	1	2	3	4	5	6	Total	
55 and Over	Count		71	34	26	38	23	23	16	231
	% within Age		30.70%	14.70%	11.30%	16.50%	10.00%	10.00%	6.90%	100.00%
	% within TTR Before		14.90%	11.60%	12.00%	13.20%	8.40%	10.60%	9.30%	11.90%
	% of Total		3.70%	1.80%	1.30%	2.00%	1.20%	1.20%	0.80%	11.90%
	Total	Count	477	293	216	288	275	217	172	1938
	% within Age		24.60%	15.10%	11.10%	14.90%	14.20%	11.20%	8.90%	100.00%
	% within TTR Before		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	% of Total		24.60%	15.10%	11.10%	14.90%	14.20%	11.20%	8.90%	100.00%

**Table 8: Age vs. Interest in TTR After Scenarios**

		Interest in TTR After Scenarios							
Age		0	1	2	3	4	5	6	Total
18-24	Count	89	57	55	54	84	37	24	400
	% within Age	22.30%	14.20%	13.80%	13.50%	21.00%	9.30%	6.00%	100.00%
	% within TTR After	17.00%	17.40%	24.10%	25.00%	32.40%	22.40%	29.30%	22.20%
	% of Total	4.90%	3.20%	3.10%	3.00%	4.70%	2.10%	1.30%	22.20%
25-30	Count	69	47	41	28	41	32	10	268
	% within Age	25.70%	17.50%	15.30%	10.40%	15.30%	11.90%	3.70%	100.00%
	% within TTR After	13.20%	14.30%	18.00%	13.00%	15.80%	19.40%	12.20%	14.90%
	% of Total	3.80%	2.60%	2.30%	1.60%	2.30%	1.80%	0.60%	14.90%
31-40	Count	101	77	37	42	50	34	17	358
	% within Age	28.20%	21.50%	10.30%	11.70%	14.00%	9.50%	4.70%	100.00%
	% within TTR After	19.30%	23.50%	16.20%	19.40%	19.30%	20.60%	20.70%	19.90%
	% of Total	5.60%	4.30%	2.10%	2.30%	2.80%	1.90%	0.90%	19.90%
41-54	Count	121	60	51	44	40	29	16	361
	% within Age	33.50%	16.60%	14.10%	12.20%	11.10%	8.00%	4.40%	100.00%
	% within TTR After	23.10%	18.30%	22.40%	20.40%	15.40%	17.60%	19.50%	20.00%
	% of Total	6.70%	3.30%	2.80%	2.40%	2.20%	1.60%	0.90%	20.00%
55 and Over	Count	81	48	27	25	22	17	9	229
	% within Age	35.40%	21.00%	11.80%	10.90%	9.60%	7.40%	3.90%	100.00%
	% within TTR After	15.50%	14.60%	11.80%	11.60%	8.50%	10.30%	11.00%	12.70%
	% of Total	4.50%	2.70%	1.50%	1.40%	1.20%	0.90%	0.50%	12.70%
Total	Count	524	328	228	216	259	165	82	1802
	% within Age	29.10%	18.20%	12.70%	12.00%	14.40%	9.20%	4.60%	100.00%
	% within TTR After	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

**Gender**

**Table 9: Gender vs. HOV Lane Use**

Gender vs. HOV Lane Use								
Gender	How often do you use an HOV lane?							
		Daily	2-3 times a week	2-3 times a month	Very rarely	Never	Total	
Gender	Male	Count	65	99	152	230	44	590
		% within Gender	11.00%	16.80%	25.80%	39.00%	7.50%	100.00%
		% within HOV Use	44.50%	36.70%	33.90%	30.70%	33.60%	33.80%
		% of Total	3.70%	5.70%	8.70%	13.20%	2.50%	33.80%
	Female	Count	78	163	287	505	83	1116
		% within Gender	7.00%	14.60%	25.70%	45.30%	7.40%	100.00%
		% within HOV Use	53.40%	60.40%	63.90%	67.40%	63.40%	64.00%
		% of Total	4.50%	9.30%	16.40%	28.90%	4.80%	64.00%
	Prefer Not to Answer	Count	3	8	10	14	4	39
		% within Gender	7.70%	20.50%	25.60%	35.90%	10.30%	100.00%
		% within HOV Use	2.10%	3.00%	2.20%	1.90%	3.10%	2.20%
		% of Total	0.20%	0.50%	0.60%	0.80%	0.20%	2.20%
Total	Total	Count	146	270	449	749	131	1745
	% within Gender	8.40%	15.50%	25.70%	42.90%	7.50%	100.00%	
	% within HOV Use	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	
	% of Total	8.40%	15.50%	25.70%	42.90%	7.50%	100.00%	

**Table 10: Gender vs. HOT Knowledge**

<b>Gender vs. HOT Knowledge</b>					
Do you know what a High Occupancy Toll (HOT) lane is?					
Gender			Yes	No	Total
	Gender	Male	Count	327	264
% within Gender			55.30%	44.70%	100.00%
% within HOT Knowledge			39.50%	28.70%	33.80%
% of Total			18.70%	15.10%	33.80%
Female		Count	475	643	1118
		% within Gender	42.50%	57.50%	100.00%
		% within HOT Knowledge	57.40%	69.80%	64.00%
		% of Total	27.20%	36.80%	64.00%
Prefer Not to Answer		Count	25	14	39
		% within Gender	64.10%	35.90%	100.00%
	% within HOT Knowledge	3.00%	1.50%	2.20%	
	% of Total	1.40%	0.80%	2.20%	
Total	Count	827	921	1748	
	% within Gender	47.30%	52.70%	100.00%	
	% within HOT Knowledge	100.00%	100.00%	100.00%	
	% of Total	47.30%	52.70%	100.00%	

