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An Examination of Houston's QuickRide Participants by Frequency of QuickRide Usage

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16. Abstract

The United States' experience with high-occupancy toll lanes continues to grow with four fairly well established projects: two in Houston, Texas, and one each in San Diego and Riverside County, California. The Houston QuickRide project allows two-person carpools to travel on the high-occupancy vehicle lanes for a $2.00 toll during the morning and afternoon peak periods, when free use of the lanes is restricted to vehicles with three or more occupants and motorcycles. After 5 years in operation (3 years on US 290), the QuickRide program receives comparatively lower patronage than the two California projects. This implementation project used standard statistical methods and an ordered logit model to examine the characteristics of current and former QuickRide participants as a step in understanding the reasons for the relatively low patronage.

The primary issue limiting QuickRide use appears to be one of convenience rather than cost. Both current and former participants cited the inconveniences of carpooling as the greatest deterrent to QuickRide use while 73.4 percent of participants reported that the toll had little or no significant impact on their decision to use QuickRide. The average time spent picking up and/or dropping off carpool partners was significantly higher among former participants. Current participants spent on average 4.3 minutes picking up and/or dropping off their carpool partners, while former participants spent 12.2 minutes, supporting the finding that a deterrent to QuickRide use is the development of a carpool.

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EXECUTIVE SUMMARY

The United States' experience with high-occupancy toll lanes continues to grow with four fairly well established projects: two in Houston, Texas, and one each in San Diego and Riverside County, California. The Houston QuickRide project allows two-person carpools to travel on the high-occupancy vehicle lanes for a $2.00 toll during the morning and afternoon peak periods, when free use of the lanes is restricted to vehicles with three or more occupants and motorcycles. After 5 years in operation (3 years on US 290), the QuickRide program receives comparatively lower patronage than the two California projects. This implementation project used standard statistical methods and an ordered logit model to examine the characteristics of current and former QuickRide participants as a step in understanding the reasons for the relatively low patronage.

Surveys of current QuickRide enrollees indicated that QuickRide participants were well educated (about 73.9 percent of participants had college or postgraduate degrees), married (approximately 90 percent were married), and had high incomes (about 62 percent of respondents stated an annual household income of $100,000 or more). In the week prior to the survey, 67 percent of participants were commuting when they used QuickRide. The average trip length of respondents was 45.3 minutes. Respondents perceived an average QuickRide travel time savings of 29.77 minutes, approximately double what they actually save. Only 1.8 percent of all participants considered the time savings inadequate. Based only on the $2.00 QuickRide toll and the travel time saved, respondent's implicit value of time (VOT) was estimated as $5.63 per hour.

Most respondents carpooled with a co-worker, an adult family member, or a child. Most participants enrolled in QuickRide to either avoid traffic congestion on the main lanes (66.2 percent) or to take advantage of the possibility of traveling with their carpool partner even during the rush hour (22.6 percent). An average of 70.8 vehicles are now being used to travel for every 100 former QuickRide participants, which is 20.8 more vehicles than that required for 100 current QuickRide participants. The most frequently cited method of finding out about QuickRide was through family members or friends (39.8 percent).

The primary issue limiting QuickRide use appears to be one of convenience rather than cost. Both current and former participants cited the inconveniences of carpooling as the greatest deterrent to QuickRide use while 73.4 percent of participants reported that the toll had little or no significant impact on their decision to use QuickRide. The average time spent picking up and/or dropping off carpool partners was significantly higher among former participants. Current participants spent on average 4.3 minutes picking up and/or dropping off their carpool partners, while former participants spent 12.2 minutes, supporting the finding that a deterrent to QuickRide use is the development of a carpool.

Four hypothesized pricing options were introduced in the survey. These were:
1. Tying the QuickRide toll to time of day,
2. Tying the QuickRide toll to the level of congestion in the HOT lanes,
3. Charging a flat monthly rate, and
4. Allowing single occupant vehicles to travel on the HOT lane at a higher toll.

Of these four options, the fourth received the most favorable support among both current and former participants. A total of 69.5 percent of current users and 66.9 percent of former enrollees were supportive of this idea.

Using discrete choice modeling techniques, it was found that males, participants with college education, those with annual household income below $50,000, those on commute trips, those carpooling with a child or an adult family member, and those between the ages of 25 and 54 are likely to make more QuickRide trips. Whether or not a participant shares the QuickRide toll with his/her carpool partner does not significantly affect the level of participation. It was also found that participants who perceive higher QuickRide travel time savings, travel on the corridor more frequently, and/or undertake longer trips are likely to use QuickRide more often, whereas long carpool formation times are a disincentive to participation in the program.

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Background

QuickRide is an innovative program designed to more effectively utilize the capacity of the high-occupancy vehicle (HOV) lanes on the Katy (I-10) and US 290 freeways in Houston. Under this program, two-person carpools can pay a toll of $2.00 to use the HOV lane during peak periods (6:45–8:00 AM and 5:00–6:00 PM), even though the lanes are normally restricted to vehicles with three or more occupants.

The Katy HOV lane opened in 1984. It is a 13.3 mile (21.4 km), one-lane reversible facility located in the median of Katy Freeway in Houston, Texas. In the beginning only transit and vanpools could use the lane. However, restrictions were gradually reduced and, by 1986, stabilized at vehicles with two or more persons (HOV-2+ carpools). The facility subsequently became highly congested during peak periods. To reduce congestion, the occupancy requirement was raised to HOV-3+ in 1988 during peak traffic periods (*1*). However, this change resulted in significant excess capacity in the HOV lane during the peak periods (*2*). In January 1998, the QuickRide program was introduced, which allows a limited number of two-person carpools to use the Katy HOV lane during the morning and afternoon peak periods for a $2.00 toll. All HOV-3+ vehicles continue to use the facility free. The $2.00 toll is charged electronically to drivers via a windshield-mounted QuickRide transponder. HOV lane users (including QuickRide participants) saved an average of 17.33 minutes during the morning rush hour and 15.04 minutes during the afternoon rush hour in 2001.

In view of the success of the Katy QuickRide program, the Metropolitan Transit Authority of Harris County converted the US 290 HOV lane to high-occupancy toll (HOT) use in November 2000. The US 290 HOT lane is a 14.6 mile (23.5 km), one-lane reversible facility in the median of Northwest Freeway (US 290) that connects the northwest suburbs of Houston with I-610 and I-10. Average travel time savings on the US 290 HOT lane was 10.51 minutes in 2001. It operates in similar manner to the Katy HOT lane facility except that it is available only during the morning peak period. The afternoon peak period on this HOT lane is not as congested and is open to HOV-2+ vehicles free of charge.

Related Projects

HOT lanes are an example of the concept of *value pricing*, which involves charging an optional toll to allow access to a restricted traffic facility such as an HOV lane (*2*). In this way, HOT lanes offer drivers a choice—staying in the slow-moving main lanes and traveling free versus paying a fee to travel in the adjoining faster-moving HOT lanes (*3*). Apart from the two Houston projects, there are presently two other HOT lane projects in the world—the State Route 91 (SR 91) Express Lanes in Orange County, California, and the I-15 FasTrak in San Diego, California (*4, 5*).

The SR 91 Express Lanes opened in 1995 as the first practical application of the concept of value pricing to a roadway facility in the United States (*6*). This project is a 10 mile (16.1 km), four-lane toll facility (two-lanes each way) located in the median of the Orange County–Riverside County travel corridor. The facility is open to all drivers and charges a toll that varies from $1.00 to $4.75 by time of day and day of week (*5*). However, vehicles with three or more occupants now use the facility at no cost during most periods of the day. Tolls are automatically charged to prepaid accounts linked to customers' FasTrak transponders. The Express Lanes provide an average travel time savings of 12 to 13 minutes compared to using the free lanes (*7*).

As of January 1999, approximately 193,000 vehicles per weekday traveled on SR 91 in the free lanes and approximately 25,000 vehicles per weekday (21,500 full fare and 3,500 high occupancy vehicles (HOVs) paying half price) traveled in the toll lanes.

The I-15 FasTrak is an 8 mile (12.9 km), reversible, two-lane HOT facility in the median of I-15, about 10 miles (16.1 km) north of San Diego, California. The project started in December 1996 and is open to all drivers. HOV-2+ vehicles may use the facility at no cost. Single-occupancy vehicles (SOVs) must pay a toll that normally varies from $0.50 to $4.00, depending on the level of traffic, and may reach $8.00 in cases of severe congestion (*8*). Under the worst traffic conditions, FasTrak participants can save up to 20 minutes of travel time as compared to the main freeway lanes (*9*). Customers must have a FasTrak account to use the HOT lanes.

As of 1999, approximately 36,000 vehicles per weekday traveled on the I-15 Northbound free lanes from 6:00 a.m. to 9:00 a.m. (when the HOT lane is operational in the Northbound direction). In the afternoon period (from 3:00 p.m. to 7:00 p.m. when the HOT lanes are open in the Southbound direction) approximately 31,000 vehicles per weekday traveled on the Southbound free lanes. During both periods, a total of approximately 13,000 vehicles (3,500 express pass full fare, 9,800 HOVs traveling for free, and 700 single occupant vehicle violators) traveled in the toll lanes (9).

Unlike the two California projects, where single-occupant vehicles can use the HOT lanes for a fee, SOVs are not permitted on the two Houston HOT lanes. In 1998, Stockton et al. conducted a survey to evaluate the effectiveness of the QuickRide program. Their study focused on issues such as the overall usage of QuickRide, changes in person throughput along the Katy Freeway corridor, and, to a lesser extent, the characteristics of QuickRide participants (2). QuickRide demand averaged 103 trips per day on the Katy HOT lane in 1998. After the introduction of QuickRide on US 290, total demand on the two facilities averaged 131 trips per day in 2000 and increased to 182 trips per day in 2002. These estimates are well below the targeted demand of 600 QuickRide vehicles per peak hour. In fact, after 5 years in operation (3 years on US 290), the Houston QuickRide program receives low patronage when compared to the two California projects where there is a high demand for HOT lane use by single-occupant vehicles (*6*).

Objectives of Study
The objectives of this study were to examine the reasons behind the current level of participation in the QuickRide program and to ascertain the following information regarding current and former enrollees:

- Respondent socioeconomic and commute characteristics,
- Perceived travel time savings using QuickRide,
- Respondents' current or past level of participation, and
- The implicit value of time for QuickRide participants.
- What factors influence this level of participation?

- What other modes of travel (SOV, transit) do they use when not using QuickRide and before they joined the QuickRide program?

- What factors influenced the enrollee to join or quit the QuickRide program?

- Under what circumstances would they increase (or decrease) their frequency of participation?

- Are there any perceived or actual inequities in the program?

- What marketing efforts were most successful in attracting them to the program?

DATA

To gather the data required for a greater understanding of QuickRide use, a survey was mailed to all 582 former QuickRide enrollees and all 1459 people enrolled in QuickRide as of December 2002. The survey included 36 questions regarding participants' most recent QuickRide (applicable to only current enrollees) and non-QuickRide trips, their typical use of QuickRide, feelings toward alternate QuickRide tolling schemes, and their socioeconomic characteristics. The survey was mailed in March 2003. Surveys returned by the beginning of April were included in the analysis (responses in the 14 surveys returned later may have been influenced by a QuickRide price change in April and were not included). Three slightly different surveys were mailed to current QuickRide participants and two to former participants. The questions regarding the respondents' most recent trip varied based on the period which the QuickRide trip occurred (Katy AM, Katy PM, or US 290 AM). The surveys were target-mailed to the respondents based on their usage of these different QuickRide movements. This approach shortened and simplified the survey instrument by focusing on questions relevant to the typical travel behavior of the respondents (see Appendix A for survey instrument).

Current Participants' Survey

The post office returned a total of 93 surveys due to incorrect addresses. Of the remaining 1366 surveys, 525 were returned on time for a 38.4 percent response rate (*10*). Once the data were entered and data entry errors corrected, the surveys were weighted based on respondents' stated

number of weekly QuickRide trips as compared to the average number of QuickRide trips that participants actually made per week during the last three weeks of March 2003. It was necessary to weight the surveys to account for both response bias and ex-post rationalization in survey responses. Both errors were expected as (a) participants who frequently used QuickRide were likely to be more interested/invested in the QuickRide program and therefore more likely to respond and (b) respondents often overstate their actual participation rate. Based on the respondents' stated use of QuickRide it was fairly obvious both types of errors existed. To account for these biases, the surveys were weighted such that the proportions of survey respondents who indicated taking a specific number of QuickRide trips on a specific freeway equaled actual average usage on that freeway for the last 3 weeks in March (see Equation 1).

$$W_{i,j} = \frac{T_{i,j}}{R_{i,j}} \qquad (1)$$

where,

$W_{i,j}$ = weighting factor for surveys on road i indicating a weekly usage of j,

$T_{i,j}$ = number of enrollees who averaged j QuickRide trips per week on freeway i based on QuickRide billing records for the last three weeks of March 2003,

$R_{i,j}$ = number of respondents on freeway i who indicated they made j QuickRide trips in the week immediately preceding the survey,

i = 1 for Katy Freeway and 2 for US 290, and

j = 0–10 for Katy Freeway and 0–5 for US 290.

The resulting weights are shown in Table 1.

Based on these data it is clear that infrequent participants (0–1 trips per week) were significantly underrepresented in survey responses and frequent participants (7–10 trips per week on Katy and 5 trips per week on US 290) were considerably overrepresented. This indicates three potential sources of error: (1) the small number of infrequent participants who responded were not representative of all infrequent participants; (2) some frequent participants were actually less frequent than indicated, skewing the characteristics of this group; and (3) some frequent

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participants' transponders were not registering with the automatic vehicle identification (AVI) equipment (this is a probable source of error and the project team is examining possible remedies). Without knowing the true number of trips made by each survey respondent (which cannot be determined since survey responses were anonymous), the best way to attempt to minimize the impact of these potential errors is through the weighting efforts described earlier.

Table 1: Weights for Current QuickRide Enrollees' Survey

Number of trips per week (j)	Katy			US 290		
	Stated ($R_{1,\,j}$)	Observed ($T_{1,\,j}$)	Weight ($W_{1,\,j}$)	Stated ($R_{2,\,j}$)	Observed ($T_{2,\,j}$)	Weight ($W_{2,\,j}$)
0–0.49	36	709	19.6944	10	396	39.6000
0.5–1.49	51	83	1.6275	31	43	1.3871
1.5–2.49	38	54	1.4211	19	30	1.5789
2.5–3.49	20	32	1.6000	23	20	0.8696
3.5–4.49	22	26	1.1818	23	19	0.8261
4.5–5.49	35	17	0.4857	86	9	0.1047
5.5–6.49	19	9	0.4737			
6.5–10	98	12	0.1224			

It should also be noted that several US 290 survey respondents indicated more than five QuickRide trips per week. It was felt the most likely rationale for this was confusion between using QuickRide and simply driving on the HOT lane in the afternoon (when QuickRide does not operate on US 290), and some respondents may have mistaken these trips for QuickRide trips. To account for this error, the stated number of weekly trips was divided by two for these respondents. Also, three respondents for US 290 and three for Katy indicated more than 10 QuickRide trips per week. These responses were removed from the analysis, thus reducing the available data to 519 responses. Analysis of the current enrollees' survey was limited to the respondents who either stated the number of QuickRide trips they made in the week immediately preceding the survey or stated the average number of QuickRide trips they made in a month or

year. In all, eight respondents did not answer this question. Hence, the total number of cases available for analysis was reduced to 511.

Former Enrollees' Survey

Out of the 582 surveys mailed to former participants, 64 were returned, thus yielding a response rate of 11 percent. However, three of these were discarded because the respondents indicated they were still enrolled in the program. This was possible since a household could include present and past QuickRide enrollees and a current enrollee may have inadvertently filled out the former enrollee's survey. Before any analysis took place, a weight variable was developed to account for the lower response rate. These weights were determined by dividing the number of surveys sent by the number of responses received. For former enrollees who traveled on Katy, there were 41 valid responses out of the 450 surveys sent, yielding a weight variable of 10.98. For those who traveled on US 290, 20 responded out of the 132 surveys sent. Thus, a weight variable of 6.60 was used for this group. Weighting the surveys in this manner made the number of responses in both data sets (current and former participants) equal the actual number of current or former enrollees who received the survey.

Aside from these surveys, several other sources of data were available for analysis, including:

1. A data set containing the transponder number, date, and time of every QuickRide trip ever charged (some QuickRide trips may have been missed due to equipment difficulties). This data set was used to build the weights described above.
2. A data set containing travel speeds on both the main (free) lanes and the HOT lanes on US 290 and Katy Freeway. These speeds are recorded using the automatic vehicle identification readers along the corridors and record millions of travel speeds each year. The travel speeds provided detailed information on the travel time savings gained through the use of QuickRide.
3. Results from a smaller survey of QuickRide enrollees conducted in 1998.

Method Of Analysis

To begin, descriptive statistics of all survey respondents were examined to obtain an overall view of respondents. Three sets of groups were then compared and tested for significant differences. These comparisons included:

1. Comparing participants based on their preferred (most frequently used) route and time of travel. Three groups were identified—Katy AM, Katy PM, and US 290 AM.

2. Comparing participants based on their registration status as of December 2002. The groups of interest were former enrollees and current enrollees.

3. Comparing participants based on their frequency of QuickRide usage. It should be noted here that since QuickRide operates only in the morning peak period on US 290, fewer trips were expected there than on Katy Freeway, where QuickRide operates during both the morning and afternoon peak periods. The three groups considered here were:

   a. Infrequent participants, defined as QuickRide enrollees who indicated they took a maximum of 1 trip on either route (Katy or US 290) in the week immediately preceding the survey,

   b. Midlevel participants, defined as QuickRide enrollees who indicated they took 2–4 QuickRide trips on Katy or 2–3 QuickRide trips on US 290 in the week immediately preceding the survey, and

   c. Frequent participants, defined as QuickRide enrollees who indicated they took 5–10 QuickRide trips on Katy or 4–5 QuickRide trips on US 290 in the week immediately preceding the survey.

To answer the fundamental question of whether there were significant differences ($p < 0.05$) between respondents in these groups, several statistical tests were used. For *categorical* responses (for example, trip purpose or occupation), the chi-square contingency test was used. One-way analysis of variance (ANOVA) and Student's t-test were used for three-way and two-way comparison of means of *continuous* data (for example, travel time savings or trip length). For *ordinal* data the Kruskal Wallis test for three-way comparison of means (for example, age or

income) was employed, while Mann-Whitney test was used for two-way comparison of means of *ordinal data*.

An ordered logit model was then formulated with QuickRide participation group (based on frequency of usage) as the dependent variable.

RESULTS: CHARACTERISTICS OF KATY AM, KATY PM, AND US 290 AM PARTICIPANTS

This portion of the study describes the characteristics of current QuickRide participants. Statistical comparisons between Katy AM, Katy PM, and US 290 AM participants are provided in Appendix B.