**Table 11: Gender vs. HOT Lane Use**

<b>Gender vs. HOT Lane Use</b>					
Have you ever used an HOT lane?					
Gender			Yes	No	Total
	Male	Count		110	478
% within Gender			18.70%	81.30%	100.00%
% within HOT Use			30.60%	34.60%	33.80%
% of Total			6.30%	27.50%	33.80%
Female	Count		237	877	1114
	% within Gender		21.30%	78.70%	100.00%
	% within HOT Use		65.80%	63.50%	64.00%
	% of Total		13.60%	50.40%	64.00%
Prefer Not to Answer	Count		13	26	39
	% within Gender		33.30%	66.70%	100.00%
	% within HOT Use		3.60%	1.90%	2.20%
	% of Total		0.70%	1.50%	2.20%
Total	Count		360	1381	1741
	% within Gender		20.70%	79.30%	100.00%
	% within HOT Use		100.00%	100.00%	100.00%
	% of Total		20.70%	79.30%	100.00%

**Table 12: Gender vs. TTR Interest Before Scenarios**

Gender vs. TTR Interest Before Scenarios										
Gender		TTR Interest Before Scenarios								Total
		0	1	2	3	4	5	6		
Male	Count	156	84	50	62	91	77	66	586	
	% within Gender	26.60%	14.30%	8.50%	10.60%	15.50%	13.10%	11.30%	100.00%	
	% within TTR Before	36.30%	31.90%	26.20%	24.40%	37.80%	39.10%	41.00%	33.70%	
	% of Total	9.00%	4.80%	2.90%	3.60%	5.20%	4.40%	3.80%	33.70%	
Female	Count	259	174	137	183	148	118	93	1112	
	% within Gender	23.30%	15.60%	12.30%	16.50%	13.30%	10.60%	8.40%	100.00%	
	% within TTR Before	60.20%	66.20%	71.70%	72.00%	61.40%	59.90%	57.80%	64.00%	
	% of Total	14.90%	10.00%	7.90%	10.50%	8.50%	6.80%	5.40%	64.00%	
Prefer Not to Answer	Count	15	5	4	9	2	2	2	39	
	% within Gender	38.50%	12.80%	10.30%	23.10%	5.10%	5.10%	5.10%	100.00%	
	% within TTR Before	3.50%	1.90%	2.10%	3.50%	0.80%	1.00%	1.20%	2.20%	
	% of Total	0.90%	0.30%	0.20%	0.50%	0.10%	0.10%	0.10%	2.20%	
Total	Count	430	263	191	254	241	197	161	1737	
	% within Gender	24.80%	15.10%	11.00%	14.60%	13.90%	11.30%	9.30%	100.00%	
	% within TTR Before	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	
	% of Total	24.80%	15.10%	11.00%	14.60%	13.90%	11.30%	9.30%	100.00%	

**Table 13: Gender vs. TRR Interest After Scenarios**

Gender vs. TRR Interest After Scenarios									
Gender		TTR Interest After Scenarios							Total
		0	1	2	3	4	5	6	
Male	Count	186	84	61	63	88	72	31	585
	% within Gender	31.80%	14.40%	10.40%	10.80%	15.00%	12.30%	5.30%	100.00%
	% within TTR								
	After	37.10%	26.90%	27.70%	30.00%	35.50%	44.20%	38.80%	33.70%
Female	Count	301	216	158	143	157	88	47	1110
	% within Gender	27.10%	19.50%	14.20%	12.90%	14.10%	7.90%	4.20%	100.00%
	% within TTR								
	After	60.10%	69.20%	71.80%	68.10%	63.30%	54.00%	58.80%	64.00%
Prefer Not to Answer	Count	14	12	1	4	3	3	2	39
	% within Gender	35.90%	30.80%	2.60%	10.30%	7.70%	7.70%	5.10%	100.00%
	% within TTR								
	After	2.80%	3.80%	0.50%	1.90%	1.20%	1.80%	2.50%	2.20%
Total	Count	501	312	220	210	248	163	80	1734
	% within Gender	28.90%	18.00%	12.70%	12.10%	14.30%	9.40%	4.60%	100.00%
	% within TTR	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	After	%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Total	Count	501	312	220	210	248	163	80	1734
	% within Gender	28.90%	18.00%	12.70%	12.10%	14.30%	9.40%	4.60%	100.00%
	% within TTR	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	After	%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Total	Count	501	312	220	210	248	163	80	1734
	% within Gender	28.90%	18.00%	12.70%	12.10%	14.30%	9.40%	4.60%	100.00%
	% within TTR	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	After	%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

## Education

**Table 14: Education vs. HOT Knowledge**

Education vs. HOT Knowledge					
Education Completed		Do you know what a High Occupancy Toll (HOT) lane is?			
			Yes	No	Total
Some High School or Less	Count		1	0	1
	% of Education		100.00%	0.00%	100.00%
	% of HOT Knowledge		0.10%	0.00%	0.10%
	% of Total		0.10%	0.00%	0.10%
High School Diploma / GED	Count		20	29	49
	% of Education		40.80%	59.20%	100.00%
	% of HOT Knowledge		2.40%	3.20%	2.80%
	% of Total		1.20%	1.70%	2.80%
Some College	Count		183	294	477
	% of Education		38.40%	61.60%	100.00%
	% of HOT Knowledge		22.30%	32.20%	27.50%
	% of Total		10.50%	16.90%	27.50%
4-Year College Degree (Bachelor's)	Count		253	282	535
	% of Education		47.30%	52.70%	100.00%
	% of HOT Knowledge		30.80%	30.90%	30.80%
	% of Total		14.60%	16.30%	30.80%
Master's Degree	Count		261	226	487
	% of Education		53.60%	46.40%	100.00%
	% of HOT Knowledge		31.80%	24.80%	28.10%
	% of Total		15.00%	13.00%	28.10%
Doctoral Degree	Count		85	69	154
	% of Education		55.20%	44.80%	100.00%
	% of HOT Knowledge		10.30%	7.60%	8.90%
	% of Total		4.90%	4.00%	8.90%
Professional Degree (MD, JD)	Count		19	13	32
	% of Education		59.40%	40.60%	100.00%
	% of HOT Knowledge		2.30%	1.40%	1.80%
	% of Total		1.10%	0.70%	1.80%
Total	Count		822	913	1735
	% of Education		47.40%	52.60%	100.00%
	% of HOT Knowledge		100.00%	100.00%	100.00%



## Income

**Table 15: Household Income vs. HOT Knowledge**

Do you know what a High Occupancy Toll (HOT) lane is?					
Household Income			Yes	No	Total
			Under \$20,000	Count	35
	% of Income	35.40%	64.60%	100.00%	
	% of HOT Knowledge	4.80%	8.20%	6.60%	
	% of Total	2.30%	4.30%	6.60%	
\$20,000 - \$30,000	Count	26	48	74	
	% of Income	35.10%	64.90%	100.00%	
	% of HOT Knowledge	3.60%	6.10%	4.90%	
	% of Total	1.70%	3.20%	4.90%	
\$30,000 - \$40,000	Count	44	81	125	
	% of Income	35.20%	64.80%	100.00%	
	% of HOT Knowledge	6.10%	10.40%	8.30%	
	% of Total	2.90%	5.40%	8.30%	
\$40,000 - \$50,000	Count	45	85	130	
	% of Income	34.60%	65.40%	100.00%	
	% of HOT Knowledge	6.20%	10.90%	8.60%	
	% of Total	3.00%	5.70%	8.60%	
\$50,000 - \$75,000	Count	117	107	224	
	% of Income	52.20%	47.80%	100.00%	
	% of HOT Knowledge	16.20%	13.70%	14.90%	
	% of Total	7.80%	7.10%	14.90%	
\$75,000 - \$100,000	Count	137	136	273	
	% of Income	50.20%	49.80%	100.00%	
	% of HOT Knowledge	18.90%	17.40%	18.20%	
	% of Total	9.10%	9.00%	18.20%	
\$100,000 - \$150,000	Count	131	134	265	
	% of Income	49.40%	50.60%	100.00%	
	% of HOT Knowledge	18.10%	17.20%	17.60%	
	% of Total	8.70%	8.90%	17.60%	
\$150,000 or more	Count	99	56	155	
	% of Income	63.90%	36.10%	100.00%	
	% of HOT Knowledge	13.70%	7.20%	10.30%	
	% of Total	6.60%	3.70%	10.30%	

Do you know what a High Occupancy Toll (HOT) lane is?					
Household Income	Prefer Not to Answer		Yes	No	
		Count	89	70	159
% of Income	56.00%	44.00%	100.00%		
% of HOT Knowledge	12.30%	9.00%	10.60%		
% of Total	5.90%	4.70%	10.60%		
Total	Total	Count	723	781	1504
		% of Income	48.10%	51.90%	100.00%
		% of HOT Knowledge	100.00%	100.00%	100.00%
		% of Total	48.10%	51.90%	100.00%

**Table 16: Household Income vs. HOT Lane Use**

Income vs. HOT Lane Use					
Household Income			Yes	No	Total
			Under \$20,000	Count	19
	% of Income	19.80%	80.20%	100.00%	
	% of HOT Use	6.20%	6.50%	6.40%	
	% of Total	1.30%	5.10%	6.40%	
\$20,000 - \$30,000	Count	7	67	74	
	% of Income	9.50%	90.50%	100.00%	
	% of HOT Use	2.30%	5.60%	4.90%	
	% of Total	0.50%	4.50%	4.90%	
\$30,000 - \$40,000	Count	27	97	124	
	% of Income	21.80%	78.20%	100.00%	
	% of HOT Use	8.80%	8.10%	8.30%	
	% of Total	1.80%	6.50%	8.30%	
\$40,000 - \$50,000	Count	21	109	130	
	% of Income	16.20%	83.80%	100.00%	
	% of HOT Use	6.90%	9.20%	8.70%	
	% of Total	1.40%	7.30%	8.70%	
\$50,000 - \$75,000	Count	49	174	223	
	% of Income	22.00%	78.00%	100.00%	
	% of HOT Use	16.00%	14.60%	14.90%	
	% of Total	3.30%	11.60%	14.90%	
\$75,000 - \$100,000	Count	56	216	272	
	% of Income	20.60%	79.40%	100.00%	
	% of HOT Use	18.30%	18.10%	18.20%	
	% of Total	3.70%	14.40%	18.20%	
\$100,000 - \$150,000	Count	52	213	265	
	% of Income	19.60%	80.40%	100.00%	
	% of HOT Use	17.00%	17.90%	17.70%	
	% of Total	3.50%	14.20%	17.70%	
\$150,000 or more	Count	45	110	155	
	% of Income	29.00%	71.00%	100.00%	
	% of HOT Use	14.70%	9.20%	10.40%	
	% of Total	3.00%	7.30%	10.40%	