Individual Demographics

Participants were, on average, 35 to 54 years old with the largest percentage (38.4 percent) between 45 and 54 years. Katy AM participants were significantly more likely to be 55 years of age or older and less likely to be younger than 35 years of age than both Katy PM and US 290 AM participants. While 53 percent of all respondents were females, Katy PM participants were significantly more likely to be males (63.8 percent) than females. About 73.9 percent of participants had college or postgraduate degrees. A significantly higher proportion (46.6 percent) of US 290 AM participants had postgraduate degrees, and 64.8 percent of participants had professional/managerial careers with no significant difference between the three groups of participants. Participants earned an average of $30.01 to $50.00 an hour in 2002. Figures 1 to 5 show the distribution of age, gender, education level, occupation, and hourly wage rate for Katy AM, Katy PM, and US 290 AM participants.
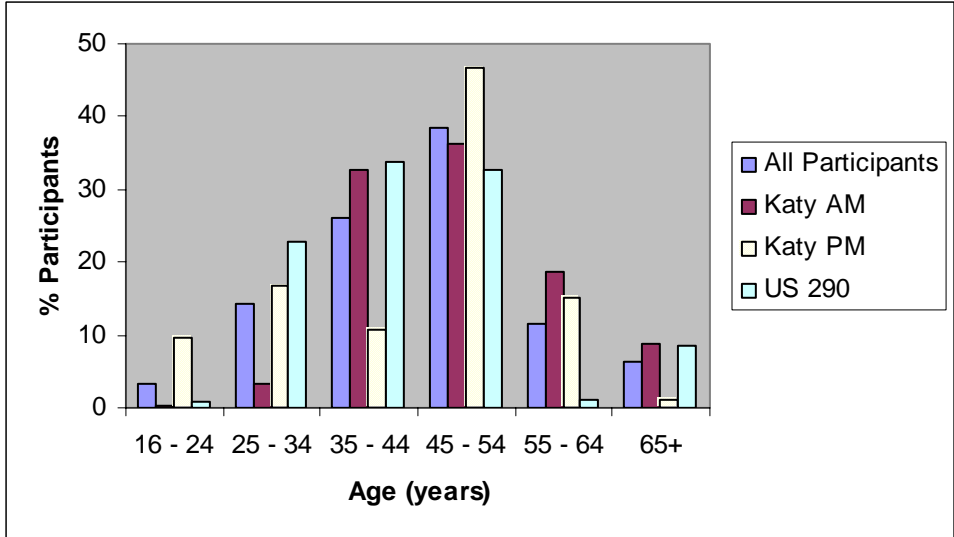
Figure 1: Age of QuickRide Participants
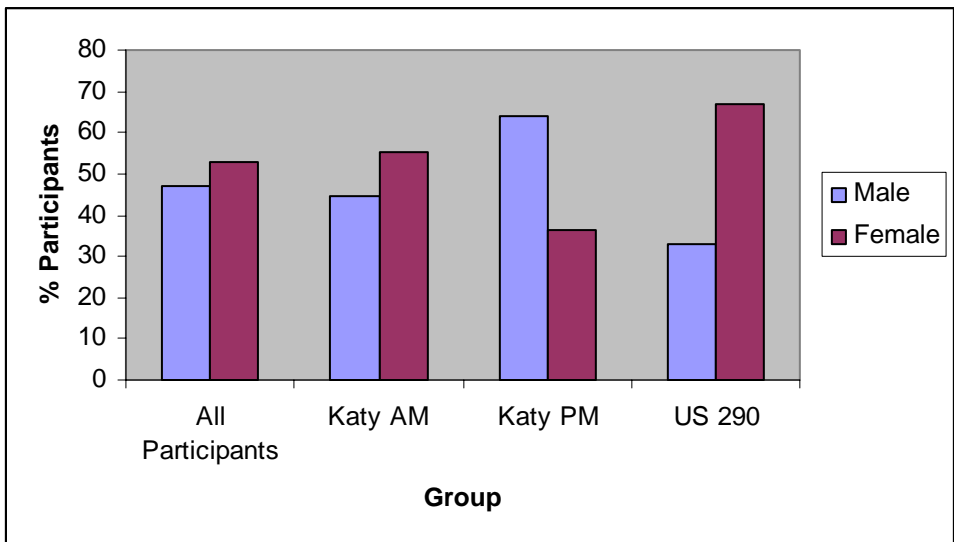
Figure 2: Gender of QuickRide Participants
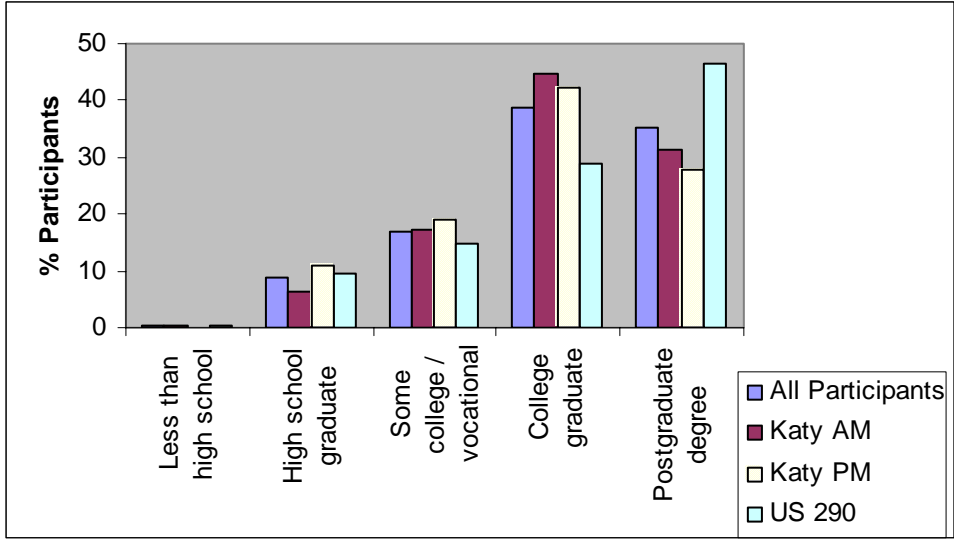
Figure 3: Education Level of QuickRide Participants
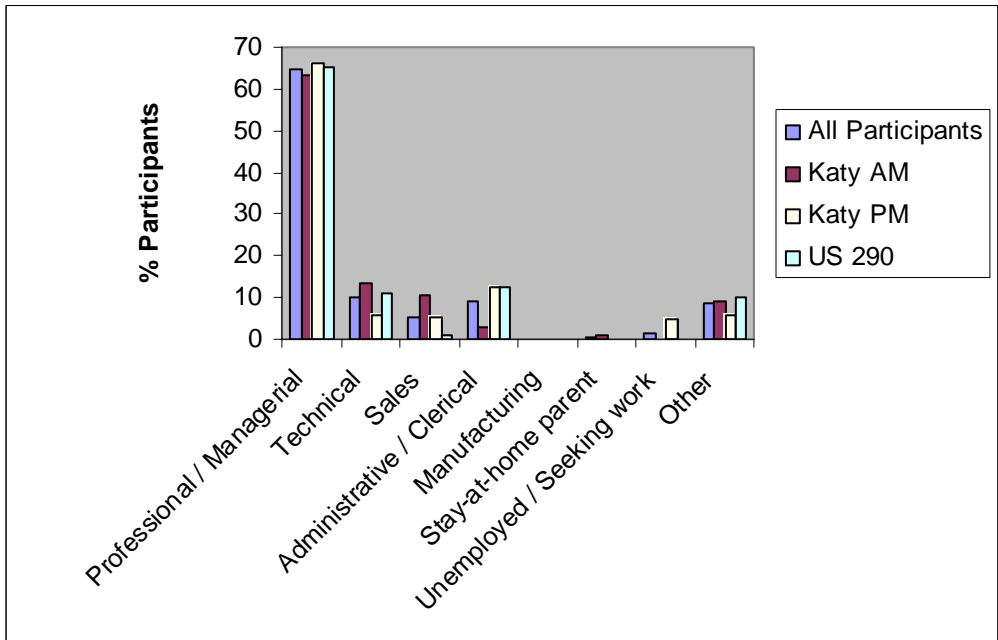
Figure 4: Occupation of QuickRide Participants
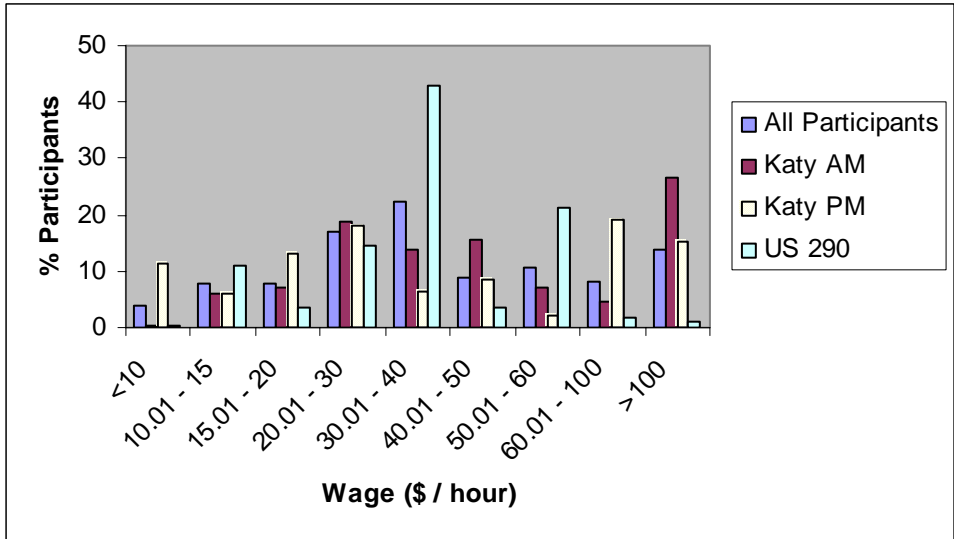
Figure 5: Wages of QuickRide Participants

Household Characteristics

An average of 2.99 persons lived in each household, and each household owned an average of 2.32 vehicles, with no significant differences between Katy AM, Katy PM, and US 290 AM QuickRide participants. About 90 percent of respondents were married. Of these, 67 percent were married with child(ren). There were, however, more single adults and fewer single parents among the Katy PM participants than among Katy AM and US 290 AM participants. Only about 7 percent of respondents reported an annual household income below $50,000; about 62 percent of respondents stated an annual household income of $100,000 or more. A significantly higher proportion (90.9 percent) of US 290 AM participants earned $75,000 or more in 2002, whereas 71.7 percent of Katy AM and 76.8 percent of Katy PM participants earned similar amounts. Household characteristics for Katy AM, Katy PM, and US 290 AM participants are shown in Figures 6 to 9.
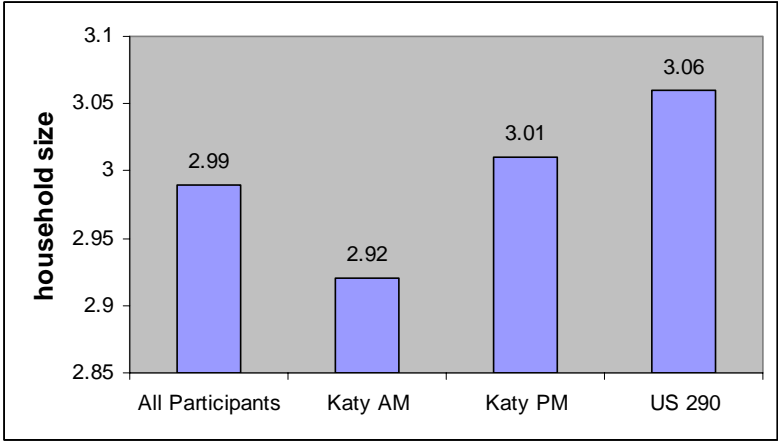
Figure 6: Persons per QuickRide Household
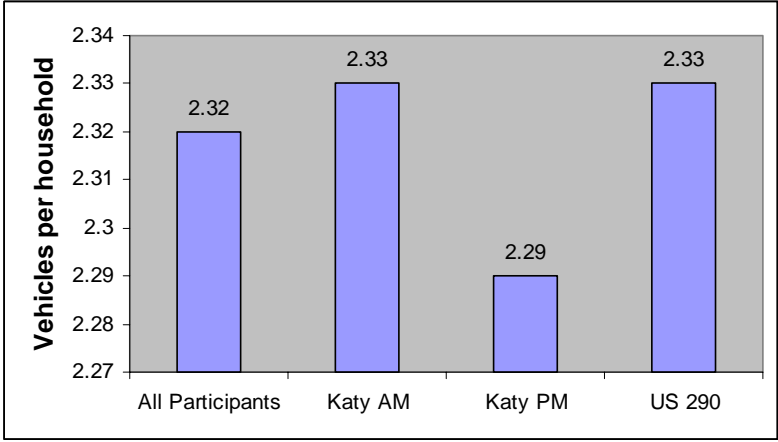
Figure 7: Vehicles per QuickRide Household
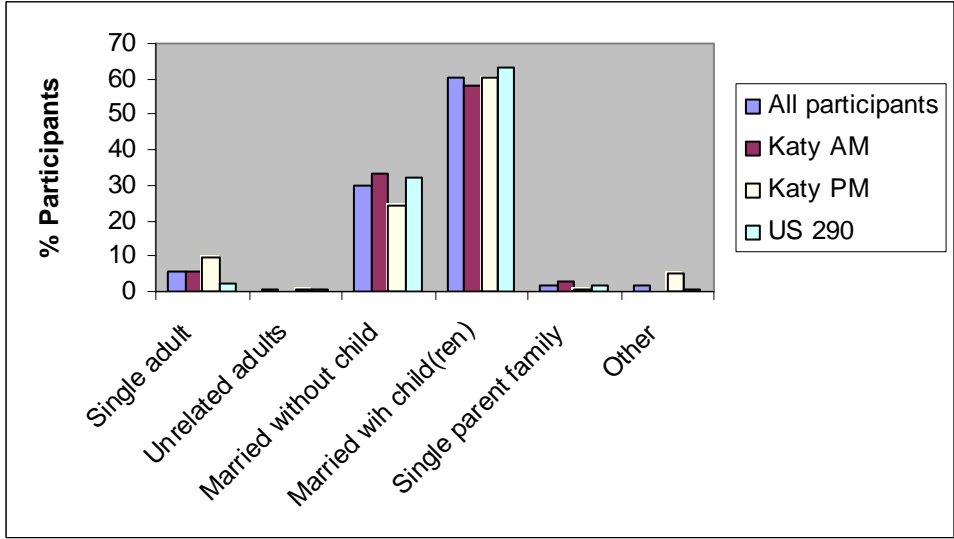
Figure 8: QuickRide Participant's Household Type
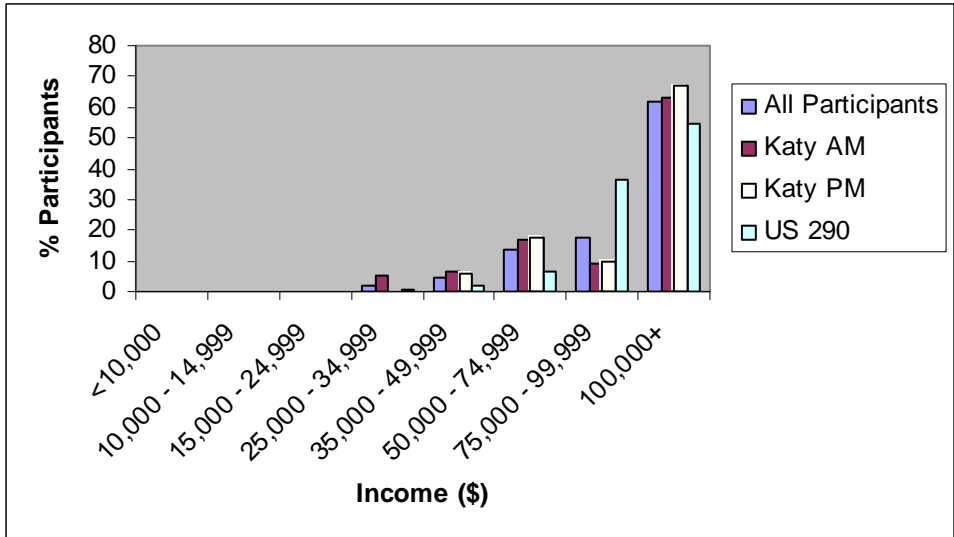
Figure 9: QuickRide Participant's Household Income (2002)

Commute Characteristics

Trip Purpose

In the week before the survey, 67 percent of participants were commuting when they used QuickRide. An even higher proportion of US 290 AM participants (76.9 percent) were on commute trips. 0.3 percent of US 290 AM participants were making recreational / social / shopping / entertainment / personal errands trips, whereas 21.7 percent of Katy PM participants were making these trips. Trips made to schools were significantly lower among Katy PM participants than Katy AM and US 290 AM participants.

QuickRide Trip Length

The average reported trip length of respondents was 45.3 minutes. Note that all trips longer than or equal to 120 minutes were considered unreasonable for travel in the Houston metropolitan area and were rejected as extreme values (19 responses were rejected based on this criterion). Katy PM participants reported an average trip length of 54.86 minutes, while average trip length on US 290 AM was 38.94 minutes.
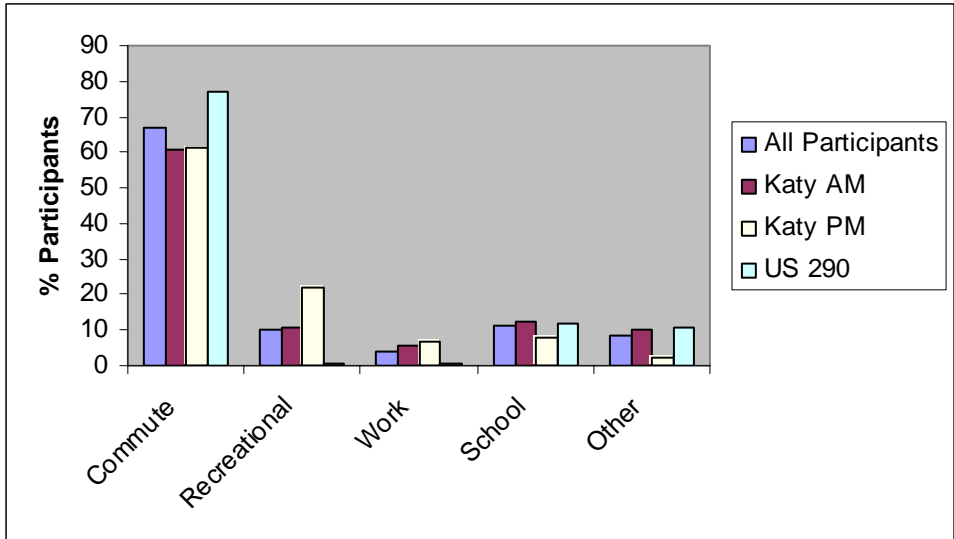
Figure 10: QuickRide Trip Purpose
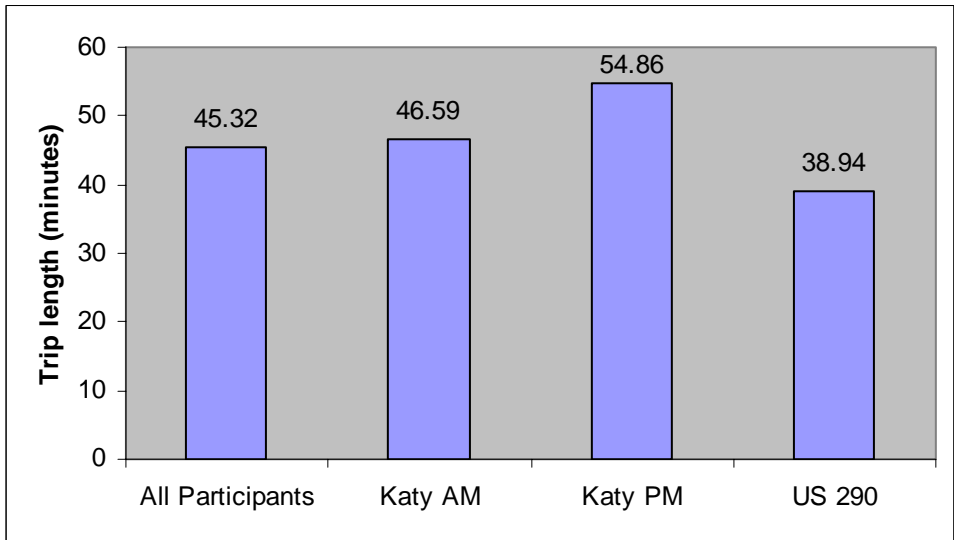
Figure 11: Perceived QuickRide Trip Length

Travel Time Savings and Implicit Value of Time for QuickRide Participants

Respondents perceived an average QuickRide travel time savings of 29.77 minutes. Katy AM and PM participants reported travel time savings of about double the actual values, whereas travel time savings perceived by US 290 AM participants was 237.7 percent of the actual value

of 10.51 minutes (see Figure 12). Actual values were obtained from millions of travel speed reading from the Houston AVI system on those corridors.
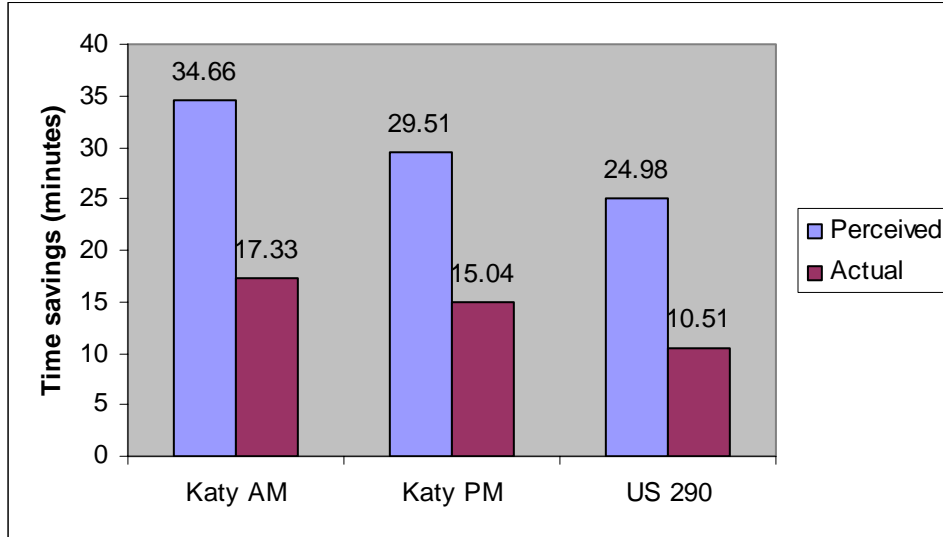
Figure 12: QuickRide Travel Time Savings

The implicit value of time (VOT) was estimated as $5.63 per hour for all participants and $4.26, $5.34, and $7.27 per hour for Katy AM, Katy PM, and US 290 AM participants, respectively.

$$VOT = \frac{\sum_{i=1}^{n} \frac{C}{(t_i - e_i)/60}}{n} \qquad (2)$$

where,

t_i = perceived QuickRide time savings by participant i,

e_i = time spent by participant i on carpool formation,

C = QuickRide toll ($2.00 per trip), and

n = number of participants.