Income vs. HOT Lane Use					
Household Income	Prefer Not to Answer	Count	Yes	No	
			30	128	158
	% of Income	19.00%	81.00%	100.00%	
	% of HOT Use	9.80%	10.70%	10.60%	
	% of Total	2.00%	8.60%	10.60%	
	Total	Count	306	1191	1497
		% of Income	20.40%	79.60%	100.00%
		% of HOT Use	100.00%	100.00%	100.00%
		% of Total	20.40%	79.60%	100.00%

**Table 17: Household Income vs. HOT Interest**

Income vs. HOT Interest										
Household Income			HOT Interest						Total	
			0	1	2	3	4	5		6
Under \$20,000	Count		34	18	10	14	9	9	4	98
	% of Income		34.70%	18.40%	10.20%	14.30%	9.20%	9.20%	4.10%	100.00%
	% of HOT Interest		6.60%	7.10%	6.40%	6.80%	5.90%	7.70%	4.20%	6.60%
	% of Total		2.30%	1.20%	0.70%	0.90%	0.60%	0.60%	0.30%	6.60%
\$20,000 - \$30,000	Count		30	10	10	7	10	4	2	73
	% of Income		41.10%	13.70%	13.70%	9.60%	13.70%	5.50%	2.70%	100.00%
	% of HOT Interest		5.80%	4.00%	6.40%	3.40%	6.60%	3.40%	2.10%	4.90%
	% of Total		2.00%	0.70%	0.70%	0.50%	0.70%	0.30%	0.10%	4.90%
\$30,000 - \$40,000	Count		50	16	16	14	12	9	5	122
	% of Income		41.00%	13.10%	13.10%	11.50%	9.80%	7.40%	4.10%	100.00%
	% of HOT Interest		9.70%	6.30%	10.30%	6.80%	7.90%	7.70%	5.20%	8.20%
	% of Total		3.40%	1.10%	1.10%	0.90%	0.80%	0.60%	0.30%	8.20%
\$40,000 - \$50,000	Count		34	26	13	24	16	10	7	130
	% of Income		26.20%	20.00%	10.00%	18.50%	12.30%	7.70%	5.40%	100.00%
	% of HOT Interest		6.60%	10.30%	8.30%	11.70%	10.50%	8.50%	7.30%	8.70%
	% of Total		2.30%	1.70%	0.90%	1.60%	1.10%	0.70%	0.50%	8.70%



**Table 18: Household Income vs. TTR Interest After Scenarios**

Income vs. TTR Interest After Scenarios										
Household Income			TTR Interest After Scenarios						Total	
			0	1	2	3	4	5		6
Under \$20,000	Count		21	11	17	13	15	15	7	99
	% of Income		21.20%	11.10%	17.20%	13.10%	15.20%	15.20%	7.10%	100.00%
	% of TTR After		4.90%	4.10%	8.90%	7.50%	7.00%	10.60%	9.00%	6.60%
	% of Total		1.40%	0.70%	1.10%	0.90%	1.00%	1.00%	0.50%	6.60%
\$20,000 - \$30,000	Count		16	12	12	10	7	11	6	74
	% of Income		21.60%	16.20%	16.20%	13.50%	9.50%	14.90%	8.10%	100.00%
	% of TTR After		3.70%	4.50%	6.30%	5.80%	3.30%	7.80%	7.70%	4.90%
	% of Total		1.10%	0.80%	0.80%	0.70%	0.50%	0.70%	0.40%	4.90%
\$30,000 - \$40,000	Count		35	25	13	17	17	12	5	124
	% of Income		28.20%	20.20%	10.50%	13.70%	13.70%	9.70%	4.00%	100.00%
	% of TTR After		8.10%	9.40%	6.80%	9.80%	8.00%	8.50%	6.40%	8.30%
	% of Total		2.30%	1.70%	0.90%	1.10%	1.10%	0.80%	0.30%	8.30%
\$40,000 - \$50,000	Count		31	27	20	10	24	11	6	129
	% of Income		24.00%	20.90%	15.50%	7.80%	18.60%	8.50%	4.70%	100.00%
	% of TTR After		7.20%	10.10%	10.50%	5.80%	11.30%	7.80%	7.70%	8.60%
	% of Total		2.10%	1.80%	1.30%	0.70%	1.60%	0.70%	0.40%	8.60%

Income vs. TTR Interest After Scenarios											
			TTR Interest After Scenarios								
			0	1	2	3	4	5	6	Total	
Household Income	\$50,000 - \$75,000	Count	80	42	22	19	28	23	9	223	
		% of Income	35.90%	18.80%	9.90%	8.50%	12.60%	10.30%	4.00%	100.00%	
		% of TTR									
		IAfter	18.50%	15.70%	11.50%	11.00%	13.10%	16.30%	11.50%	14.90%	
	% of Total	5.40%	2.80%	1.50%	1.30%	1.90%	1.50%	0.60%	14.90%		
	\$75,000 - \$100,000	Count	74	49	36	40	35	22	14	270	
		% of Income	27.40%	18.10%	13.30%	14.80%	13.00%	8.10%	5.20%	100.00%	
		% of TTR									
		After	17.10%	18.40%	18.80%	23.10%	16.40%	15.60%	17.90%	18.10%	
	% of Total	4.90%	3.30%	2.40%	2.70%	2.30%	1.50%	0.90%	18.10%		
	\$100,000 - \$150,000	Count	82	53	29	30	31	24	15	264	
		% of Income	31.10%	20.10%	11.00%	11.40%	11.70%	9.10%	5.70%	100.00%	
		% of TTR									
		IAfter	19.00%	19.90%	15.20%	17.30%	14.60%	17.00%	19.20%	17.70%	
	% of Total	5.50%	3.50%	1.90%	2.00%	2.10%	1.60%	1.00%	17.70%		
	\$150,000 or more	Count	38	22	20	20	27	15	12	154	
		% of Income	24.70%	14.30%	13.00%	13.00%	17.50%	9.70%	7.80%	100.00%	
		% of TTR									
After		8.80%	8.20%	10.50%	11.60%	12.70%	10.60%	15.40%	10.30%		
% of Total	2.50%	1.50%	1.30%	1.30%	1.80%	1.00%	0.80%	10.30%			
Prefer Not to Answer	Count	55	26	22	14	29	8	4	158		
	% of Income	34.80%	16.50%	13.90%	8.90%	18.40%	5.10%	2.50%	100.00%		