These estimates were lower than what was found by dividing the cost of QuickRide ($2.00) by the actual travel time savings (see Figure 12). Using that method, values of time of $6.92,

$7.98, and $11.42 per hour were found for Katy AM, Katy PM, and US 290 AM participants, respectively. This was due to the actual travel time savings being significantly lower than the respondent's perceived travel time savings.

Current Level of QuickRide Participation

No significant differences were observed in the number of QuickRide trips made by participants (see Figure 13). Participants made an average of 0.64 trips in the week immediately preceding the survey, with no significant differences between Katy and US 290 AM participants.
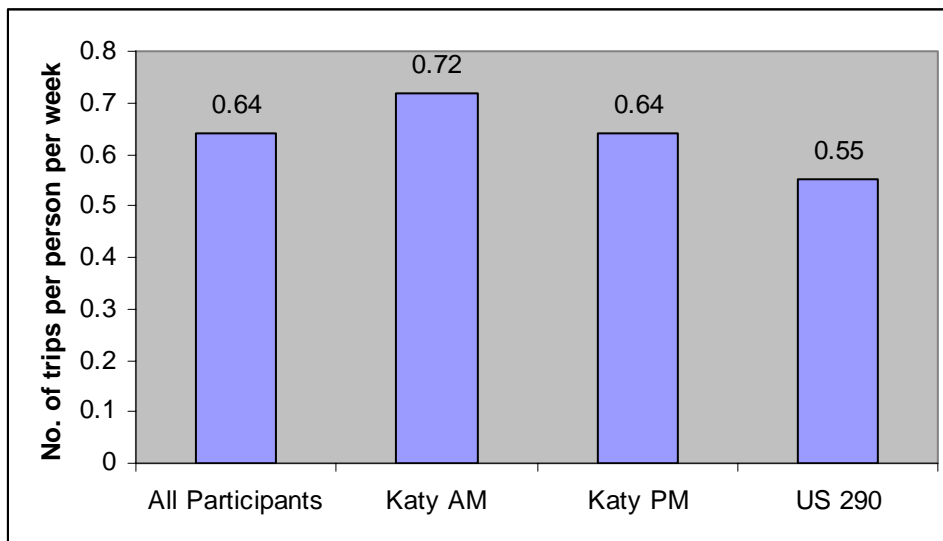
Figure 13: QuickRide Trips in the Weeks Immediately Preceding the Survey

Respondents cited the difficulty of participating in carpools and the fact that their work schedules might permit them to adjust their travel time to less congested periods as major reasons for the relatively low levels of participation. Table 2 summarizes the primary reasons why participants do not use QuickRide more often than they do now and the percentage of respondents citing the particular reason.

Table 2: Factors Influencing Current Level of Participation

Reason	All Participants (%)	Katy AM (%)	Katy PM (%)	US 290 AM (%)
Difficult to participate in carpool	33.1	23.5	25.6	51.2
Congestion in HOT lane	0.4	0.2	0.6	0.5
Inadequate time savings	1.8	0.4	4.9	0.0
Program is complicated and confusing	0.1	0.2	0.0	0.0
Flexible work schedule	14.7	19.2	18.5	6.0
Price of QuickRide	3.3	6.0	1.5	2.1
Sometimes forget	1.5	0.0	4.3	0.2
Other	45.1	50.3	44.5	40.0

A significantly higher proportion of US 290 AM participants (51.2 percent) found carpooling difficult compared to 23.5 and 25.6 percent of Katy AM and Katy PM participants, respectively. Participants were generally satisfied with their time savings when using QuickRide. Only 1.8 percent of all participants considered the time savings were inadequate, and an even smaller proportion (0.1 percent) found the QuickRide program complicated and confusing.

Of all respondents, 80.5 percent indicated they would increase their level of participation if they could drive alone on the HOT lane, while 28.5 percent indicated they would make more QuickRide trips if the toll were reduced. Although 19.9 and 25.6 percent of Katy AM and Katy PM participants, respectively, would increase their level of participation if the QuickRide operating hours were extended, only 3.3 percent of US 290 AM participants indicated they would increase their level of participation if there were longer operating hours (see Figure 14).
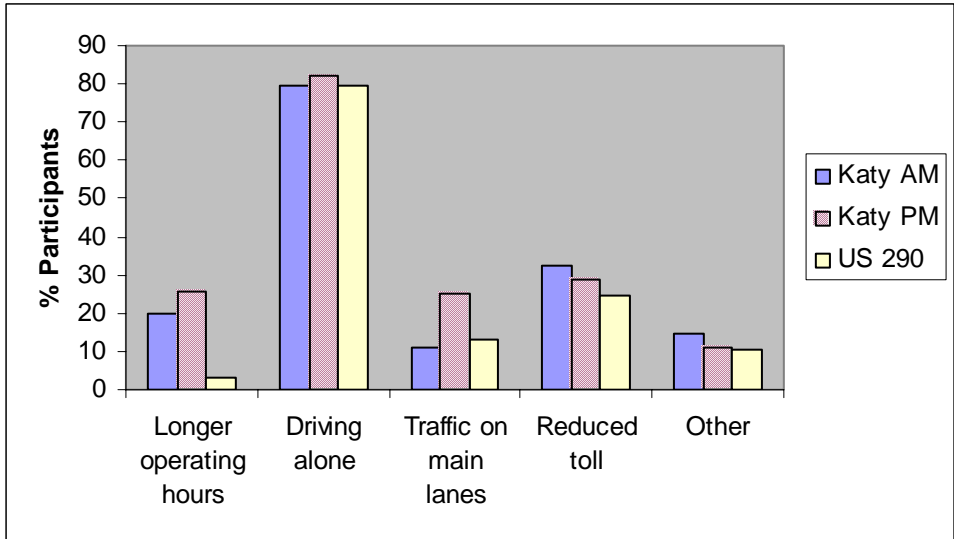
Figure 14: Circumstances under Which QuickRide Participation Would Increase

Usual Carpool Partner and Carpool Formation Time

Most respondents carpooled with a coworker (40.6 percent), an adult family member (35.9 percent), or a child (24.7 percent). (Note that for questions where users could select more than one answer the total response for that question may exceed 100 percent. This is the case with carpool partner.) A significantly higher proportion of Katy PM participants engaged in casual or informal carpools (Note: a casual carpool is one which the drivers and passengers do not have pre-arranged plans to carpool. Instead, passengers wait at a designated location, usually a park and ride lot, for drivers to pick them up. Often these people will not know one another). Katy AM participants were more likely to travel with a neighbor than both Katy PM and US 290 AM participants (see Figure 15). Respondents spent as long as 23 minutes picking up and dropping off their carpool partners, with the average carpool formation time being 4.33 minutes. There were no significant differences in carpool formation times among Katy AM, Katy PM, and US 290 AM participants (Figure 16). Carpooling with coworkers or casual carpoolers required carpool formation times of 7.35 and 8.10 minutes, respectively. This was significantly longer than the time required for carpooling with an adult family member (1.42 minutes), a child (1.65 minutes), or a neighbor (2.93 minutes).
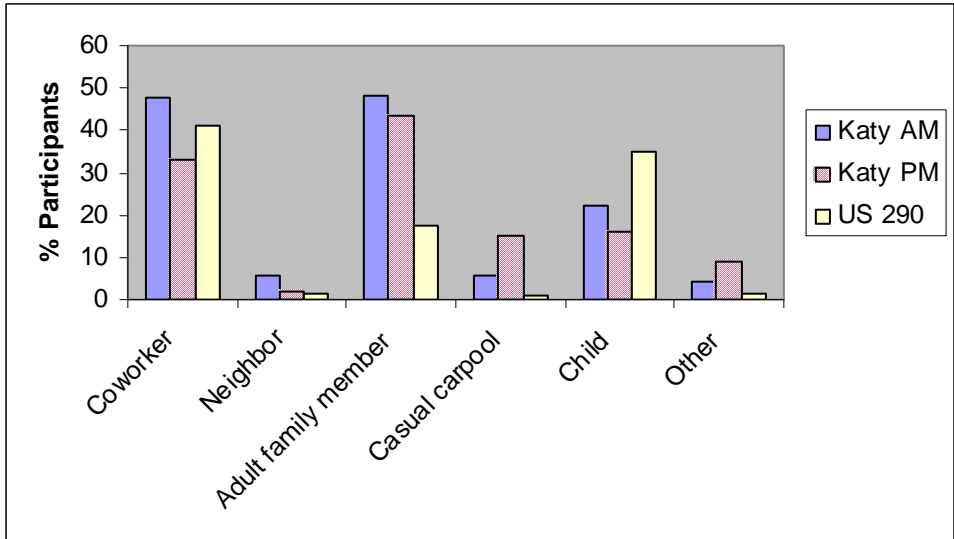
Figure 15: Usual QuickRide Carpool Partners
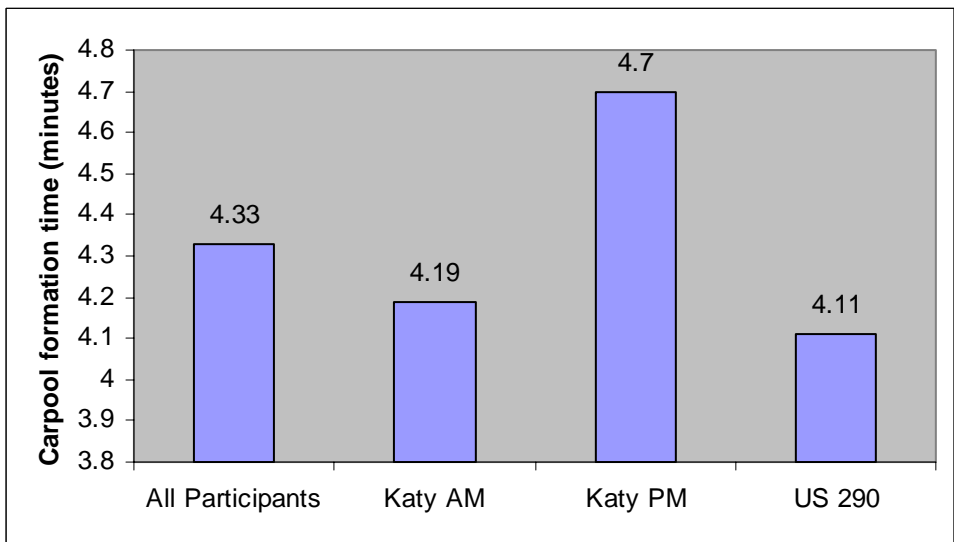
Figure 16: Carpool Formation Times

QuickRide Toll and Equity Issues

Approximately 22 percent of Katy AM participants, 32 percent of Katy PM participants, and 26 percent of US 290 AM participants said their carpool partners helped pay the $2.00 QuickRide toll. Of all respondents, 26.8 percent shared the toll with their carpool partners. Most respondents shared the toll with their passengers when traveling with either a coworker or an adult family

member, while only 6 percent of all respondents who traveled with casual carpoolers shared the toll with their passengers (see Figure 17).
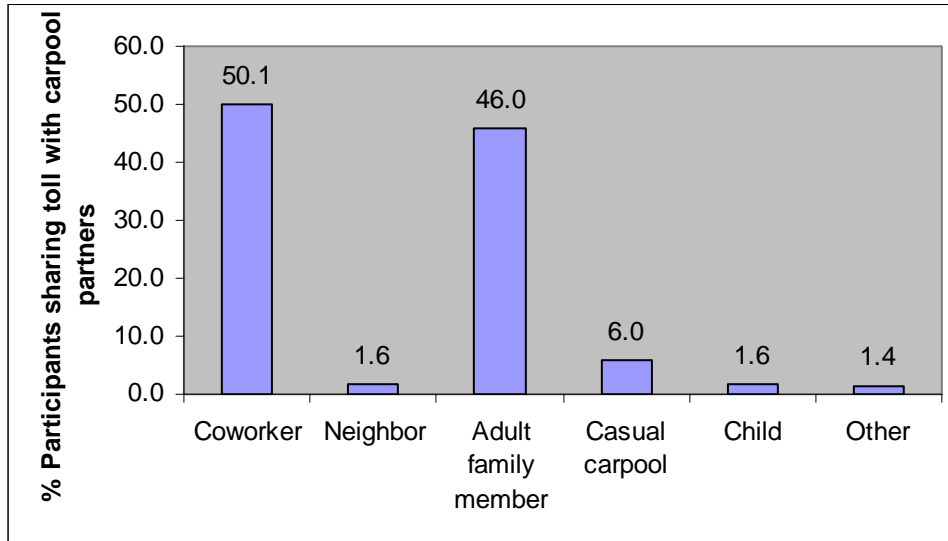
Figure 17: Participants Sharing QuickRide Toll with Carpool Partners

Most respondents (78.5 percent) were either indifferent to the $2.00 toll or found the toll reasonable. 73.4 percent of participants reported that the toll had little or no significant impact on their decision to use QuickRide. Thus, the survey results suggest that there are, at present, no inequity concerns with the program *among current enrollees*. This may be attributed to the fact that over 90 percent of respondents had household incomes greater than $50,000 in the year 2002. Due to these income levels an investigation of inequity issues between enrollees and non-enrollees is warranted.

Non-QuickRide Trips
In the week before the survey (when not using QuickRide), 53.6 percent of participants drove alone; 30.4 and 12.5 percent traveled in two-person carpools and carpools of three or more persons, respectively. 3.5 percent traveled by bus. US 290 AM participants were, however, significantly less likely to form 3+ person carpools or travel by bus than either Katy AM or Katy PM participants (Figure 18). The average number of trips on both freeways, irrespective of travel

mode, was 7.3 per person per week. Commuting accounts for 70.6 percent of the non-QuickRide trips. On the occasions when participants traveled in the HOT lane in 3+ person carpools, an average of 6.88 minutes was spent picking up and dropping off carpool partners.
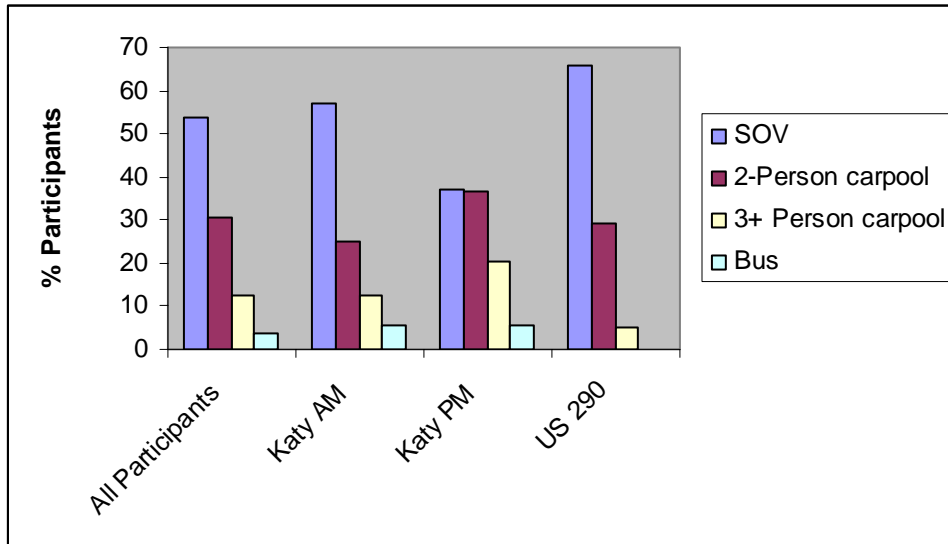
Figure 18: Other Modes of Travel Used by QuickRide Participants

Participants cited the lack of common trip times as the most important reason for not always carpooling with three or more people. The need for advanced arrangements, restrictions on choice of when to travel, and lack of common origin-destination combinations were also important reasons for not forming 3+ person carpools. Table 3 summarizes how participants, on average, rated various factors that inhibit carpooling on a scale of 1 to 10 (1 indicating not important and 10 indicating important).

Enrollment Issues
Most participants enrolled in QuickRide to either avoid traffic congestion on the main lanes (66.2 percent) or to take advantage of the possibility of traveling with their carpool partners even during the rush hour (22.6 percent). However, whereas the former reason applied broadly to all participants, the latter was significantly more likely to occur among Katy PM participants than among both Katy AM and US 290 AM participants. Of Katy AM participants, 14.5 percent

joined the program because they found it too dangerous and stressful to drive on the main lanes. Only 1.1 percent of US 290 AM participants cited the danger and / or stress of driving on the main lanes as their major reason for joining QuickRide (see Figure 19).

Table 3: Factors Responsible for Not Carpooling

Factor	All Participants	Katy AM	Katy PM	US 290 AM
Need for advanced arrangements	7.32	7.12	7.13	7.74
Restrictions on choice of when to travel	7.96	7.22	8.27	8.41
Lack of common origin-destination combinations	7.11	6.01	7.18	8.20
Lack of common trip times	8.19	7.53	8.54	8.48
Others	6.61	9.52	3.34	6.12

Ranking out of 10, with 1 being unimportant and 10 indicating important
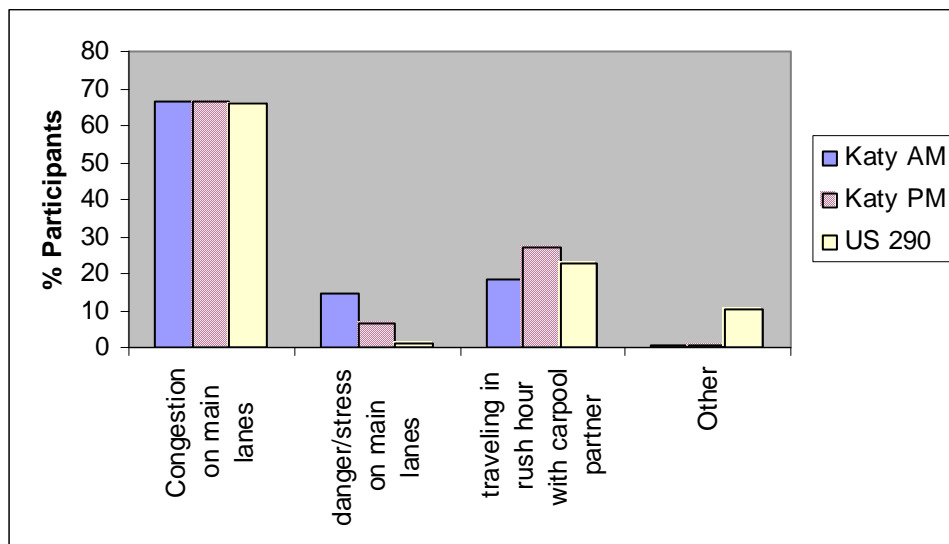
Figure 19: Why Participants Joined QuickRide

Most participants (39.8 percent) first learned about QuickRide through family members or friends. Newspapers were more successful in attracting US 290 AM participants than Katy

participants (see Figure 20). Mail and radio account for 3.6 and 2.6 percent of all participants, respectively, and 18.1 percent of participants did not recall where they learned about QuickRide.
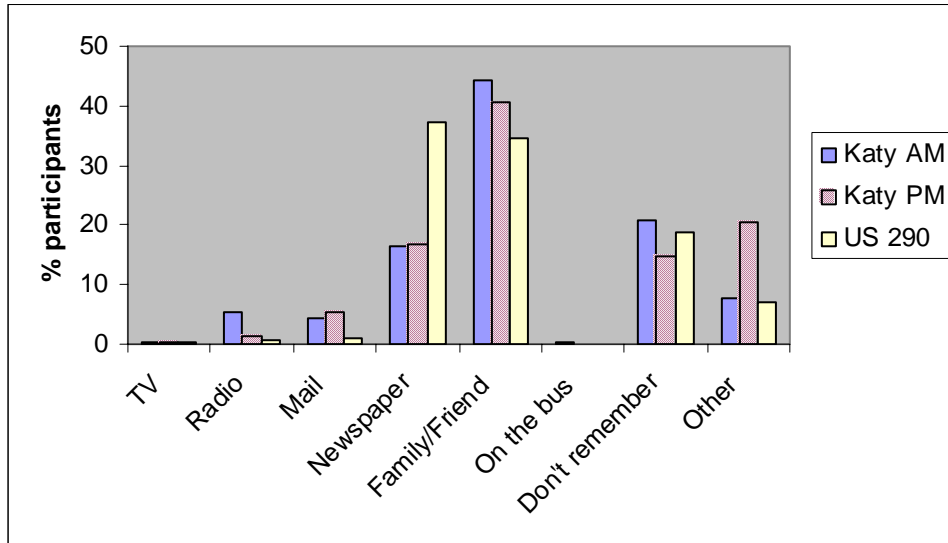
Figure 20: How Participants First Learned about QuickRide

Perceptions about Other Pricing Options

Flat QuickRide Toll
Respondents were asked the number of QuickRide trips they would make per week if the toll were $1.00, $1.50, $2.50, and $3.00. They were also asked to state the number of trips they would make if two-person carpools were allowed to use the HOT lane during peak periods without paying a fee. As expected, the average number of trips decreased as the toll increased. However, the number of QuickRide trips indicated by both Katy AM and Katy PM participants for the prevailing $2.00 toll was inconsistent with this general trend. For example, participants indicated a willingness to take more QuickRide trips at the $3.00 toll level than they currently take at the $2.00 toll level. Except for the $2.00 toll, US 290 AM participants consistently stated a weekly number of QuickRide trips less than 50 percent of both AM and PM Katy participants (see Figure 21). Katy PM trip estimates were also consistently lower than Katy AM trip estimates.
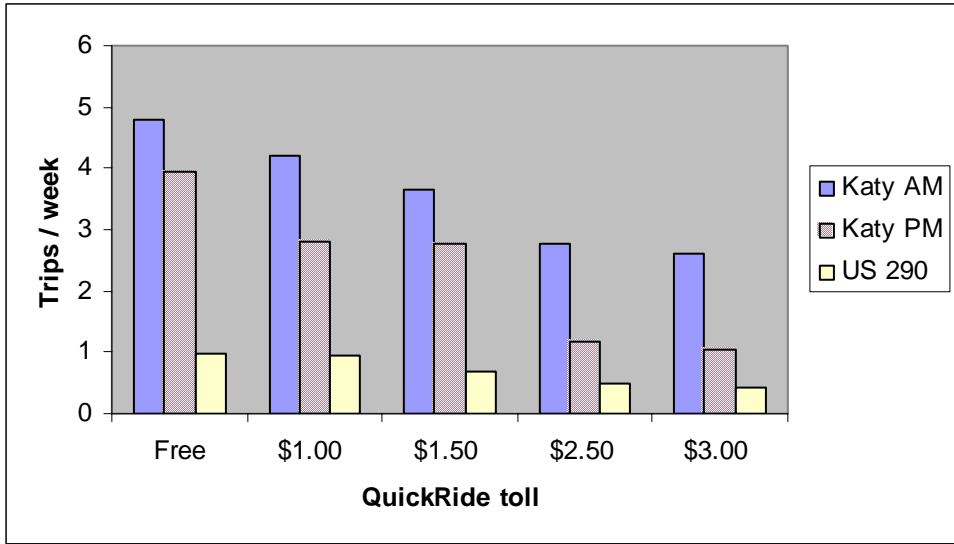
Figure 21: Average Number of QuickRide Trips per Week for Various Tolls

Variable QuickRide Toll

Participants were generally not happy with the idea of tying the QuickRide toll to the time of day
or the amount of congestion in the HOT lanes. Lowering the toll during specific off-peak periods
and raising the toll during peak periods was opposed by 38.3 percent of participants, while 42.6
percent opposed varying the toll with the amount of traffic in the HOT lanes (see Table 4).

Table 4: Percentage Distribution of Responses to Potential QuickRide Pricing Options

	Varying toll by time of day (%)	Varying toll by amount of traffic in HOT lanes (%)
Strongly favor	14.3	13.8
Somewhat favor	14.5	12.2
Indifferent	32.8	31.4
Somewhat oppose	17.7	21.4
Strongly oppose	20.6	21.2

SOV Buy-in

Of the four potential pricing options participants were asked to comment about, the ability to drive alone on the HOT lane at higher tolls seemed to be the most favored: 69.5 percent of participants favored allowing drivers to drive alone in the HOT lane for a higher toll than carpoolers, while 8.1 percent were indifferent. Figure 22 summarizes how often participants stated they would drive alone on the HOT lanes, if they could do so for various tolls.
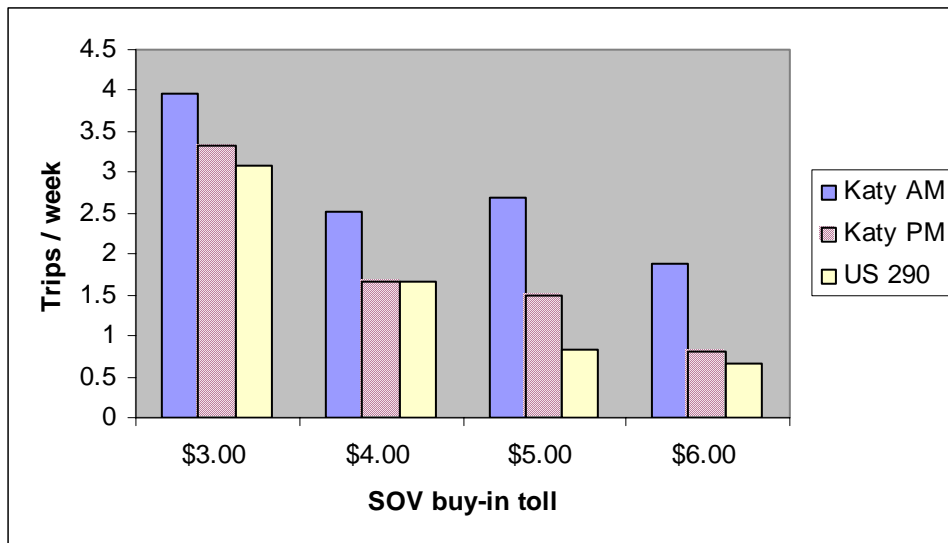
Figure 22: Average Number of Trips per Week for QuickRide SOV Buy-in Tolls

Summary

Most participants first learned of QuickRide through friends, family members, or newspapers and enrolled in the program primarily to avoid traffic congestion on the main lanes. About the same number of males and females responded to the survey. Most respondents were between 45 and 64 years old and married, had at least a college degree, professional or managerial careers, annual household income of $50,000 or more, and an average wage rate of $30.01 to $50.00 per hour in 2002. The average household size was 2.99 persons and an average 2.32 vehicles were available to each household.

Each participant made an average of 0.64 QuickRide trips in the week preceding the survey, most of which were commute trips. Most participants cited the difficulty of participating in

carpools as the main reason for the relatively low patronage. They indicated a willingness to increase their current level of participation if they could drive alone on the HOT lanes for a higher toll (80.5 percent of participants) or if the current toll were reduced (28.5 percent of participants) for HOV-2. Of all respondents, 53.6 percent drove alone during their non-QuickRide trip (in the week preceding the survey), while 30.4 percent traveled in two-person carpools. For an average QuickRide trip length of 45.3 minutes, participants spent 4.3 minutes on carpool formation. The average QuickRide travel time savings perceived by participants was 29.8 minutes with the implicit value of time being $5.63 per hour.

RESULTS: CHARACTERISTICS OF FORMER ENROLLEES

This section of the report discusses the characteristics of former QuickRide enrollees and relates these to those of current enrollees to determine if there are any significant differences. The results are summarized in the table in Appendix C.

Socioeconomic Characteristics
Mean age, income, household size, and number of vehicles per household did not vary significantly between current and former QuickRide participants. Even though the unemployment rate was slightly higher among former participants (see Figure 23), percentage profiles of occupations and household types generally did not vary significantly between groups. There were also significantly more females in the former-participant group than among current enrollees.

Commute Characteristics
Table 5 shows the travel modes used by participants (when not using QuickRide) and the percentage of participants who travel by each mode. Note that for current QuickRide enrollees the values shown in the table represent situations where they travel in the Katy or US 290 corridor (either on or off the HOT lanes) without using QuickRide.
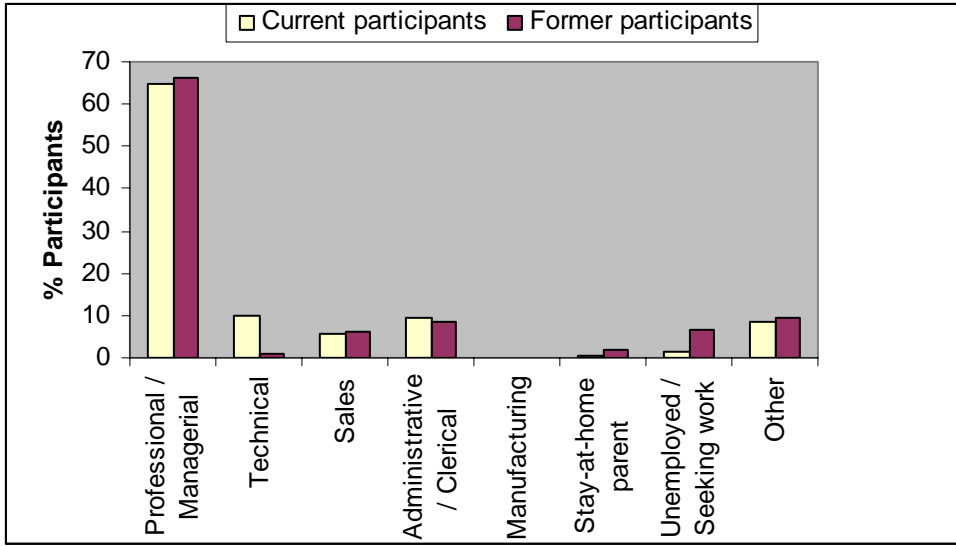
Figure 23: Percentage Distribution of Occupation

Table 5: Percentage Distribution of Vehicle Occupancy for Non-QuickRide Trips

Occupancy (persons)	Current Participants (%)	Corresponding # Vehicles	Former Participants (%)	Corresponding # Vehicles
1	53.6	53.6	50.3	50.3
2	30.4	15.7	33.0	16.5
3	6.6	2.2	11.0	3.7
4	2.0	0.5	0.9	0.2
5 or more	3.9	0.8	0.0	0
Bus	3.5	0	5.2	0
TOTAL	100	72.8	100	70.8

17.1 percent of former enrollees travel by bus or in carpools of three or more persons. Travel modes used by this group are similar to those of current enrollees (when they are not using QuickRide). As with current enrollee's trips, most of the trips made by former enrollees were for commute purposes (78.3 percent). Former participants made an average of 7.9 trips in the week immediately preceding the survey. They also indicated that they made an average of 6.8

QuickRide trips per week when they used to participate in the program. (This compares to the unweighted response of QuickRide enrollees of 4.2 QuickRide trips per week.)

Table 5 also shows that an average of 70.8 vehicles were used for every 100 former QuickRide participants, which is 20.8 more vehicles than that required for 100 current QuickRide participants (with 2 per vehicle). This increase in the number of vehicles used per 100 people hinders the congestion reduction objective of value pricing. The 83 percent of former enrollees who drive alone or travel in two-person carpools represent a potential market for QuickRide. It is therefore essential to find out what caused former participants to quit QuickRide and what factors would cause as many as possible to rejoin QuickRide.

Approximately 35 percent of former participants indicated that they quit QuickRide because they no longer traveled on Katy Freeway or US 290. Although former users more frequently reported that the $2.00 toll was excessive, the main cause for the underutilization of QuickRide seemed to be the difficulty of carpooling (see Table 6). Among former participants, 4.6 percent thought QuickRide did not offer enough time savings, while 3.3 percent quit the program due to lack of suitable entry/exit locations.

Table 6: Main Reasons for Leaving QuickRide/Not Using QuickRide More Often

Reason	Current participants (%)	Former participants (%)
Hard to carpool	33.1	31.4
Flexible work schedule	14.7	10.5
Trip cost ($2.00) is too much	3.3	10.0

The average time spent picking up and/or dropping off carpool partners was also significantly higher among former participants. Current participants spent on average 4.3 minutes picking up and/or dropping off their carpool partners, while former participants spent 12.2 minutes. A plausible reason for this difference in carpool formation times is the composition of carpools (see Figure 24).
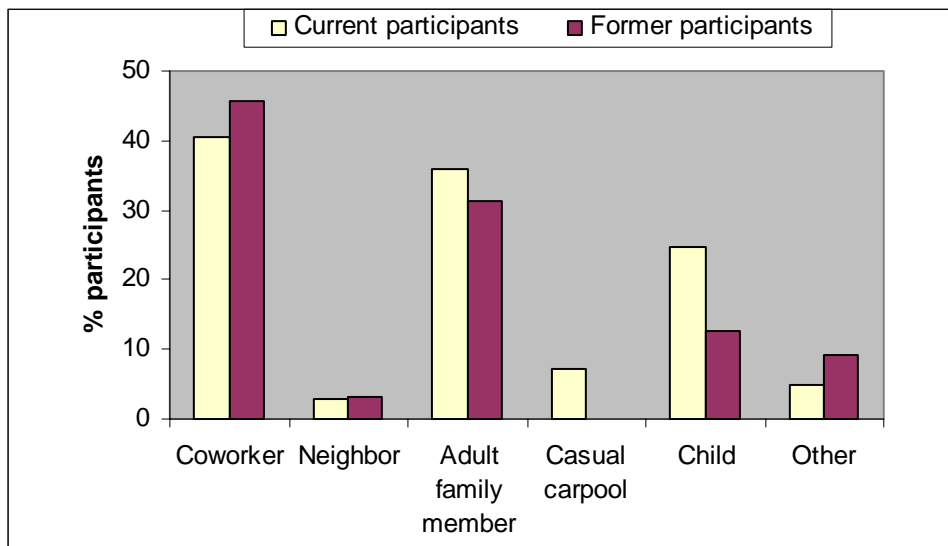
Figure 24: Carpooling Partner while Using QuickRide

Former enrollees were significantly less likely to carpool with a child or an adult family member than current enrollees (44 versus 49 percent) but were more likely to travel with a coworker (45.6 percent). This could contribute to increased carpool formation times. However, it is important to note that former enrollees might be overstating their carpool formation times or the disutility of carpooling to justify their decision to quit the program. (Conversely, current participants might also understate carpool formation times to justify their participation). Interestingly, former enrollees perceived greater QuickRide time savings (35.0 minutes) than current enrollees (29.8 minutes). This might be one of many reasons why former enrollees reported more QuickRide trips than current enrollees (6.8 versus 4.20[1] trips per week). However,

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[1] Unweighted data were used here so as to obtain a more realistic estimate for comparison with former participants.

the fact that they quit QuickRide in spite of the large perceived time savings (Figure 25) suggests that their value of travel time may be lower than that of current enrollees.
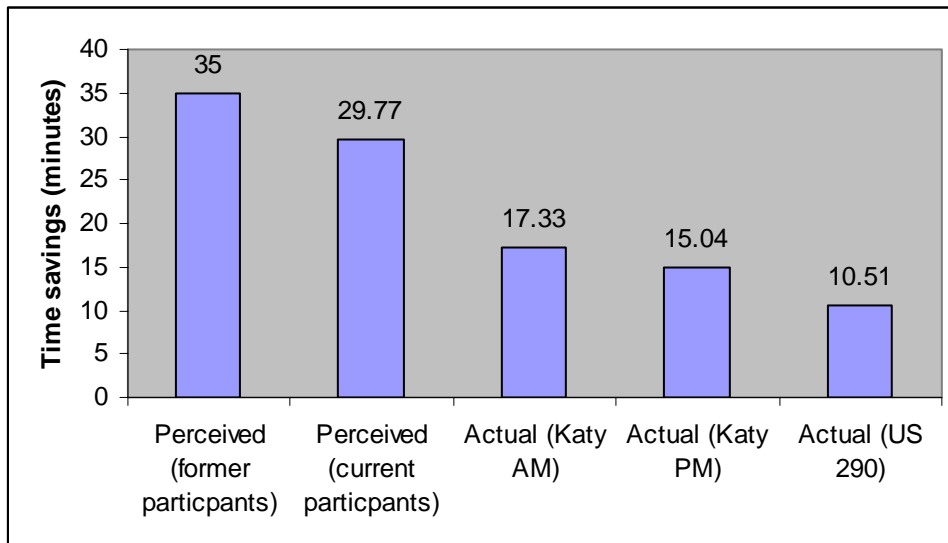
Figure 25: Perceived and Actual Travel Time Savings Using QuickRide

Another commute characteristic that varied significantly among the two groups is the impact of the QuickRide toll on the current level of QuickRide participation or the decision to quit QuickRide. A higher percentage of former users (10 percent) left the program because they found the $2.00 toll excessive, while 3.3 percent of current enrollees are making fewer trips than they potentially would because of the toll. Moreover, 47.2 percent of former participants shared the toll with their carpool partners, whereas only 26.8 percent of current enrollees shared the toll with their partners. The fact that there were no significant differences in annual household income between current and former participants and that former participants were more likely to perceive the toll as excessive and were also more likely to share the toll with their carpool partners reinforces the observation that former enrollees might have lower values of travel time than current enrollees. That is, compared to former enrollees, current enrollees were more willing to pay the $2.00 QuickRide toll for relatively smaller perceived travel time savings.