**Number of People in the Household**

**Table 19: Number of People in the Household vs. HOV Use**

Number of People in the Household vs. HOV Use							
Number of People in the Household		How often do you use an HOV lane?					Total
		Daily	2-3 times a week	2-3 times a month	Very rarely	Never	
		1	Count	22	28	58	
	% of People in HH	7.30%	9.30%	19.30%	51.20%	13.00%	100.00%
	% of HOV Use	13.40%	9.50%	11.70%	18.10%	26.70%	15.40%
	% of Total	1.10%	1.40%	3.00%	7.90%	2.00%	15.40%
2	Count	46	67	133	271	36	553
	% of People in HH	8.30%	12.10%	24.10%	49.00%	6.50%	100.00%
	% of HOV Use	28.00%	22.80%	26.80%	31.90%	24.70%	28.30%
	% of Total	2.40%	3.40%	6.80%	13.90%	1.80%	28.30%
3	Count	29	50	96	115	15	305
	% of People in HH	9.50%	16.40%	31.50%	37.70%	4.90%	100.00%
	% of HOV Use	17.70%	17.00%	19.30%	13.50%	10.30%	15.60%
	% of Total	1.50%	2.60%	4.90%	5.90%	0.80%	15.60%
4	Count	25	74	82	111	15	307
	% of People in HH	8.10%	24.10%	26.70%	36.20%	4.90%	100.00%
	% of HOV Use	15.20%	25.20%	16.50%	13.10%	10.30%	15.70%
	% of Total	1.30%	3.80%	4.20%	5.70%	0.80%	15.70%
5 or More	Count	16	41	56	60	14	187
	% of People in HH	8.60%	21.90%	29.90%	32.10%	7.50%	100.00%
	% of HOV Use	9.80%	13.90%	11.30%	7.10%	9.60%	9.60%
	% of Total	0.80%	2.10%	2.90%	3.10%	0.70%	9.60%

**Primary I-10 Trip Purpose**

**Table 20: Primary I-10 Trip Purpose vs. HOT Interest**

Primary Trip Purpose vs. HOT Interest										
Primary Trip Purpose		HOT Interest								Total
		0	1	2	3	4	5	6		
Commuting to/from work	Count	72	34	17	27	20	24	12	206	
	% within Purpose	35.00%	16.50%	8.30%	13.10%	9.70%	11.70%	5.80%	100.00%	
	% within HOT Interest	19.00%	20.50%	17.30%	19.00%	20.40%	36.90%	24.00%	20.60%	
	% of Total	7.20%	3.40%	1.70%	2.70%	2.00%	2.40%	1.20%	20.60%	
Work related (other than to and from home or work)	Count	25	17	12	11	9	4	6	84	
	% within Purpose	29.80%	20.20%	14.30%	13.10%	10.70%	4.80%	7.10%	100.00%	
	% within HOT Interest	6.60%	10.20%	12.20%	7.70%	9.20%	6.20%	12.00%	8.40%	
	% of Total	2.50%	1.70%	1.20%	1.10%	0.90%	0.40%	0.60%	8.40%	
To attend class at a school or educational institute	Count	39	13	11	12	8	6	8	97	
	% within Purpose	40.20%	13.40%	11.30%	12.40%	8.20%	6.20%	8.20%	100.00%	
	% within HOT Interest	10.30%	7.80%	11.20%	8.50%	8.20%	9.20%	16.00%	9.70%	
	% of Total	3.90%	1.30%	1.10%	1.20%	0.80%	0.60%	0.80%	9.70%	
Recreational / Social / Entertainment	Count	153	62	31	54	30	23	13	366	
	% within Purpose	41.80%	16.90%	8.50%	14.80%	8.20%	6.30%	3.60%	100.00%	
	% within HOT Interest	40.40%	37.30%	31.60%	38.00%	30.60%	35.40%	26.00%	36.70%	
	% of Total	15.30%	6.20%	3.10%	5.40%	3.00%	2.30%	1.30%	36.70%	
Shopping / Personal errands	Count	56	30	18	26	20	6	8	164	
	% within Purpose	34.10%	18.30%	11.00%	15.90%	12.20%	3.70%	4.90%	100.00%	
	% within HOT Interest	14.80%	18.10%	18.40%	18.30%	20.40%	9.20%	16.00%	16.40%	
	% of Total	5.60%	3.00%	1.80%	2.60%	2.00%	0.60%	0.80%	16.40%	

Primary Trip Purpose vs. HOT Interest										
		HOT Interest								
Primary Trip Purpose	Other	Count	34	10	9	12	11	2	3	81
		% within Purpose	42.00%	12.30%	11.10%	14.80%	13.60%	2.50%	3.70%	100.00%
		% within HOT Interest	9.00%	6.00%	9.20%	8.50%	11.20%	3.10%	6.00%	8.10%
		% of Total	3.40%	1.00%	0.90%	1.20%	1.10%	0.20%	0.30%	8.10%
	Total	Count	379	166	98	142	98	65	50	998
		% within Purpose	38.00%	16.60%	9.80%	14.20%	9.80%	6.50%	5.00%	100.00%
		% within HOT Interest	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
		% of Total	38.00%	16.60%	9.80%	14.20%	9.80%	6.50%	5.00%	100.00%