Enrollment Issues

Like current participants, most former participants enrolled in QuickRide to either avoid traffic congestion on the main lanes (66.9 percent) or to take advantage of the possibility of traveling even during the rush hour with their carpool partners (31.0 percent). None of the former participants thought it was dangerous or stressful to drive in the main lanes. This may have also contributed to their decision to quit the program. Family members and friends, newspapers, and television were the most successful marketing strategies for attracting former enrollees to QuickRide. Radio and mail each accounted for about 3 percent of enrollment. 5 percent of former enrollees first heard about QuickRide on the bus, and 22.8 percent of participants did not recall where they heard about QuickRide (see Figure 26).
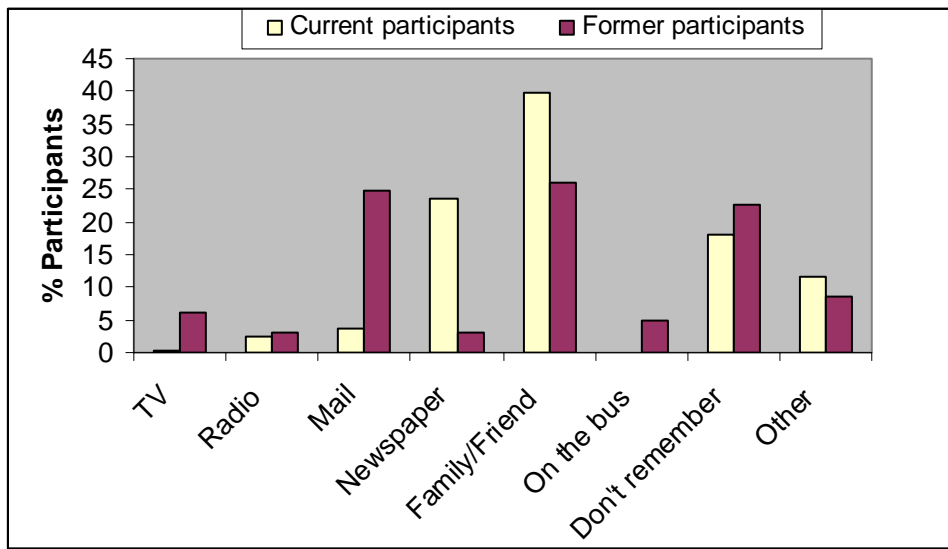
Figure 26: How Participants First Learned of QuickRide

Perceptions about Other Pricing Options

There were four hypothesized pricing options introduced in the survey, including:

1. Tying the QuickRide toll to time of day,

2. Tying the QuickRide toll to the level of congestion in the HOT lanes,

3. Charging a flat monthly rate, and

4. Allowing single occupant vehicles to travel on the HOT lane at a higher toll.

Of these four options, the fourth received the most favorable support among both current and former participants. A total of 69.5 percent of current users and 66.9 percent of former enrollees were supportive of this idea, while 8.1 percent of current participants and 5.1 percent of former participants were indifferent to it. The approval rate was even higher for participants who indicated that difficulties with carpooling was their main reason for either quitting QuickRide or not using QuickRide as often as they desired (84.2 percent of current enrollees and 75.9 percent of former enrollees). In comparison to current participants, former enrollees were willing to make more SOV trips per week for a $3.00 toll, but fewer trips per week at higher toll levels (see Figure 27). Paying a $3.00 toll to drive alone on the HOT lane was even more attractive to participants than traveling in two-person carpools for no fee (3.5 trips per week for driving alone for a $3.00 toll versus 3.0 trips per week for two-person carpool with no fee).
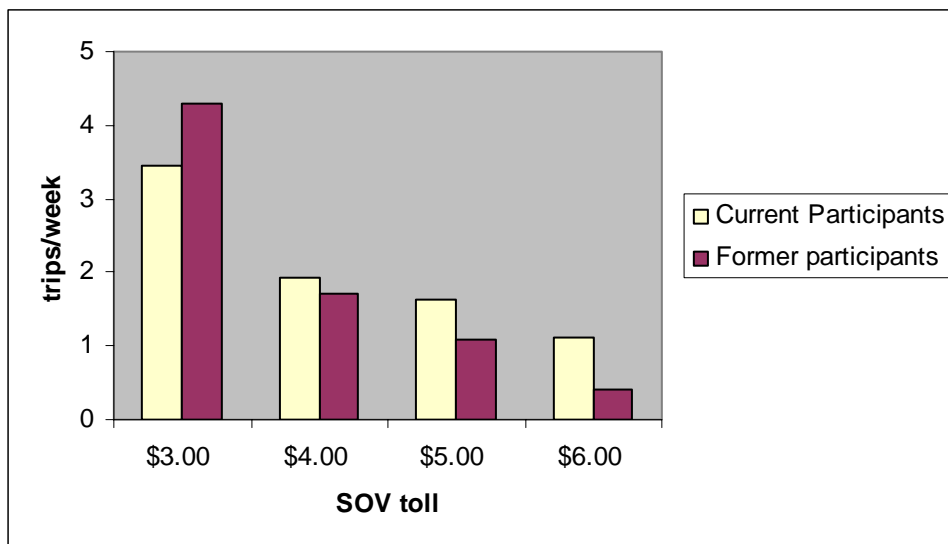
Figure 27: Stated Number of SOV Trips per Week on HOT Lanes

These results suggest that public opinion might favor the SOV buy-in pricing option and is thus worth further investigation. The idea of opening HOT lanes to fee-paying single-occupant

vehicles has already been put into practice in the San Diego and Orange County projects and has generally been successful in increasing utilization of the HOT lane without compromising level of service in the lane. About 76 percent of former enrollees favored a flat monthly toll and were willing to pay an average fee of $48.56 per month to use QuickRide.

Summary

There were no significant differences in age, income, occupation, household type, household size, or number of vehicles per household between former and current participants. There were, however, significantly more females than males in the former participants' group. Most participants either drove alone (50.3 percent) or traveled in two-person carpools (33.3 percent) during their most recent trip (in the week preceding the survey) on the Katy or US 290 freeways.

The primary issue limiting QuickRide use appears to be one of convenience rather than cost. Both current and former participants cited the inconveniences of carpooling as the greatest deterrent to QuickRide use. Also, 73.4 percent of participants reported that the toll had little or no significant impact on their decision to use QuickRide. Drivers choose to travel on the HOT lane because of its valuable time savings. However, if extra time it takes to pick up a carpool partner almost equals the time saved on the HOT lane, drivers lose the motivation to carpool. This very circumstance appears to have influenced former QuickRide participants and prompted them to subsequently leave the program.

RESULTS: EXAMINING PARTICIPANTS BY FREQUENCY OF QUICKRIDE USAGE

Appendix D provides a summary of the statistical tests conducted for comparing the characteristics of infrequent (0–1 trips per week on Katy or US 290), midlevel (2–4 trips per week on Katy or 2–3 trips per week on US 290), and frequent (5–10 trips per week on Katy or 4–5 trips per week on US 290) QuickRide participants.

Individual Demographics

Frequent and midlevel QuickRide participants were significantly more likely to be 35 to 44 years old and significantly less likely to be 65 years of age or older. There were significantly more females than males in the mid-level and frequent participants group than in the infrequent participants group. College graduates or those with some college/vocational education were significantly more likely to be midlevel to frequent participants than postgraduate degree holders. Administrative/clerical workers were significantly more likely to be midlevel or frequent participants. Most respondents (22 percent) earned between $30.01 and $40.00 per hour in 2002. This was representative of the infrequent participants but not midlevel and frequent participants, most of whom earned between $20.01 and $30.00 per hour.

Household Characteristics

There were more unrelated adults per household among the frequent participants than infrequent to midlevel participants. There were slightly more single-parent families among the midlevel and frequent participants than among infrequent participants. Approximately 7 percent of respondents reported an annual household income below $50,000 with the proportion of mid-level participants in this group being significantly higher than both frequent and infrequent participants. About 62 percent of respondents stated an annual household income of $100,000 or more. Although rather high, this was not surprising, as drivers in this corridor generally have higher than average incomes.

Commute Characteristics

Trip Purpose

A higher proportion of midlevel (90 percent) and frequent (83 percent) participants use QuickRide for commute trips. No shopping/recreational trips were made by midlevel and frequent participants, whereas about 12 percent of infrequent participants' trips were for shopping/recreational purposes. Trips made to schools were significantly lower among midlevel participants than infrequent or frequent participants. Due to the location of a school near an exit on both freeways, it was not surprising frequent QuickRide participants were on a school-related

trip. In fact, a noticeable decrease in AM QuickRide participation occurs during school holidays (see Figure 28).

Trip Length and Perceived QuickRide Time Savings

The average trip length was 45.3 minutes. Mid-level participants made significantly longer trips than both frequent and infrequent participants, with infrequent participants making the shortest trips. Midlevel and frequent QuickRide participants reported a perceived QuickRide travel time savings of more than 34 minutes (more than double that actually recorded on either Katy [AM/PM] or US 290). Infrequent participants reported a perceived travel time savings of 28.7 minutes.
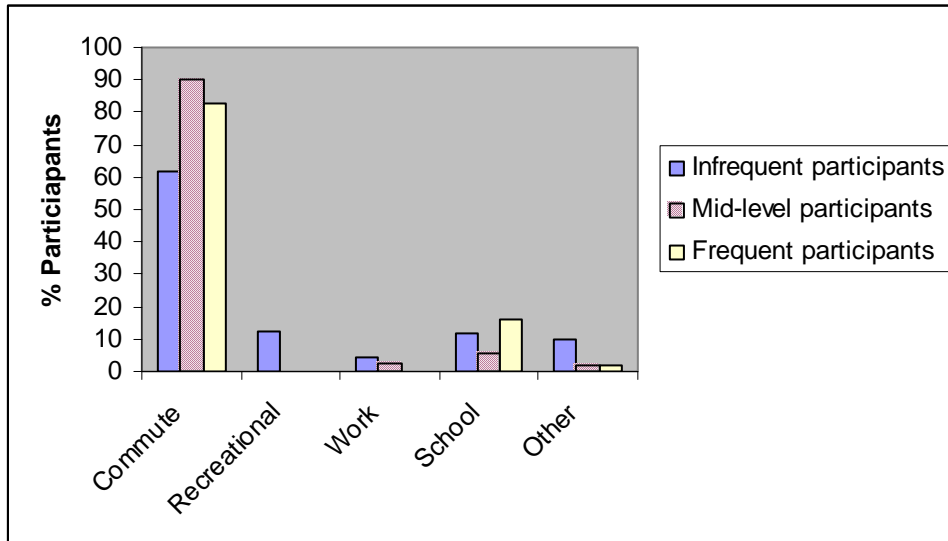
Figure 28: Distribution of Trip Purpose

Usual Carpool Partner and Carpool Formation Time

Midlevel participants were significantly more likely to carpool with an adult family member or neighbor than either frequent or infrequent participants. Midlevel and frequent participants were also significantly more likely to spend some extra time forming carpools (5.32 minutes) than infrequent participants (4.14 minutes). One possible explanation would be that midlevel and frequent QuickRide participants have established carpools while infrequent participants normally

only carpool when it is very convenient for them and therefore have low average formation times. Frequent and midlevel participants had significantly higher carpool formation times than infrequent participants when carpooling with a child or an adult family member (see Figure 29).

Frequency of Travel in the Katy/US 290 Freeway Corridor
Frequent QuickRide participants reported more non-QuickRide trips on the corridors than midlevel participants, who in turn made more non-QuickRide trips on the corridors than infrequent QuickRide participants.
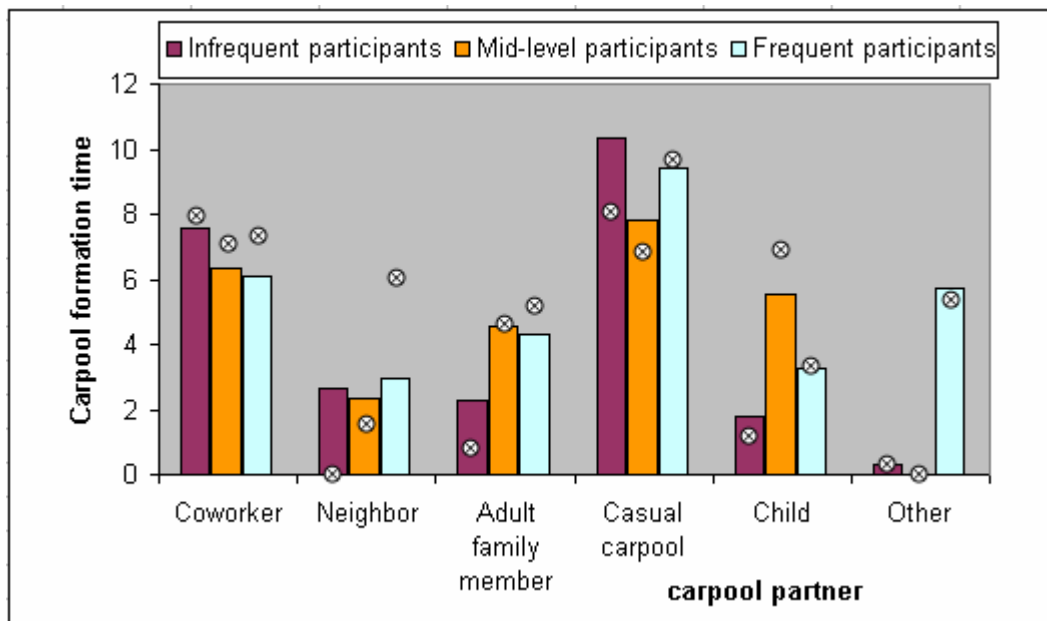
Figure 29: QuickRide Carpool Formation Times for Various Carpool Compositions
The bars indicate results from all respondents whereas circles are responses from those who chose only one type of carpool partner.

Effect of Toll on Frequency of Participation
Approximately 51 percent of frequent participants, 33 percent of midlevel participants, and 25 percent of infrequent participants said their carpool partners helped pay the $2.00 QuickRide toll. In response to a question that asked for the number of QuickRide trips per week enrollees would be willing to take at toll levels between $0.00 and $3.00, frequent participants consistently stated

a higher number of trips than midlevel participants. Mid-level participants stated more trips than infrequent participants. This suggests that varying the toll in the stated range is not likely to change the proportion of participants in the three groups. Additionally, at the various toll levels, there were small changes in the number of QuickRide trips, indicating inelastic responses to toll (see Figure 30).
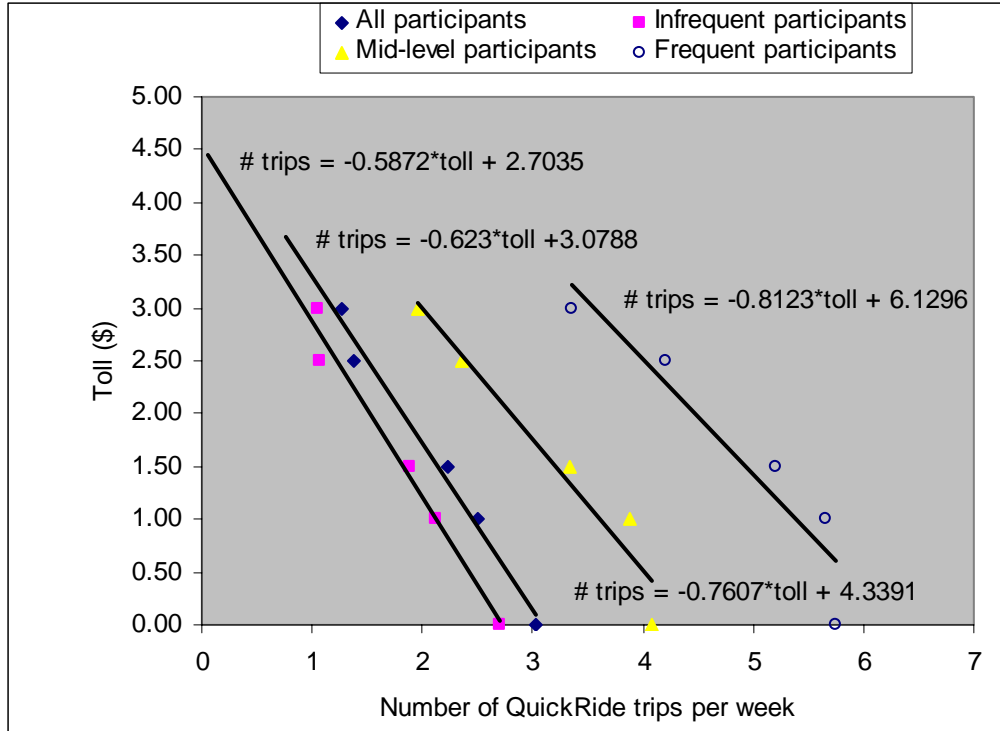
Figure 30: Stated Number of QuickRide Trips at Various Toll Levels

Ordered Logit Model of QuickRide Trip Frequency

A standard multinomial logit modeling was used. This model assumes that each decision-maker has a utility function (*11*):

$$U_j = \beta'X_j + \varepsilon_j \tag{3}$$

where,

j = the set of alternatives available to the decision-maker,

X_j = a vector of measurable attributes of each travel option,

β' = a vector of the coefficients of X_j,

ε_j = unobservable factors, and

U_j = utility of decision-maker for travel option j.

The fact that the measured variables do not include everything relevant to the individual's decision makes the choice process probabilistic (*12*). It has been shown (*11, 12, 13, 14*) that the choice probability depends on the systematic utility differences as well as the distribution of the random (unobserved) utility differences. The most common model used is the *logit model,* which assumes that the random utilities follow the extreme value distribution (error terms are independently and identically distributed). The resulting choice probability is:

$$P_i = \frac{e^{\beta'X_i}}{\sum_{all\ j} e^{\beta'X_j}}$$
(4)

In situations where the dependent variable is discrete and ordered in nature (as was the case in this study), the ordered logit model, a special case of logit models, is used. If, for example, there are three alternatives (for example 1 = poor, 2 = good, 3 = excellent), then two cut-off points (μ_0 and μ_1) are estimated using maximum likelihood estimation. The decision is then represented as:

"poor" if $U_j < \mu_0$

"good" if $\mu_0 < U_j < \mu_1$

"excellent" if $U_j > \mu_1$

Using these cut-off points the probability of an alternative being chosen is estimated as follows (*13*):

$$P_1 = \frac{1}{1 + e^{-(\mu_0 - \beta'X_j)}}$$
(5)

$$P_2 = \frac{1}{1 + e^{-(\mu_1 - \beta'X_j)}} - P_1$$
(6)

$$P_3 = 1 - (P_1 + P_2) \tag{7}$$

where,

       P_i = the probability of choosing alternative i ($i = 1, 2, 3$),

       μ_0, μ_1 = the two cut-off points.

The explanatory variables tested in the model, their measurements, and expected (hypothesized) impact on QuickRide trip frequency are summarized in Table 7. The hypotheses were formulated based on intuitive reasoning and a thorough review of carpooling literature. Various combinations of the independent variables were tested in the ordered logit model. However, only those variables that were significant at the 5 percent level and showed negligible correlation with other variables were used in the final model. Limdep 7.0 software was used for model estimation. Table 8 provides a summary of the modeling results.