**Table 21: Primary I-10 Trip Purpose vs. Interest in TTR Before**

Primary Trip Purpose vs. TTR Interest Before Scenarios										
Primary Trip Purpose		TTR Interest Before Scenarios								Total
		0	1	2	3	4	5	6		
Commuting to/from work	Count	51	31	20	31	26	24	21	204	
	% within Purpose	25.00%	15.20%	9.80%	15.20%	12.70%	11.80%	10.30%	100.00%	
	% within TTR Before	19.20%	23.00%	17.50%	19.00%	19.50%	25.00%	23.90%	20.50%	
	% of Total	5.10%	3.10%	2.00%	3.10%	2.60%	2.40%	2.10%	20.50%	
Work related (other than to and from home or work)	Count	16	12	10	20	6	10	11	85	
	% within Purpose	18.80%	14.10%	11.80%	23.50%	7.10%	11.80%	12.90%	100.00%	
	% within TTR Before	6.00%	8.90%	8.80%	12.30%	4.50%	10.40%	12.50%	8.50%	
	% of Total	1.60%	1.20%	1.00%	2.00%	0.60%	1.00%	1.10%	8.50%	
To attend class at a school or educational institute	Count	22	8	9	16	17	8	18	98	
	% within Purpose	22.40%	8.20%	9.20%	16.30%	17.30%	8.20%	18.40%	100.00%	
	% within TTR Before	8.30%	5.90%	7.90%	9.80%	12.80%	8.30%	20.50%	9.80%	
	% of Total	2.20%	0.80%	0.90%	1.60%	1.70%	0.80%	1.80%	9.80%	
Recreational / Social / Entertainment	Count	107	44	43	59	54	33	24	364	
	% within Purpose	29.40%	12.10%	11.80%	16.20%	14.80%	9.10%	6.60%	100.00%	
	% within TTR Before	40.20%	32.60%	37.70%	36.20%	40.60%	34.40%	27.30%	36.60%	
	% of Total	10.80%	4.40%	4.30%	5.90%	5.40%	3.30%	2.40%	36.60%	
Shopping / Personal errands	Count	40	31	26	20	24	14	8	163	
	% within Purpose	24.50%	19.00%	16.00%	12.30%	14.70%	8.60%	4.90%	100.00%	
	% within TTR Before	15.00%	23.00%	22.80%	12.30%	18.00%	14.60%	9.10%	16.40%	
	% of Total	4.00%	3.10%	2.60%	2.00%	2.40%	1.40%	0.80%	16.40%	
Other	Count	30	9	6	17	6	7	6	81	
	% within Purpose	37.00%	11.10%	7.40%	21.00%	7.40%	8.60%	7.40%	100.00%	

**Table 22: Primary I-10 Trip Purpose vs. Interest in TTR After**

Primary Trip Purpose vs. TTR Interest After Scenarios										
Primary Trip Purpose		TTR Interest After Scenarios								Total
		0	1	2	3	4	5	6		
Commuting to/from work	Count	68	31	17	22	30	16	11	195	
	% within Purpose	34.90%	15.90%	8.70%	11.30%	15.40%	8.20%	5.60%	100.00%	
	% within TTR After	22.40%	18.60%	16.70%	19.80%	25.90%	22.50%	24.40%	21.30%	
	% of Total	7.40%	3.40%	1.90%	2.40%	3.30%	1.70%	1.20%	21.30%	
Work related (other than to and from home or work)	Count	20	16	13	10	9	8	6	82	
	% within Purpose	24.40%	19.50%	15.90%	12.20%	11.00%	9.80%	7.30%	100.00%	
	% within TTR After	6.60%	9.60%	12.70%	9.00%	7.80%	11.30%	13.30%	9.00%	
	% of Total	2.20%	1.70%	1.40%	1.10%	1.00%	0.90%	0.70%	9.00%	
To attend class at a school or educational institute	Count	27	15	13	12	9	7	7	90	
	% within Purpose	30.00%	16.70%	14.40%	13.30%	10.00%	7.80%	7.80%	100.00%	
	% within TTR After	8.90%	9.00%	12.70%	10.80%	7.80%	9.90%	15.60%	9.80%	
	% of Total	3.00%	1.60%	1.40%	1.30%	1.00%	0.80%	0.80%	9.80%	
Recreational / Social / Entertainment	Count	116	62	37	37	38	29	10	329	
	% within Purpose	35.30%	18.80%	11.20%	11.20%	11.60%	8.80%	3.00%	100.00%	
	% within TTR After	38.30%	37.10%	36.30%	33.30%	32.80%	40.80%	22.20%	36.00%	
	% of Total	12.70%	6.80%	4.00%	4.00%	4.20%	3.20%	1.10%	36.00%	
Shopping / Personal errands	Count	47	27	18	19	20	7	7	145	
	% within Purpose	32.40%	18.60%	12.40%	13.10%	13.80%	4.80%	4.80%	100.00%	
	% within TTR After	15.50%	16.20%	17.60%	17.10%	17.20%	9.90%	15.60%	15.80%	
	% of Total	5.10%	3.00%	2.00%	2.10%	2.20%	0.80%	0.80%	15.80%	
Other	Count	25	16	4	11	10	4	4	74	
	% within Purpose	33.80%	21.60%	5.40%	14.90%	13.50%	5.40%	5.40%	100.00%	

## HOT Interest and Use

**Table 23: HOT Interest vs. TTR Interest Before Scenarios**

HOT Interest vs. TTR Interest Before Scenarios									
HOT Interest		TTR Interest Before							Total
		0	1	2	3	4	5	6	
0	Count	390	81	51	58	34	20	31	665
	% within HOT Interest	58.60%	12.20%	7.70%	8.70%	5.10%	3.00%	4.70%	100.00%
	% within TTR Before	82.10%	27.70%	23.70%	20.30%	12.50%	9.30%	18.10%	34.50%
	% of Total	20.20%	4.20%	2.60%	3.00%	1.80%	1.00%	1.60%	34.50%
1	Count	35	129	68	40	46	12	6	336
	% within HOT Interest	10.40%	38.40%	20.20%	11.90%	13.70%	3.60%	1.80%	100.00%
	% within TTR Before	7.40%	44.20%	31.60%	14.00%	16.90%	5.60%	3.50%	17.40%
	% of Total	1.80%	6.70%	3.50%	2.10%	2.40%	0.60%	0.30%	17.40%
2	Count	15	28	57	38	41	22	6	207
	% within HOT Interest	7.20%	13.50%	27.50%	18.40%	19.80%	10.60%	2.90%	100.00%
	% within TTR Before	3.20%	9.60%	26.50%	13.30%	15.10%	10.20%	3.50%	10.70%
	% of Total	0.80%	1.50%	3.00%	2.00%	2.10%	1.10%	0.30%	10.70%
3	Count	16	24	17	98	59	33	11	258
	% within HOT Interest	6.20%	9.30%	6.60%	38.00%	22.90%	12.80%	4.30%	100.00%
	% within TTR Before	3.40%	8.20%	7.90%	34.30%	21.70%	15.30%	6.40%	13.40%
	% of Total	0.80%	1.20%	0.90%	5.10%	3.10%	1.70%	0.60%	13.40%
4	Count	8	17	15	31	60	59	19	209
	% within HOT Interest	3.80%	8.10%	7.20%	14.80%	28.70%	28.20%	9.10%	100.00%
	% within TTR Before	1.70%	5.80%	7.00%	10.80%	22.10%	27.30%	11.10%	10.80%
	% of Total	0.40%	0.90%	0.80%	1.60%	3.10%	3.10%	1.00%	10.80%

HOT Interest vs. TTR Interest Before Scenarios										
		TTR Interest Before								
		0	1	2	3	4	5	6	Total	
HOT Interest	5	Count	7	9	5	14	25	56	27	143
		% within HOT Interest	4.90%	6.30%	3.50%	9.80%	17.5%	39.20%	18.90%	100.00%
		% within TTR Before	1.50%	3.10%	2.30%	4.90%	9.20%	25.90%	15.80%	7.40%
		% of Total	0.40%	0.50%	0.30%	0.70%	1.30%	2.90%	1.40%	7.40%
	6	Count	4	4	2	7	7	14	71	109
		% within HOT Interest	3.70%	3.70%	1.80%	6.40%	6.40%	12.80%	65.10%	100.00%
		% within TTR Before	0.80%	1.40%	0.90%	2.40%	2.60%	6.50%	41.50%	5.70%
		% of Total	0.20%	0.20%	0.10%	0.40%	0.40%	0.70%	3.70%	5.70%
	Total	Count	475	292	215	286	272	216	171	1927
		% within HOT Interest	24.60%	15.20%	11.20%	14.80%	14.10%	11.20%	8.90%	100.00%
		% within TTR Before	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
		% of Total	24.60%	15.20%	11.20%	14.80%	14.10%	11.20%	8.90%	100.00%

**Table 24: HOT Use vs. HOT Interest**

HOT Usage vs. HOT Interest										
		HOT Interest								
		0	1	2	3	4	5	6	Total	
Have you ever used an HOT lane?	Yes	Count	123	64	45	55	45	44	29	405
		% within HOT Use	30.40%	15.80%	11.10%	13.60%	11.10%	10.90%	7.20%	100.00%
		% within HOT Interest	18.30%	19.00%	21.60%	21.30%	21.60%	31.00%	26.60%	21.00%
		% of Total	6.40%	3.30%	2.30%	2.80%	2.30%	2.30%	1.50%	21.00%
	No	Count	548	273	163	203	163	98	80	1528
		% within HOT Use	35.90%	17.90%	10.70%	13.30%	10.70%	6.40%	5.20%	100.00%
		% within HOT Interest	81.70%	81.00%	78.40%	78.70%	78.40%	69.00%	73.40%	79.00%
		% of Total	28.30%	14.10%	8.40%	10.50%	8.40%	5.10%	4.10%	79.00%
	Total	Count	671	337	208	258	208	142	109	1933
		% within HOT Use	34.70%	17.40%	10.80%	13.30%	10.80%	7.30%	5.60%	100.00%
		% within HOT Interest	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
		% of Total	34.70%	17.40%	10.80%	13.30%	10.80%	7.30%	5.60%	100.00%



**Table 25: HOT Use vs TTR Interest Before Scenarios**

HOT Usage vs. TTR Interest Before Scenarios										
		TTR Interest Before Scenarios								
		0	1	2	3	4	5	6	Total	
Have you ever used an HOT lane?	Yes	Count	91	49	46	59	57	53	48	403
		% within HOT Use	22.60%	12.20%	11.40%	14.60%	14.10%	13.20%	11.90%	100.00%
		% within TTR Before	19.20%	16.70%	21.30%	20.60%	20.80%	24.80%	27.90%	20.90%
		% of Total	4.70%	2.50%	2.40%	3.10%	3.00%	2.70%	2.50%	20.90%
	No	Count	382	244	170	228	217	161	124	1526
		% within HOT Use	25.00%	16.00%	11.10%	14.90%	14.20%	10.60%	8.10%	100.00%
		% within TTR Before	80.80%	83.30%	78.70%	79.40%	79.20%	75.20%	72.10%	79.10%
		% of Total	19.80%	12.60%	8.80%	11.80%	11.20%	8.30%	6.40%	79.10%
	Total	Count	473	293	216	287	274	214	172	1929
		% within HOT Use	24.50%	15.20%	11.20%	14.90%	14.20%	11.10%	8.90%	100.00%
		% within TTR Before	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
		% of Total	24.50%	15.20%	11.20%	14.90%	14.20%	11.10%	8.90%	100.00%