Table 7: Definitions and Measurements of Explanatory Variables Used in Logit Model

Variable	Measurement	Predicted Effect*
Commute trip	1, if trip purpose = commute; 0, otherwise	+
Trip length	QuickRide travel time (minutes)	+
Time savings	Perceived QuickRide time savings (minutes)	+
Carpool formation time	Time to pick up/drop off carpool partner (minutes)	−
Frequency of travel in corridor	Total number of one-way trips per week in corridor	+
Partner's contribution	1, if carpool partner helps pay toll 0, otherwise	+
Household size	Number of people/household	+
Vehicle availability	Number of vehicles/household	−
Low income	1, if household income (2002) less than $50,000 0, otherwise	−

Age	1, 25 to 54			+
	0, 18 to 24 or 55 and older			
Hourly wage rate	1, less than $20 per hour			−
	0, $20 or more per hour			

* '+' indicates the variable was predicted to increase the frequency of participation in QuickRide. The opposite effect was predicted for those variables with a '−'sign.

Table 8: Model Estimation Results

Variable	Coefficient	Standard Error	t-stat	p-value
Constant	-4.8166	0.3048	-15.802	0.0000
Commute trip	1.5197	0.1401	10.844	0.0000
Trip length	0.0256	0.0032	6.948	0.0000
Time savings	0.0109	0.0040	2.560	0.0105
Frequency of travel in corridor	0.1158	0.0143	8.099	0.0000
Low income	0.4980	0.1664	2.933	0.0028
Married with child(ren)	-0.6236	0.1273	-4.897	0.0000
Age (25–54)	0.5449	0.1399	3.894	0.0001
Gender (male)	-0.2723	0.1216	-2.240	0.0251
College education	0.2073	0.0756	2.742	0.0061
Cut-off point 1 (infrequent to midlevel participation)	0 (by default)			
Cut-off point 2 (midlevel to frequent participation)	1.5719	0.1900	8.272	0.0000
	Summary Statistics			
Number of observations	378			
Log likelihood function	-209.7810			
Restricted log likelihood	-381.0114			
Chi-squared	342.4607			
Significance level	0.0000			

As hypothesized, QuickRide participation increases with commute characteristics such as commute trips, trip length, perceived travel time savings, and frequency of travel in the Katy or US 290 travel corridors. These results appear reasonable. For example, commute trips are usually time constrained and participants are likely to derive maximum benefits from using QuickRide. Since the $2.00 QuickRide toll is relatively small compared to the overall cost of a long trip (*6, 15*), it is not surprising that QuickRide trip frequency increased with increasing trip length. It is also reasonable that the program would be more attractive to participants who perceive greater QuickRide travel time savings than those who perceive little or no travel time savings. The finding that QuickRide trip frequency increases with frequency of use of the travel corridor (irrespective of travel mode) is also not surprising since frequent travelers would generally be more acquainted with traffic conditions in the corridor than occasional travelers (*11*).

Socioeconomic characteristics such as age, gender, annual household income, household type, and education also have significant effects on QuickRide trip frequency. The results indicate that the 25 to 54 age group used QuickRide more frequently than both young adults and persons over 65 years of age. Retirement, declining income, and fewer childcare responsibilities might cause older drivers to make fewer QuickRide trips.

Contrary to our a priori belief that higher-income households would make more QuickRide trips than lower-income households, the model estimation results show that participants with annual household incomes of $50,000 or less are more likely to use QuickRide than those with household incomes in excess of $50,000 per year (note that only 7 percent of the sample had low incomes). A plausible reason is that high income earners generally have job security and flexible schedules and can afford to be late for work or shift their travel times to the nonpeak periods. The results also indicate that participants who are married with at least one child are less likely to use QuickRide and having a college degree also increases the probability of using QuickRide.

Household size, vehicle availability, occupation, and hourly wage rate are not significant at the 5 percent level. Similarly, whether or not a QuickRide program participant shares the toll with his/her carpool partner does not significantly affect the frequency of QuickRide use.

The negative constant term is also reasonable and suggests that all things being equal, drivers are more likely to be infrequent participants of QuickRide. This result is consistent with QuickRide usage data that shows approximately 84 percent of QuickRide enrollees averaged between 0 and 1 QuickRide trips per week in 2002. Approximately 11 percent averaged between 1 and 2 trips per week and 5 percent averaged more than 2 trips per week. (Note that this level of recorded participation may be slightly lower than actual usage due to the missed transponder reads, as mentioned earlier.)

CONCLUSIONS

Surveys of current QuickRide enrollees indicate that QuickRide participants are well educated (about 73.9 percent of respondents had college or postgraduate degrees), married (approximately 90 percent were married), and have high incomes (about 62 percent of respondents stated an annual household income of $100,000 or more). In the week prior to the survey, 67 percent of participants were commuting when they used QuickRide. The average trip length of respondents is 45.3 minutes. Respondents perceive an average QuickRide travel time savings of 29.77 minutes, approximately double what they actually save. Only 1.8 percent of all participants considered the time savings inadequate. Based only on the $2.00 QuickRide toll and the travel time saved, respondent's implicit value of time (VOT) was estimated as $5.63 per hour.

Most respondents carpooled with a co-worker, an adult family member, or a child. Most participants enrolled in QuickRide to either avoid traffic congestion on the main lanes (66.2 percent) or to take advantage of the possibility of traveling with their carpool partners even during the rush hour (22.6 percent). An average of 70.8 vehicles were used for every 100 former QuickRide participants, which is 20.8 more vehicles than that required for 100 current QuickRide participants. The most frequently cited method of finding out about QuickRide was through family members or friends (39.8 percent).

The primary issue limiting QuickRide use appears to be one of convenience rather than cost. Both current and former participants cited the burden of carpooling as the greatest deterrent to QuickRide use while 73.4 percent of participants reported that the toll had little or no significant impact on their decision to use QuickRide. The average time spent picking up and/or dropping off carpool partners was significantly higher among former participants. Current participants spent on average 4.3 minutes picking up and/or dropping off their carpool partners, while former participants spent 12.2 minutes. This supports the finding that the primary deterrent to QuickRide use is the development of a carpool.

There were four hypothesized pricing options introduced in the survey, including:

1. Tying the QuickRide toll to time of day,

2. Tying the QuickRide toll to the level of congestion in the HOT lanes,

3. Charging a flat monthly rate, and

4. Allowing single occupant vehicles to travel on the HOT lane at a higher toll.

Of these four options, the fourth received the most favorable support among both current and former participants. A total of 69.5 percent of current users and 66.9 percent of former enrollees were supportive of this idea.

Using discrete choice modeling techniques, it was found that males, participants with college education, those with annual household income below $50,000, those on commute trips, those carpooling with a child or an adult family member, and those between the ages of 25 and 64 are likely to make more QuickRide trips. Whether or not a participant shares the QuickRide toll with his/her carpool partner does not significantly affect the level of participation. It was also found that participants who perceive higher QuickRide travel time savings, travel on the corridor more frequently, and/or undertake longer trips are likely to use QuickRide more often, whereas long carpool formation times are a disincentive to participation in the program.

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Part I: Please tell us about your most recent trips on the Katy Freeway traveling towards downtown Houston during the work week (Monday to Friday). We are interested in both the last time you used QuickRide and the last time you did not.

Note: If it has been a long time since you used QuickRide to travel towards downtown and you can't remember the details of the trip then only describe the non-QuickRide trip.

	Using QuickRide (Paid $2)	**Not Using QuickRide**
1. What was the purpose of the trip?	❑ Commuting (to or from work) ❑ Recreational/ Social/Shopping/ Entertainment/ Personal errands ❑ Work related (other than commuting) ❑ School ❑ Other (*specify*): _____	❑ Commuting (to or from work) ❑ Recreational/ Social/Shopping/ Entertainment/ Personal errands ❑ Work related (other than commuting) ❑ School ❑ Other (*specify*): _____
2. What time of day did your trip start? (for example, when did you leave your driveway?)	***a.m. p.m.*** (*circle one*)	***a.m. p.m.*** (*circle one*)
3. What time did your trip end? (for example, when did you arrive at the parking lot at work?)	***a.m. p.m.*** (*circle one*)	***a.m. p.m.*** (*circle one*)
4. Near what major cross streets did your trip start? *Example: Kinsgsland Blvd and Mason Creek.*	and	and
5. Near what major cross streets did your trip end? *Example: Main St. and Texas Ave.*	and	and

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[2] Identical surveys were sent to Katy PM and US 290 participants

	Using QuickRide (Paid $2)	Not Using QuickRide
6. How many people, including yourself, were in the vehicle?	*2*	❏ 1 ❏ 2 ❏ 3 ❏ 4 ❏ 5 or more ❏ Took a bus ❏ Motorcycle
7. Did you use the HOV lane?	*Yes*	❏ Yes ❏ No

Part II: Questions Regarding Your Use of the QuickRide Program

8. How did you first learn of the QuickRide program? (*Check only one*)
- ❏   TV
- ❏   Mail
- ❏   Newspaper
- ❏   Radio
- ❏   Family / Friend
- ❏   On the bus
- ❏   I don't remember
- ❏   Other (*specify*): _____

9. Which of the following most influenced your decision to join QuickRide?
(*Check only one*)
- ❏   To avoid traffic congestion on the main lanes
- ❏   It is too dangerous or stressful to drive at peak periods on the main lanes
- ❏   I could now travel even during the peak period with my carpool partner
- ❏   Other (*specify*): _____

10. How many **total trips** did you make during the past full work week (Monday to Friday) on both the HOV lane and the main lanes? (*Count each direction of travel as one trip.*)

11. How many **QuickRide trips** did you make during the past full work week (Monday to Friday)
(*Count each direction of travel as one trip.*)?

If none, please indicate how often you use QuickRide

times per month / year
(*circle one*)

12. About how much time do you think using QuickRide saves you on a typical one-way trip on the HOV lane compared with using the main lanes?

13. To what extent does the $2.00 toll factor into your decision to use QuickRide?
- ❑ Very significant
- ❑ Somewhat significant
- ❑ None/No impact
- ❑ Somewhat insignificant
- ❑ Very insignificant

14. What is the main reason you do not use QuickRide more often than you do now? (*Check only one*)
- ❑ I find it difficult to participate in a carpool
- ❑ The HOV lane is sometimes as congested as the main lanes
- ❑ The HOV lane does not offer me enough time savings
- ❑ The program is complicated and confusing
- ❑ My work schedule allows me to adjust my time of travel to less congested periods
- ❑ The price of QuickRide
- ❑ I sometimes forget
- ❑ Other (*specify*): _____

15. Who do you normally travel with when using QuickRide? (*Check all that apply*)
- ❑ Co-worker / Person in the same or a nearby office building
- ❑ Neighbor
- ❑ Adult family member
- ❑ Impromptu / casual carpool (also known as slugging)
- ❑ Child
- ❑ Other (*specify*): _____

16. How much extra time does it take you to pick up and drop off this passenger?

minutes

17. Does the passenger help pay the QuickRide toll?
- ❑ Yes
- ❑ No

18. Do you find the $2 QuickRide toll…
- ❑ Very reasonable
- ❑ Somewhat reasonable
- ❑ Neutral
- ❑ Somewhat unreasonable
- ❑ Very unreasonable

*If you sometimes travel in the HOV lane with **three or more** persons in the car answer Questions 19 and 20. Otherwise skip to Question 21.*

19. How much extra time does it take for you to pick up and drop off the second (and third, fourth, etc.) passenger compared to your trips with you and one passenger?

20. Please rate the following reasons why you do not always carpool with three or more people. A rating of 1 indicates the reason is not a factor while a 10 indicates the reason is always an important factor. Circle your answers.

NOT A FACTOR IMPORTANT FACTOR   ←   →

The need for advanced arrangements   1 2 3 4 5 6 7 8 9 10

Restrictions on my choice of when to travel   1 2 3 4 5 6 7 8 9 10

Lack of common origin-destination combinations   1 2 3 4 5 6 7 8 9 10

Lack of common trip times   1 2 3 4 5 6 7 8 9 10

Other (*specify*)———————————————   1 2 3 4 5 6 7 8 9 10

Part III: The questions in this part of the survey are to find out your views on a number of potential options for improving QuickRide. The issues raised are only hypothetical and do not represent local, state or federal policy.

21. Which of the following would cause you to use QuickRide more often? (*Check all that apply*)
    - ❑ Longer QuickRide operating hours
    - ❑ Being able to pay to drive alone on HOV lane
    - ❑ Increased traffic on main freeway lanes
    - ❑ Reduced QuickRide toll
    - ❑ Other (*specify*) _____

22. In Question 10, you indicated the number of QuickRide trips you made in the previous week. How many trips would you have made if the following tolls were charged instead of $2.00?

Toll Number of QuickRide trips per week
(count each direction of travel as one trip)

Free   _____

$1.00:   _____

$1.50:   _____

$2.50:   _____

$3.00:   _____

23. To maintain smooth traffic flow, the $2.00 QuickRide toll could be tied to the time of day. As shown in the graph below, lower tolls may be charged for travel in specific off-peak periods (for example, 6:45 to 7:00 a.m.) and higher tolls during the peak periods (for example, 7:00 to 7:45 a.m.). What is your initial feeling regarding this option? (*Check only one*)

    ❏ Strongly favor
    ❏ Somewhat favor
    ❏ Indifferent
    ❏ Somewhat oppose
    ❏ Strongly oppose

QuickRide Toll — $2.50, $1.50, $1.50

6:45 7:00 7:45 8:00
Time (a.m)
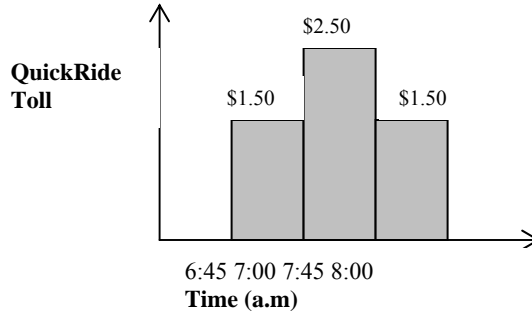
24. The QuickRide toll could also change with the amount of traffic in the HOV lane. For example if the HOV lane is not too congested then the toll might be less than $2. However, if it was very congested the toll may be more than $2 to maintain the smooth flow of traffic. What is your initial feeling regarding this option? (*Check only one*)

    ❏ Strongly favor
    ❏ Somewhat favor
    ❏ Indifferent
    ❏ Somewhat oppose
    ❏ Strongly oppose

25. How do you feel about allowing people to drive alone on the HOV lane for a higher toll than carpoolers?

    ❏ Strongly favor
    ❏ Somewhat favor
    ❏ Indifferent
    ❏ Somewhat oppose
    ❏ Strongly oppose

26. If you could drive alone on the HOV lane for the toll listed below, how often would you drive alone on the HOV lane?

Toll	Number of trips per week (count each direction of travel as one trip)
$3.00	_____
$4.00	_____
$5.00	_____
$6.00	_____

Part IV: User Information

The following questions will be used for statistical purposes only and individual responses will remain confidential. All of your answers are very important to us and in no way will they be used to identify you.

27. What is your age?
    - ❑ 16 to 24
    - ❑ 25 to 34
    - ❑ 35 to 44
    - ❑ 45 to 54
    - ❑ 55 to 64
    - ❑ 65 and over

28. What is your gender?
    - ❑ Male
    - ❑ Female

29. Please describe your household type.
    - ❑ Single adult
    - ❑ Unrelated adults (e.g. room mates)
    - ❑ Married without child
    - ❑ Married with child(ren)
    - ❑ Single parent family
    - ❑ Other (*specify*): _____

30. Including yourself, how many people live in your household?

31. All together, how many motor vehicles (including cars, vans, trucks, and motorcycles) are available for use by members of your household?

32. What category best describes your occupation?
    - ❑ Professional / Managerial
    - ❑ Technical
    - ❑ Sales
    - ❑ Administrative / Clerical
    - ❑ Manufacturing
    - ❑ Stay-at-home parent
    - ❑ Unemployed / Seeking work
    - ❑ Other *(specify)*: _____

33. What is the last year of school you have completed?
    - ❑ Less than high school
    - ❑ High school graduate

❑ Some college / Vocational
❑ College graduate
❑ Postgraduate degree

34. What is your best estimate of your hourly wage rate?
❑ Less than $10
❑ $10.01 to $15
❑ $15.01 to $20
❑ $20.01 to $30
❑ $30.01 to $40
❑ $40.01 to $50
❑ $50.01 to $60
❑ $60.01 to $100
❑ Over $100

35. What was your annual household income before taxes in 2002?
❑ Less than $10,000
❑ $10,000 to $14,999
❑ $15,000 to $24,999
❑ $25,000 to $34,999
❑ $35,000 to $49,999
❑ $50,000 to $74,999
❑ $75,000 to $99,999
❑ $100,000 or more

36. Please list any comments or suggestions you have regarding QuickRide:

_____

_____

APPENDIX A2: SURVEY INSTRUMENT FOR FORMER KATY QUICKRIDE PARTICIPANTS[3]

Part I: Please tell us about your most recent trip towards downtown Houston on the US 290 Freeway during the work week (Monday to Friday).

> ❑ I no longer drive on US 290 (*Go to question 9*)

1. What was the purpose of the trip?
    - ❑ Commuting (to or from work)
    - ❑ Recreational/ Social/Shopping/Entertainment/Personal errands
    - ❑ Work related (other than commuting)
    - ❑ School
    - ❑ Other (*specify*) _____

2. What time of day did your trip start? (for example, when did you leave your driveway?)

   [   ]   a.m. / p.m.

   (circle one)

3. What time did your trip end? (for example, when did you arrive at the parking lot at work?)

   [   ]   a.m. / p.m.

   (circle one)

4. Near what major cross streets did your trip start?
   Example: Barker Cypress Rd. and Cypress Creek

   [   ]   and   [   ]

5. Near what major cross streets did your trip end?
   Example: Main St. and Texas Ave.

   [   ]   and   [   ]

6. How many people, including yourself, were in the vehicle?
    - ❑ 1 ❑ 2
    - ❑ 3 ❑ 4
    - ❑ 5 or more
    - ❑ Took a bus
    - ❑ Motorcycle

7. Did you use the HOV lane?
    - ❑ Yes
    - ❑ No

---

[3] An identical survey was mailed to former US 290 QuickRide participants

8. How many *total trips* did you make during the past full work week (Monday to Friday) on both the HOV lane and the main lanes? (*Count each direction of travel as one trip.*)

```

```

Part II: Questions Regarding your Previous Use of the QuickRide Program.

9. How did you first learn of the QuickRide program? (*Check only one*)
   - ❑ TV
   - ❑ Mail
   - ❑ Newspaper
   - ❑ Radio
   - ❑ Family / Friend
   - ❑ On the bus
   - ❑ I don't remember
   - ❑ Other (*specify*) _____

10. Which of the following most influenced your decision to join QuickRide? (*Check only one*)
   - ❑ To avoid traffic congestion on the main lanes
   - ❑ It is too dangerous or stressful to drive at peak periods on the main lanes
   - ❑ I could now travel even during the peak period with my carpool partner
   - ❑ Other (*specify*): _____

11. How many *QuickRide trips* did you normally make during a full work week (Monday to Friday)? (*Count each direction of travel as one trip.*)

```

```

If none, please indicate how often you used QuickRide

```

```
times per month / year
(*circle one*)

12. How much additional time did a typical one-way trip on the main lanes take you as compared to a one-way trip on the HOV lane using QuickRide?

```

```

13. Why do you not use QuickRide anymore? (*Check up to three reasons*)
   - ❑ I find it difficult to participate in a carpool
   - ❑ I now carpool with 3 or more people in the vehicle
   - ❑ The HOV lane is sometimes as congested as the main lanes
   - ❑ The HOV lane does not offer me enough time savings

- ❑ Not a convenient place to enter or exit the HOV lane
- ❑ The program is complicated and confusing
- ❑ My work schedule allows me to adjust my time of travel to less congested periods
- ❑ The program requires a credit card
- ❑ I do not travel on US 290 Freeway as much or at all anymore
- ❑ It costs too much for each use ($2.00 per trip)
- ❑ The $2.50 monthly administrative fee
- ❑ Other (*specify*) _____

14. If you selected the $2.50 monthly administrative fee in Question 13, to what extent did it factor into your leaving QuickRide?
- ❑ The fee was my main reason
- ❑ The fee was one reason
- ❑ Not Sure
- ❑ The fee played a minor role
- ❑ The fee was not a factor

15. If you selected the $2.00 toll in Question 13, to what extent did it factor into your leaving QuickRide?
- ❑ The toll was my main reason
- ❑ The toll was one reason
- ❑ Not Sure
- ❑ The toll played a minor role
- ❑ The toll was not a factor

16. Who did you normally travel with when using QuickRide? (*Check only one*)
- ❑ Co-worker / Worker dropped off
- ❑ Neighbor
- ❑ Adult family member
- ❑ Impromptu / casual carpool (also known as slugging)
- ❑ Child
- ❑ Other (*specify*):_____

17. Did picking up and dropping off the passenger take any additional time compared to the time for your trip without a passenger?
- ❑ Yes
- ❑ No

If 'Yes', indicate the total additional time for both picking up and dropping off the additional passenger.

| |
| |

minutes

18. Did the passenger help pay the QuickRide toll?
- ❑ Yes
- ❑ No

Part III: The questions in this part are to find out your views on a number of potential options for improving QuickRide. The issues raised are only hypothetical and do not represent local, state or federal policy.