**Table 26: HOT Use vs. TTR Interest After Scenarios**

HOT Usage vs. TTR Interest After Scenarios									
Have you ever used an HOT lane?		TTR Interest After Scenarios							Total
		0	1	2	3	4	5	6	
Yes	Count	109	65	42	49	59	38	17	379
	% within HOT Use	28.80%	17.20%	11.10%	12.90%	15.60%	10.00%	4.50%	100.00%
	% within TTR After	20.80%	19.90%	18.50%	22.70%	22.80%	23.50%	20.70%	21.10%
	% of Total	6.10%	3.60%	2.30%	2.70%	3.30%	2.10%	0.90%	21.10%
No	Count	414	262	185	167	200	124	65	1417
	% within HOT Use	29.20%	18.50%	13.10%	11.80%	14.10%	8.80%	4.60%	100.00%
	% within TTR After	79.20%	80.10%	81.50%	77.30%	77.20%	76.50%	79.30%	78.90%
	% of Total	23.10%	14.60%	10.30%	9.30%	11.10%	6.90%	3.60%	78.90%
Total	Count	523	327	227	216	259	162	82	1796
	% within HOT Use	29.10%	18.20%	12.60%	12.00%	14.40%	9.00%	4.60%	100.00%
	% within TTR After	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	% of Total	29.10%	18.20%	12.60%	12.00%	14.40%	9.00%	4.60%	100.00%

**Interest in TTR**

**Table 27: Interest in TTR Before vs. Interest in TTR After**

TTR Interest Before Scenarios vs. TTR Interest After Scenarios									
TTR Interest Before Scenarios		TTR Interest After Scenarios							Total
		0	1	2	3	4	5	6	
0	Count	355	51	19	12	6	3	1	447
	% within TTR Before	79.40%	11.40%	4.30%	2.70%	1.30%	0.70%	0.20%	100.00%
	% within TTR After	68.70%	15.60%	8.40%	5.60%	2.30%	1.80%	1.20%	25.00%
	% of Total	19.80%	2.80%	1.10%	0.70%	0.30%	0.20%	0.10%	25.00%
1	Count	51	136	44	21	12	5	1	270
	% within TTR Before	18.90%	50.40%	16.30%	7.80%	4.40%	1.90%	0.40%	100.00%
	% within TTR After	9.90%	41.60%	19.40%	9.70%	4.60%	3.00%	1.20%	15.10%
	% of Total	2.80%	7.60%	2.50%	1.20%	0.70%	0.30%	0.10%	15.10%
2	Count	28	51	67	27	18	4	0	195
	% within TTR Before	14.40%	26.20%	34.40%	13.80%	9.20%	2.10%	0.00%	100.00%
	% within TTR After	5.40%	15.60%	29.50%	12.50%	6.90%	2.40%	0.00%	10.90%
	% of Total	1.60%	2.80%	3.70%	1.50%	1.00%	0.20%	0.00%	10.90%
3	Count	38	42	39	78	47	15	2	261
	% within TTR Before	14.60%	16.10%	14.90%	29.90%	18.00%	5.70%	0.80%	100.00%
	% within TTR After	7.40%	12.80%	17.20%	36.10%	18.10%	9.10%	2.50%	14.60%
	% of Total	2.10%	2.30%	2.20%	4.40%	2.60%	0.80%	0.10%	14.60%
4	Count	20	26	29	36	93	42	7	253
	% within TTR Before	7.90%	10.30%	11.50%	14.20%	36.80%	16.60%	2.80%	100.00%
	% within TTR After	3.90%	8.00%	12.80%	16.70%	35.90%	25.60%	8.60%	14.10%
	% of Total	1.10%	1.50%	1.60%	2.00%	5.20%	2.30%	0.40%	14.10%

TTR Interest Before Scenarios vs. TTR Interest After Scenarios										
		TTR After Scenarios								
		0	1	2	3	4	5	6	Total	
TTR Interest Before Scenarios	5	Count	9	12	23	24	54	69	11	202
		% within TTR Before	4.50%	5.90%	11.40%	11.90%	26.70%	34.20%	5.40%	100.00%
		% within TTR After	1.70%	3.70%	10.10%	11.10%	20.80%	42.10%	13.60%	11.30%
		% of Total	0.50%	0.70%	1.30%	1.30%	3.00%	3.90%	0.60%	11.30%
	6	Count	16	9	6	18	29	26	59	163
		% within TTR Before	9.80%	5.50%	3.70%	11.00%	17.80%	16.00%	36.20%	100.00%
		% within TTR After	3.10%	2.80%	2.60%	8.30%	11.20%	15.90%	72.80%	9.10%
		% of Total	0.90%	0.50%	0.30%	1.00%	1.60%	1.50%	3.30%	9.10%
	Total	Count	517	327	227	216	259	164	81	1791
		% within TTR Before	28.90%	18.30%	12.70%	12.10%	14.50%	9.20%	4.50%	100.00%
		% within TTR After	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
		% of Total	28.90%	18.30%	12.70%	12.10%	14.50%	9.20%	4.50%	100.00%