19. Which of the following would cause you to use QuickRide again? (*Check all that apply*)
   - ❑ A flat monthly fee (example, $25 a month) instead of the $2 toll
   - ❑ Increased traffic on main freeway lanes
   - ❑ Reduced QuickRide toll
   - ❑ Longer QuickRide operating hours
   - ❑ Being able to pay to drive alone on HOV lane
   - ❑ None
   - ❑ Other (*Specify*) _____

20. To maintain smooth traffic flow, the $2.00 QuickRide toll could be tied to the time of day. As shown in the graph below, lower tolls could be charged for travel in specific off-peak periods (for example, 6:45 to 7:00 a.m.) and higher tolls during the peak periods (for example, 7:00 to 7:45 a.m.). Would you consider using QuickRide again if such a pricing scheme were in place?
(*Check only one*)

   - ❑ Yes
   - ❑ Probably
   - ❑ Not sure
   - ❑ Probably not
   - ❑ No
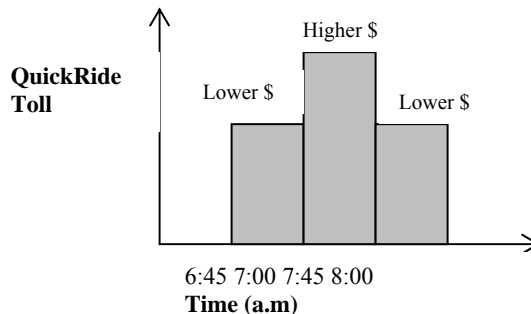
21. The QuickRide toll could also change with the amount of traffic in the HOV lane. For example if the HOV lane is not too congested then the toll might be less than $2. However, if it was very congested the toll may be more than $2 to maintain the smooth flow of traffic. Would you consider using QuickRide again if such a pricing scheme were in place? (*Check only one*)

   - ❑ Yes
   - ❑ Probably
   - ❑ Not sure
   - ❑ Probably not
   - ❑ No

22. How would you feel about allowing people to drive alone on the HOV lane for a higher toll than carpoolers? Please note that the toll for solo drivers would be set high enough to maintain good traffic flow in the HOV lane.
   - ❑ Strongly favor
   - ❑ Somewhat favor
   - ❑ Indifferent
   - ❑ Somewhat oppose
   - ❑ Strongly oppose

23. If you could drive alone on the HOV lane for the toll listed below, how often would you drive alone on the HOV lane?

Toll   Number of trips per week *(count each direction of travel as one trip)*

$3.00   _____

$4.00   _____

$5.00   _____

$6.00   _____

24. How much would you be willing to pay if you could pay a flat monthly fee, instead of the current $2 toll, and use QuickRide as many times as you wish?

❑   I still would not use QuickRide

        or

❑   I would pay a maximum of $_____ per month

Part IV: User Information

The following questions will be used for statistical purposes only and individual responses will remain confidential. All of your answers are very important to us and in no way will they be used to identify you.

25. What is your age?
   ❑   16 to 24
   ❑   25 to 34
   ❑   35 to 44
   ❑   45 to 54
   ❑   55 to 64
   ❑   65 and over

26. What is your gender?
   ❑   Male
   ❑   Female

27. Please describe your household type.
   ❑   Single adult
   ❑   Unrelated adults (e.g. room mates)
   ❑   Married without child
   ❑   Married with child(ren)
   ❑   Single parent family
   ❑   Other (*specify*):   _____

28. Including yourself, how many people live in your household?

[   ]

29. All together, how many motor vehicles (including cars, vans, trucks, and motorcycles) are available for use by members of your household?

[   ]

30. What category best describes your occupation?
- ❑ Professional / Managerial
- ❑ Technical
- ❑ Sales
- ❑ Administrative / Clerical
- ❑ Manufacturing
- ❑ Stay-at-home parent
- ❑ Unemployed / Seeking work
- ❑ Other *(specify)*: _____

31. What is the last year of school you have completed?
- ❑ Less than high school
- ❑ High school graduate
- ❑ Some college / Vocational
- ❑ College graduate
- ❑ Postgraduate degree

32. What is your best estimate of your hourly wage rate?
- ❑ Less than $10
- ❑ $10.01 to $15
- ❑ $15.01 to $20
- ❑ $20.01 to $30
- ❑ $30.01 to $40
- ❑ $40.01 to $50
- ❑ $50.01 to $60
- ❑ $60.01 to $100
- ❑ Over $100

33. What was your annual household income before taxes in 2002?
- ❑ Less than $10,000
- ❑ $10,000 to $14,999
- ❑ $15,000 to $24,999
- ❑ $25,000 to $34,999
- ❑ $35,000 to $49,999
- ❑ $50,000 to $74,999
- ❑ $75,000 to $99,999
- ❑ $100,000 or more

34. What did you like most about QuickRide?

   _____

35. What did you like least about QuickRide?

   _____

36. Please list any additional comments or suggestions you have regarding QuickRide:

   _____

   _____

APPENDIX B: CHARACTERISTICS OF CURRENT QUICKRIDE PARTICIPANTS

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Katy AM Participants (N = 473)	Katy PM Participants (N = 469)	US 290 Participants (N = 517)
Q1: QuickRide trip purpose*				
Commute*	66.7	60.8	61.4	76.9
Recreation*	9.9	10.6	21.7	0.3
Work*	4.1	5.9	6.8	0.3
School*	11.0	12.3	7.8	11.9
Other*	8.3	10.3	2.4	10.7
Q1: Non-QuickRide trip purpose*				
Commute*	70.6	76.0	49.4	83.8
Recreation*	14.1	16.7	22.5	3.8
Work*	2.8	0.6	7.1	1.1
School*	6.1	6.4	12.7	0.3
Other*	6.5	0.3	8.3	11.0
Q2&3: QuickRide trip length (minutes)* [a]	45.32	46.59	54.86	38.94

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Katy AM Participants (N = 473)	Katy PM Participants (N = 469)	US 290 Participants (N = 517)
Q2&3: Non-QuickRide trip length (minutes)* [a]	53.04	52.1	59.21	48.61
Q6: Non-QuickRide vehicle occupancy*				
1	53.6	57.1	37.3	65.8
2	30.4	25.1	36.7	29.1
3	6.6	3.0	12.9	4.0
4	2.0	3.6	1.6	0.8
5+	3.9	5.7	6.0	0.3
Bus	3.5	5.5	5.5	0.0
Q7: HOV lane use during Non-QuickRide trip				
Used HOV lane	40.4	44.3	44.9	32.0
Did not use HOV lane	59.6	55.7	55.1	68.0
Q8: How user first learned about QuickRide*				

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Katy AM Participants (N = 473)	Katy PM Participants (N = 469)	US 290 Participants (N = 517)
TV	0.4	0.4	0.4	0.4
Radio*	2.6	5.5	1.3	0.8
Mail*	3.6	4.5	5.4	1.1
Newspaper*	23.7	16.6	16.9	37.4
Family/Friend*	39.8	44.3	40.7	34.5
On the bus	0.1	0.2	0.0	0.0
Don't remember	18.1	20.7	14.8	18.9
Other*	11.6	7.7	20.6	6.9
Q9: Factor that most influenced decision to join QuickRide*				
Avoid main lane congestion	66.2	66.7	66.4	65.7
Avoid danger/stress on main lane*	7.3	14.5	6.3	1.1
Able to travel with carpool partner*	22.6	18.3	26.9	22.7
Other*	3.9	0.4	0.5	10.5
Q10: Total trips/wk on corridor* [a]	7.32	7.26	8.6	6.22
Q11: QuickRide trips/wk* [a]	0.64	0.72	0.64	0.55

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Katy AM Participants (N = 473)	Katy PM Participants (N = 469)	US 290 Participants (N = 517)
Q12: Perceived travel time savings* [a]	29.77	34.66	29.51	24.98
Q13: Extent toll factor into decision to use QuickRide*				
Very significant	6.4	3.0	3.6	12.4
Somewhat significant	20.3	13.5	30.0	17.6
Non/No impact	41.1	40.0	42.8	40.5
Somewhat insignificant	19.8	22.8	10.4	26.0
Very insignificant	12.5	20.7	13.2	3.6
Q14: Reason for less frequent use*				
Difficult to participate in carpool*	33.1	23.5	25.6	51.2
HOV lane sometimes congested	0.4	0.2	0.6	0.5
Not enough time savings*	1.8	0.4	4.9	0.0
Program complicated and confusing	0.1	0.2	0.0	0.0
Flexible work schedule*	14.7	19.2	18.5	6.0
Price of QuickRide*	3.3	6.0	1.5	2.1
Sometimes forget*	1.5	0.0	4.3	0.2

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Katy AM Participants (N = 473)	Katy PM Participants (N = 469)	US 290 Participants (N = 517)
Other*	45.1	50.3	44.5	40.0
Q15: Usual carpool partner*				
Coworker*	40.6	47.5	33.0	41.1
Neighbor*	2.8	5.7	1.7	1.2
Adult family member*	35.9	48.4	43.5	17.6
Casual carpool (slug)*	7.1	5.9	15.1	1.0
Child*	24.7	22.2	16.2	34.8
Other*	4.8	4.4	9.2	1.2
Q16: Extra time to pick up/drop off QuickRide partner [a]	4.33	4.19	4.70	4.11
Q17: Passenger's contribution to toll*				
Passenger helps pay toll	26.8	22.2	32.1	26.0
Passenger does not help pay toll	73.2	77.8	67.9	74.0
18: Impression about $2.00 QuickRide toll*				
Very reasonable	26.9	26.7	32.7	21.5

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Katy AM Participants (N = 473)	Katy PM Participants (N = 469)	US 290 Participants (N = 517)
Somewhat reasonable	29.5	41.5	20.9	26.2
Neutral	22.1	23.1	21.4	21.8
Somewhat unreasonable	19.0	8.3	20.1	28.7
Very unreasonable	2.5	0.4	4.9	1.9
Q19: Extra time to pick up and drop off 2nd, 3rd, … passengers (when user travels in HOV lane with 3+ persons)*[a]	6.88	3.33	9.14	7.85
Q20: Why participant does not always form 3+ carpool [a]				
Need for advanced arrangements	7.32	7.12	7.13	7.74
Restrictions on choice of when to travel*	7.96	7.22	8.27	8.41
Lack of common origin-destination combinations*	7.11	6.01	7.18	8.2
Lack of common trip times*	8.19	7.53	8.54	8.48
Other*	6.61	9.52	3.34	6.12

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Katy AM Participants (N = 473)	Katy PM Participants (N = 469)	US 290 Participants (N = 517)
Q21: What would increase frequency of participation?*				
Longer QuickRide operating hours*	15.8	19.9	25.6	3.3
Driving alone for a higher fee	80.5	79.7	82.3	79.5
Increased traffic on main lanes*	16.2	11.0	25.0	13.0
Reduced QuickRide toll*	28.5	32.6	28.6	24.6
Other	12.1	14.8	11.1	10.4
Q22: QuickRide trips for various tolls				
Free*	3.03	4.78	3.96	0.99
$1.00*	2.50	4.20	2.79	0.93
$1.50*	2.23	3.66	2.76	0.67
$2.50*	1.38	2.78	1.16	0.48
$3.00*	1.27	2.61	1.05	0.42
Q23: Impression about varying toll by time of day				
Strongly favor	14.3	12.1	27.0	4.0

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Katy AM Participants (N = 473)	Katy PM Participants (N = 469)	US 290 Participants (N = 517)
Somewhat favor	14.5	17.1	13.7	13.0
Indifferent	32.8	36.6	31.9	30.0
Somewhat oppose	17.7	13.5	1.7	37.3
Strongly oppose	20.6	20.7	25.7	15.7
Q24: Impression about tying toll to level of congestion in HOV lane*				
Strongly favor	13.8	22.8	16.4	2.5
Somewhat favor	12.2	19.7	11.9	5.1
Indifferent	31.4	22.2	26.4	45.3
Somewhat oppose	21.4	17.8	17.0	29.3
Strongly oppose	21.2	17.5	28.3	17.9
Q25: Impression about allowing SOVs on HOV lane for a higher toll*				
Strongly favor	47.2	43.6	40.2	58.1
Somewhat favor	22.2	29.0	14.1	23.6
Indifferent	8.1	4.9	17.5	1.9

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Katy AM Participants (N = 473)	Katy PM Participants (N = 469)	US 290 Participants (N = 517)
Somewhat oppose	4.6	1.7	9.6	2.5
Strongly oppose	17.9	20.9	18.6	13.9
Q26: Number of SOV trips if allowed for a fee [a]				
$3.00*	3.46	3.96	3.33	3.08
$4.00*	1.94	2.52	1.67	1.67
$5.00*	1.64	2.68	1.48	0.83
$6.00*	1.11	1.89	0.81	0.67
Q27: Age*				
16 to 24*	3.4	0.4	9.6	0.8
25 to 34*	14.3	3.2	16.7	22.9
35 to 44*	26.0	32.7	10.7	33.8
45 to 54	38.4	36.3	46.8	32.8
55 to 64	11.6	18.7	15.1	1.1
65+*	6.2	8.7	1.1	8.6
Q28: Gender*				

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Katy AM Participants (N = 473)	Katy PM Participants (N = 469)	US 290 Participants (N = 517)
Male	47	44.8	63.8	33.2
Female	53	55.2	36.2	66.8
Q29: Household type*				
Single adult*	5.7	5.8	9.8	2.1
Unrelated adults	0.4	0.0	0.4	0.6
Married without child*	29.9	33.5	24.0	32.1
Married with child(ren)	60.5	57.9	60.4	63.0
Single parent family*	1.7	2.9	0.4	1.7
Other*	1.7	0.0	4.9	0.4
Q30: Household size [a]	2.99	2.92	3.01	3.06
Q31: Vehicles per household [a]	2.32	2.33	2.29	2.33
Q32: Occupation*				
Professional/Managerial	64.8	63.2	66.1	65.3
Technical*	10.1	13.6	5.6	11.0
Sales*	5.5	10.4	5.2	0.8
Administrative/Clerical*	9.3	2.8	12.6	12.5

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Katy AM Participants (N = 473)	Katy PM Participants (N = 469)	US 290 Participants (N = 517)
Manufacturing	0.0	0.0	0.0	0.0
Stay-at-home parent*	0.4	1.1	0.2	0.0
Unemployed/Seeking work*	1.6	0.0	4.7	0.2
Other*	8.4	8.9	5.6	10.0
Q33: Last year of school completed*				
Less than high school	0.2	0.4	0.0	0.2
High school graduate	8.8	6.4	10.8	9.5
Some college/Vocational	17.0	17.4	19.1	14.7
College graduate*	38.6	44.6	42.3	29.0
Postgraduate degree*	35.3	31.2	27.7	46.6
Q34: Hourly wage rate				
Less than $10*	3.8	0.5	11.5	0.2
$10.01 to $15*	7.8	5.9	5.9	11.0
$15.01 to $20*	7.8	7.2	13.2	3.6
$20.01 to $30	17.0	18.7	18.0	14.6
$30.01 to $40*	22.2	13.9	6.5	42.9

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Katy AM Participants (N = 473)	Katy PM Participants (N = 469)	US 290 Participants (N = 517)
$40.01 to $50*	8.9	15.5	8.4	3.4
$50.01 to $60*	10.5	7.0	2.2	21.1
$60.01 to $100*	8.1	4.5	19.1	1.9
Over $100*	13.9	26.7	15.2	1.2
Q35: Annual household income*				
Less than $10,000	0.1	0.0	0.3	0.0
$10,000 to $14,999	0.0	0.0	0.0	0.0
$15,000 to $24,999	0.1	0.0	0.0	0.3
$25,000 to $34,999*	2.0	5.2	0.0	0.5
$35,000 to $49,999*	4.6	6.2	5.8	2.1
$50,000 to $74,999*	13.7	16.9	17.3	6.2
$75,000 to $99,999*	17.8	8.8	9.5	36.1
$100,000 or more*	61.7	62.9	67.3	54.8

No response data were excluded by individual question number; therefore the sum of respondents from individual categories may not equal the total of all respondents. Where users could select more than one answer the total response for that question may exceed 100%.

* Significant difference (at the 0.05 level) between groups of survey respondents. Statistical tests used included:

- Kruskal-Wallis test for 3-way comparison (by group number) of ordinal data (for example; age, education, and income).
- One-way ANOVA for 3-way comparison (by group number) of continuous data (for example; trip length, travel time savings).
- Chi-square test for 3-way comparison of nominal data (for example; trip purpose, gender, household type, and occupation).

a. These entries represent mean responses (not proportions).
b. N values based on weighted data. Actual number of surveys was 174, 145, and 192 for Katy AM, Katy PM, and US 290 participants, respectively.

APPENDIX C: CHARACTERISTICS OF FORMER QUICKRIDE PARTICIPANTS

Characteristic (Percent of respondents in each category)	Current Participants (N = 1459)[b]	Former Participants (N = 582)[b]
Trip Purpose*		
Commute	66.7	78.3
Shopping/Recreational*	9.9	12.2
Work (other than commute)*	4.1	1.0
School*	11.0	4.0
Other*	8.3	4.6
Vehicle Occupancy		
1	0	50.3
2	100.0	33.0
3	0	11.0
4	0	0.9
5 or more	0	0
Bus	0	5.2
Motorcycle	0	0
HOV Lane Use		
Yes	100.0	53.6
No	0	46.4
Average Total Trips per Work Week*[a]	7.32	7.9
First Learned of QuickRide by:*		
TV*	0.4	6.2
Mail	2.6	3.2
Newspaper*	3.6	24.8
Radio	23.7	3.1
Family/Friend*	39.8	25.9

Characteristic (Percent of respondents in each category)	Current Participants (N = 1459)[b]	Former Participants (N = 582)[b]
On the bus*	0.1	5.0
I don't remember	18.1	22.8
Other*	11.6	8.5
Reason for Joining QuickRide*		
To avoid traffic congestion	66.2	66.9
Too dangerous to drive on main lanes*	7.3	0
Travel during peak period with carpool partner	22.6	31.0
Other	3.9	2.1
Average Number of QuickRide Trips per Week*[a]	0.64	6.8
Average HOV Time Savings per Trip (mins)*[a]	29.77	35.0
Reason for Not Using QuickRide More Often/No Longer Using QuickRide		
Hard to carpool	33.1	31.4
Carpool with 3+		6.7
HOV lane is congested	0.4	5.4
Not enough time savings	1.8	4.6
Entrance/exit inconvenience		3.3
Program is complicated	0.1	0
Flexible work schedule	14.7	10.5
Credit card requirement		2.1
No longer use I 10/US-290		34.7
Trip cost ($2.00) is too much	3.3	10.0

Characteristic (Percent of respondents in each category)	Current Participants (N = 1459)[b]	Former Participants (N = 582)[b]
$2.50 monthly fee		2.5
Other	45.1	13.0
$2.50 Monthly Administrative Fee Factor		
The fee was my main reason		4.5
The fee was one reason		7.5
Not Sure		0
The fee played a minor role		4.5
The fee was not a factor		83.6
$2.00 Toll Factor		
The toll was my main reason		11.1
The toll was one reason		18.1
Not sure		0
The toll played a minor role		4.2
The toll was not a factor		66.7
Travel Partner When Using QuickRide		
Coworker	40.6	45.6
Neighbor	2.8	3.2
Adult family member*	35.9	31.4
Casual carpool (slugging)*	7.1	0
Child*	24.7	12.7
Other*	4.8	9.1
Additional Time for Picking up Carpool (mins)*[a]	4.3	12.2
Did passenger Help Pay QuickRide Toll?*		

Characteristic (Percent of respondents in each category)	Current Participants (N = 1459)[b]	Former Participants (N = 582)[b]
Yes	26.8	47.4
No	73.2	52.6
Incentive for Using More /Rejoining QuickRide*		
Increased traffic on main lanes*	16.2	16.4
Reduced QuickRide toll*	28.5	13.7
Longer QuickRide hours	15.8	12.6
Ability to drive alone on HOV*	80.5	60.3
Other*	12.1	25.2
Favorability of Variable Tolling (with Time)*		
Yes	14.3	43.4
Probably	14.5	7.4
Not sure	32.8	9.1
Probably not	17.7	12.8
No	20.6	27.3
Favorability of Variable Tolling (with Amount of Traffic)*		
Yes	13.8	34.6
Probably	12.2	6.3
Not sure	31.4	14.3
Probably not	21.4	16.5
No	21.2	28.3
Favorability of Single Driver Use of HOV		

Characteristic (Percent of respondents in each category)	Current Participants (N = 1459)[b]	Former Participants (N = 582)[b]
Strongly favor	47.3	46.3
Somewhat favor	22.2	20.6
Indifferent	8.1	5.1
Somewhat oppose	4.6	7.1
Strongly oppose	17.9	21.0
Average Number of Trips per Week for Single Driver HOV Lane Use*[a]		
$3.00*	3.46	4.3
$4.00	1.94	1.7
$5.00	1.64	1.1
$6.00*	1.11	0.4
Favorability of Flat Monthly Fee		
Still would not use QuickRide		24.0
Favors flat monthly fee		76.0
Average amount willing to pay		$48.56
Age		
16 – 24*	3.4	0
25 – 34 *	14.3	8.5
35 – 44	26.0	35.4
45 – 54	38.4	35.4
55 – 64*	11.6	15.8
65 and over	6.2	5.0
Gender*		
Male	47.0	37.7
Female	53.0	62.3
Household Type*		

Characteristic (Percent of respondents in each category)	Current Participants (N = 1459)[b]	Former Participants (N = 582)[b]
Single adult	5.7	6.2
Unrelated adults	0.4	0
Married without child*	29.9	25.8
Married with child(ren)	60.5	56.5
Single parent family*	1.7	11.5
Other*	1.7	0
Average Number of People in Household [a]	2.99	2.8
Average Number of Vehicles in Household [a]	2.32	2.4
Occupation*		
Professional/Managerial	64.8	66.0
Technical*	10.1	1.1
Sales	5.5	6.0
Administrative/Clerical	9.3	8.7
Manufacturing	0.0	0
Stay-at-home parent	0.4	1.9
Unemployed*	1.6	6.8
Other*	8.4	9.4
Education*		
Less than high school	0.2	0
High school graduate	8.8	5.8
Some college/Vocational*	17.0	26.9
College graduate	38.6	46.9
Postgraduate degree*	35.3	20.4
Hourly Wage*		
Less than $10*	3.8	0

Characteristic (Percent of respondents in each category)	Current Participants (N = 1459)[b]	Former Participants (N = 582)[b]
$10.01 to $15*	7.8	0
$15.01 to $20	7.8	7.1
$20.01 to $30*	17.0	28.1
$30.01 to $40	22.2	18.3
$40.01 to $50	8.9	12.5
$50.01 to $60	10.5	12.1
$60.01 to $100	8.1	7.1
Over $100	13.9	14.7
Income*		
Less than $10,000	0.1	0
$10,000 to $14,999	0.0	0
$15,000 to $24,999	0.1	0
$25,000 to $34,999*	2.0	0
$35,000 to $49,999*	4.6	9.1
$50,000 to $74,999*	13.7	20.7
$75,000 to $99,999*	17.8	12.5
$100,000 or more	61.7	57.8

No response data were excluded by individual question number; therefore the sum of respondents from individual categories may not equal the total of all respondents.   Where users could select more than one answer the total response for that question may exceed 100%.

* Significant difference (at the 0.05 level) between groups of survey respondents. Statistical tests used included:
- Mann-Whitney test for 2-way comparison (by group number) of ordinal data (for example; age, education, and income).
- Student's t-test for 2-way comparison (by group number) of continuous data (for example; trip length, travel time savings).
- Chi-square test for 2-way comparison of nominal data (for example; trip purpose, gender, household type, and occupation).

a. These entries represent mean responses (not proportions).
b. N values based on weighted data. Actual number of surveys was 525 and 61 for current and former participants, respectively.

APPENDIX D: CHARACTERISTICS OF FREQUENT, MIDLEVEL AND INFREQUENT PARTICIPANTS

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Infrequent Participants Katy: 0-1 trips/week US-290: 0-1 trips/week (N = 1231)	Midlevel Participants Katy: 2-4 trips/week US-290: 2-3 trips/week (N = 162)	Frequent Participants Katy: 5-10 trips/week US-290: 4-5 trips/week (N = 66)
Q1: QuickRide trip purpose*				
Commute*	66.7	61.7	89.9	82.5
Recreation*	9.9	12.2	0	0
Work	4.1	4.6	2.7	0
School*	11.0	11.6	5.4	15.9
Other*	8.3	9.9	2.0	1.6
Q1: Non-QuickRide trip purpose*				
Commute	70.6	70.4	73.7	65.1
Recreation	14.1	13.4	15.8	23.3
Work	2.8	2.4	6.1	2.3
School	6.1	6.6	1.8	7.0
Other	6.5	7.2	7.4	2.3

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Infrequent Participants Katy: 0-1 trips/week US-290: 0-1 trips/week (N = 1231)	Midlevel Participants Katy: 2-4 trips/week US-290: 2-3 trips/week (N = 162)	Frequent Participants Katy: 5-10 trips/week US-290: 4-5 trips/week (N = 66)
Q2&3: QuickRide trip length (minutes) [a]	45.32	44.70	49.37	44.78
Q2&3: Non-QuickRide trip length (minutes) [a]	53.04	52.44	56.38	56.26
Q6: Non-QuickRide vehicle occupancy				
1	53.6	55.1	39.5	60.5
2	30.4	29.0	42.7	25.6
3	6.6	6.0	10.5	9.3
4	2.0	1.4	5.6	4.7
5+	3.9	4.3	1.6	0.0
Bus	3.5	4.2	0.0	0.0
Q7: HOV lane use during Non-QuickRide Trip				
Used HOV lane	40.4	39.8	49.2	27.9

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Infrequent Participants Katy: 0-1 trips/week US-290: 0-1 trips/week (N = 1231)	Midlevel Participants Katy: 2-4 trips/week US-290: 2-3 trips/week (N = 162)	Frequent Participants Katy: 5-10 trips/week US-290: 4-5 trips/week (N = 66)
Did not use HOV lane	59.6	60.2	50.8	72.1
Q8: How user first learned about QuickRide*				
TV	0.4	0.3	0.6	1.5
Radio	2.6	2.4	5.1	1.5
Mail	3.6	3.7	3.8	1.5
Newspaper*	23.7	25.0	17.2	16.9
Family/Friend	39.8	39.3	41.4	46.2
On the bus	0.1	0.0	0.6	0.0
Don't remember*	18.1	19.8	8.9	10.8
Other*	11.6	9.7	22.3	21.5
Q9: Factor that most influenced decision to join QuickRide				
Avoid main lane congestion	66.2	64.6	74.8	73.4

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Infrequent Participants Katy: 0-1 trips/week US-290: 0-1 trips/week (N = 1231)	Midlevel Participants Katy: 2-4 trips/week US-290: 2-3 trips/week (N = 162)	Frequent Participants Katy: 5-10 trips/week US-290: 4-5 trips/week (N = 66)
Avoid danger/ stress on main lane	7.3	7.3	7.5	6.3
Able to travel with carpool partner	22.6	24.2	15.1	14.1
Other	3.9	3.9	2.5	6.3
Q10: Total trips/week on corridor*	7.32	7.04	8.47	9.75
Q11: QuickRide trips/week[a]*	0.64	0.1	2.64	5.65
Q12: Perceived travel time savings*	29.77	28.71	35.29	34.22
Q13: Extent toll factor into decision to use QuickRide*				
Very Significant	6.4	4.7	16.1	12.3
Somewhat significant	20.3	19.6	21.1	30.8
Non/No impact	41.1	41.6	38.5	38.5
Somewhat insignificant	19.8	22.3	6.2	6.2
Very insignificant	12.5	11.8	18.0	12.3
Q14: Reason for less frequent use*				

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Infrequent Participants Katy: 0-1 trips/week US-290: 0-1 trips/week (N = 1231)	Midlevel Participants Katy: 2-4 trips/week US-290: 2-3 trips/week (N = 162)	Frequent Participants Katy: 5-10 trips/week US-290: 4-5 trips/week (N = 66)
Difficult to participate in carpool*	33.1	35.4	20.1	22.4
HOV lane sometimes congested*	0.4	0.0	1.9	3.4
Not enough time savings	1.8	2.0	0.6	0.0
Program complicated and confusing*	0.1	0.0	0.6	0.0
Flexible work schedule*	14.7	13.0	26.0	19.0
Price of QuickRide*	3.3	2.5	7.8	6.9
Sometimes forget	1.5	1.7	0.6	0.0
Other	45.1	45.3	42.2	48.3
Q15: Usual carpool partner*				
Coworker	40.6	40.4	40.4	42.4
Neighbor*	2.8	1.9	8.6	6.1
Adult family member*	35.9	34.5	46.3	36.4
Casual carpool (slug)	7.1	7.4	6.2	4.5
Child	24.7	25.7	17.3	25.8

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Infrequent Participants Katy: 0-1 trips/week US-290: 0-1 trips/week (N = 1231)	Midlevel Participants Katy: 2-4 trips/week US-290: 2-3 trips/week (N = 162)	Frequent Participants Katy: 5-10 trips/week US-290: 4-5 trips/week (N = 66)
Other	4.8	5.1	2.5	3.0
Q16: Extra Time to pick up and/drop off QuickRide partner [A]*	4.33	4.14	5.32	5.32
Q17: Passenger's contribution to toll*				
Passenger helps pay toll	26.8	24.5	33.3	50.8
Passenger does not help pay toll	73.2	75.5	66.7	49.2
Q18: Impression about $2.00 toll				
Very reasonable	26.9	27.8	22.8	21.2
Somewhat reasonable	29.5	28.3	36.4	34.8
Neutral	22.1	21.7	22.8	27.3
Somewhat unreasonable	19.0	20.1	14.2	12.1
Very unreasonable	2.5	2.2	3.7	4.5
Q19: Extra time to pick up and drop off 2nd, 3rd, … passengers (when user	6.88	7.41	5.12	4.91

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Infrequent Participants Katy: 0-1 trips/week US-290: 0-1 trips/week (N = 1231)	Midlevel Participants Katy: 2-4 trips/week US-290: 2-3 trips/week (N = 162)	Frequent Participants Katy: 5-10 trips/week US-290: 4-5 trips/week (N = 66)
travels in HOV lane with 3+ persons)[a]*				
Q20: Why participant does not always form 3+ carpool [a]				
Need for advanced arrangements	7.32	7.41	7.25	6.15
Restrictions on choice of when to travel*	7.96	8.21	6.95	7.34
Lack of common origin-destination combinations*	7.11	7.36	5.95	6.72
Lack of common trip times*	8.19	8.44	7.08	7.71
Other	6.61	6.28	6.68	8.57
Q21: What would increase frequency of participation?*				
Longer QuickRide operating hours*	15.8	14.6	18.5	31.8
Driving alone for a higher fee	80.5	80.8	79.0	77.3

Characteristic (Percent of respondents in each category)	All Participants (N = 1459)[b]	Frequency of QuickRide Use		
		Infrequent Participants Katy: 0-1 trips/week US-290: 0-1 trips/week (N = 1231)	Midlevel Participants Katy: 2-4 trips/week US-290: 2-3 trips/week (N = 162)	Frequent Participants Katy: 5-10 trips/week US-290: 4-5 trips/week (N = 66)
Increased traffic on main lanes*	16.2	14.6	25.0	22.7
Reduced QuickRide toll*	28.4	27.0	35.4	37.9
Other	12.1	12.4	9.9	10.6
Q22: QuickRide trips for various tolls				
Free*	3.03	2.7	4.08	5.74
$1.00*	2.50	2.12	3.88	5.66
$1.50*	2.23	1.88	3.34	5.20
$2.50*	1.38	1.07	2.36	4.2
$3.00*	1.27	1.05	1.95	3.35
Q23: Impression about varying toll by time of day				
Strongly favor	14.3	14.4	16.0	9.1
Somewhat favor	14.5	13.1	23.5	18.2
Indifferent	32.8	34.8	23.5	21.2

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Infrequent Participants Katy: 0-1 trips/week US-290: 0-1 trips/week (N = 1231)	Midlevel Participants Katy: 2-4 trips/week US-290: 2-3 trips/week (N = 162)	Frequent Participants Katy: 5-10 trips/week US-290: 4-5 trips/week (N = 66)
Somewhat oppose	17.7	18.1	14.2	18.2
Strongly oppose	20.6	19.6	22.8	33.3
Q24: Impression about tying toll to level of congestion in HOV lane*				
Strongly favor	13.8	14.3	14.2	4.6
Somewhat favor	12.2	11.6	14.2	18.5
Indifferent	31.4	33.6	22.2	13.8
Somewhat oppose	21.4	21.5	18.5	27.7
Strongly oppose	21.2	19.1	30.9	35.4
Q25: Impression about allowing SOVs on HOV lane for a higher toll*				
Strongly favor	47.2	49.0	40.4	40.4
Somewhat favor	22.2	22.0	23.0	24.6
Indifferent	8.1	8.7	5.6	3.1

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Infrequent Participants Katy: 0-1 trips/week US-290: 0-1 trips/week (N = 1231)	Midlevel Participants Katy: 2-4 trips/week US-290: 2-3 trips/week (N = 162)	Frequent Participants Katy: 5-10 trips/week US-290: 4-5 trips/week (N = 66)
Somewhat oppose	4.6	3.7	6.2	16.9
Strongly oppose	17.9	16.6	24.8	23.1
Q26: Number of SOV trips if allowed for a fee [A]				
$3.00	3.46	3.51	3.05	3.59
$4.00	1.94	1.92	2.16	1.77
$5.00*	1.64	1.74	1.16	0.90
$6.00	1.11	1.15	0.93	0.61
Q27: Age*				
16 to 24	3.4	3.3	4.3	3.0
25 to 34	14.3	14.0	16.1	15.2
35 to 44*	26.0	24.2	36.0	33.3
45 to 54	38.4	38.9	36.0	36.4
55 to 64	11.6	12.3	6.8	10.6

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Infrequent Participants Katy: 0-1 trips/week US-290: 0-1 trips/week (N = 1231)	Midlevel Participants Katy: 2-4 trips/week US-290: 2-3 trips/week (N = 162)	Frequent Participants Katy: 5-10 trips/week US-290: 4-5 trips/week (N = 66)
65+*	6.2	7.3	0.6	1.5
Q28: Gender*				
Male	47	48.5	39.6	37.9
Female	53	51.5	60.4	62.1
Q29: Household type*				
Single adult	5.7	5.4	6.9	9.0
Unrelated adults*	0.4	0.2	0.6	4.5
Married without child	29.9	30.8	29.4	14.9
Married with child(ren)	60.5	60.7	57.5	62.7
Single parent family*	1.7	1.0	5.0	6.0
Other	1.7	1.8	0.6	3.0
Q30: Household size [a]	2.99	2.99	3.05	2.99
Q31: Vehicles per household [a]	2.32	2.30	2.44	2.27
Q32: Occupation*				

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
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Professional/Managerial	64.8	65.2	62.2	64.6
Technical	10.1	10.6	8.3	4.6
Sales	5.5	5.5	5.8	4.6
Administrative/Clerical*	9.3	7.9	16.7	16.9
Manufacturing	0.0	0.0	0.0	0.0
Stay-at-home parent*	0.4	0.3	0.6	3.1
Unemployed/Seeking work	1.6	1.8	0.6	0.0
Other	8.4	8.8	5.8	6.2
Q33: Last year of school completed*				
Less than high school*	0.2	0.0	1.3	1.5
High school graduate	8.8	9.1	8.1	6.1
Some college/Vocational*	17.0	15.8	21.3	28.8
College graduate*	38.6	37.2	46.3	45.5
Postgraduate degree*	35.3	37.9	23.1	18.2

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Infrequent Participants Katy: 0-1 trips/week US-290: 0-1 trips/week (N = 1231)	Midlevel Participants Katy: 2-4 trips/week US-290: 2-3 trips/week (N = 162)	Frequent Participants Katy: 5-10 trips/week US-290: 4-5 trips/week (N = 66)
Q34: Hourly wage rate				
Less than $10	3.8	4.3	1.4	1.9
$10.01 to $15	7.8	8.4	3.6	7.4
$15.01 to $20*	7.8	6.9	12.9	9.3
$20.01 to $30*	17.0	16.0	19.4	27.8
$30.01 to $40	22.2	23.5	17.3	13.0
$40.01 to $50*	8.9	7.9	14.4	13.0
$50.01 to $60	10.5	11.4	6.5	5.6
$60.01 to $100	8.1	8.1	8.6	7.4
Over $100	13.9	13.6	15.8	14.8
Q35: Annual household income*				
Less than $10,000*	0.1	0.0	0.7	0.0
$10,000 to $14,999	0.0	0.0	0.0	0.0
$15,000 to $24,999*	0.1	0.0	0.7	0.0

Characteristic (Percent of respondents in each category)	Frequency of QuickRide Use			
	All Participants (N = 1459)[b]	Infrequent Participants Katy: 0-1 trips/week US-290: 0-1 trips/week (N = 1231)	Midlevel Participants Katy: 2-4 trips/week US-290: 2-3 trips/week (N = 162)	Frequent Participants Katy: 5-10 trips/week US-290: 4-5 trips/week (N = 66)
$25,000 to $34,999	2.0	2.1	1.3	1.7
$35,000 to $49,999	4.6	4.2	7.4	5.2
$50,000 to $74,999	13.7	13.1	15.4	19.0
$75,000 to $99,999	17.8	17.7	18.8	17.2
$100,000 or more	61.7	62.9	55.7	56.9

No response data were excluded by individual question number; therefore the sum of respondents from individual categories may not equal the total of all respondents. Where users could select more than one answer the total response for that question may exceed 100%.

* Significant difference (at the 0.05 level) between groups of survey respondents. Statistical tests used included:
- Kruskal-Wallis test for 3-way comparison (by group number) of ordinal data (for example; age, education, and income).
- One-way ANOVA for 3-way comparison (by group number) of continuous data (for example; trip length, travel time savings).
- Chi-square test for 3-way comparison of nominal data (for example; trip purpose, gender, household type, and occupation).

a. These entries represent mean responses (not proportions).
b. N values based on weighted data. Actual number of surveys was 128, 122, and 261 for infrequent, mid-level, and frequent participants, respectively.