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16. Abstract

The report characterizes with the greatest detail both the passenger and commuter users as well as non-users of the Central Texas Turnpike System recently opened in November 2006 in Austin, TX. The process of analysis includes a review of literature of other tolling facilities in the nation, where focus is given on studies of similar nature regarding demographics of users both among passenger and commercial motorists. This background study also touches on the general environmental justice impacts of tolling facilities. The report continues by using survey data taken both prior to and after the construction of the turnpike system in regards to preference and usage by local residents. The last portion of the report concerns the analysis of actual transaction data from the Central Texas Turnpike System – where transactions are linked to account type, axle count and billing zip code. This actual data coupled with the stated preferences of the surveys provides a detailed look into the characteristics of a typical toll road user in the Central Texas area. These findings are presented and discussed in detail.

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WHO USES TOLL ROADS?

An Analysis of Central Texas Turnpike Users

by

Chris Robertson
Jolanda Prozzi
C. Michael Walton

Research Report SWUTC/08/476660-00065-1

Southwest Regional University Transportation Center
Center for Transportation Research
University of Texas at Austin
Austin, TX 78712

DECEMBER 2008

DISCLAIMER

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ABSTRACT

The report characterizes with the greatest detail both the passenger and commuter users as well as non-users of the Central Texas Turnpike System recently opened in November 2006 in Austin, TX. The process of analysis includes a review of literature of other tolling facilities in the nation, where focus is given on studies of similar nature regarding demographics of users both among passenger and commercial motorists. This background study also touches on the general environmental justice impacts of tolling facilities. The report continues by using survey data taken both prior to and after the construction of the turnpike system in regards to preference and usage by local residents. The last portion of the report concerns the analysis of actual transaction data from the Central Texas Turnpike System – where transactions are linked to account type, axle count and billing zip code. This actual data coupled with the stated preferences of the surveys provides a detailed look into the characteristics of a typical toll road user in the Central Texas area. These findings are presented and discussed in detail.

EXECUTIVE SUMMARY

User charging and toll roads are increasing in popularity in the United States and in Texas. A primary concern surrounding direct user charging of roadway usage is the issue of environmental justice (EJ) and social equity. Despite the transportation network improvements resulting from the building of a toll road, environmental justice populations are claimed to receive fewer benefits from a toll road because of their inability to pay the toll. It is thus implied that toll road users would differ demographically from non-toll users in terms of education level, income, and ethnicity. However, it has also been argued that these EJ populations will benefit from less congested parallel non-toll roads if a segment of the commuting population is diverted to toll roads. At the same time, very little is known about truck usage of toll roads. This is partly attributable to a lack of understanding of the behavioral responses of different truck market segments to tolling, as well as the cost structures of these truck market segments and their influence on a trucker's decision to use tolls.

The analysis conducted in this report provides insight into numerous aspects concerning toll roads in Central Texas. A detailed literature review of related studies on similar tolling facilities provides a framework for the analysis conducted in the Austin area, as well as characteristics for comparing the results. The published literature on the demographics of toll road users showed correlations between toll road usage and higher incomes, as well as toll road usage and higher education levels. The findings regarding usage and gender are less pronounced, but a higher correlation among males is present on most tollways studied.

Survey data gathered in Austin regarding user preferences both before and after the construction of the CTTS are also analyzed and supplemented with an analysis of sample transaction data for one week in November 2007 that reflected actual toll road usage. The transaction data included zip code and account type (i.e., commercial and non-commercial) information. A 2005 survey conducted prior to the completion of the CTTS,

found that female, Hispanic, younger, and higher income, as well as higher educated respondents indicated that they would use the CTTS. A 2008 survey conducted after the construction of the CTTS also found a correlation between higher income levels and toll road usage, as well as higher education levels and toll road usage. The 2008 survey also revealed that - although a higher percentage of females indicated that they would use the toll roads (compared to males) in the 2005 survey – a higher percentage of male respondents actually used the CTTS.

The analyzed transaction data provided some very interesting findings regarding the transactions of non-commercial and commercial account holders, their axle count and billing addresses. An analysis of the transaction data revealed that non-commercial two axle vehicles dominated the toll transactions in November 2007. Billing zip codes with the highest transaction concentrations for the non-commercial transactions were located north of Austin from where the CTTS toll roads provide convenient and fast access to downtown Austin. The billing zip codes of the commercial transactions, on the other hand, showed higher concentrations in areas south of the city.

The actual transaction data provided valuable insight into the billing address and account types of CTTS users, while the survey data provided interesting information regarding the characteristics of both the users and non-users of the CTTS. This data provides insight into the perceptions of both users and non-users of the CTTS and can be used to inform marketing strategies, as well as future enhancements to the system.

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CHAPTER 1: LITERATURE REVIEW

INTRODUCTION

User charging and toll roads are increasing in popularity in the United States and in Texas. A primary concern surrounding direct user charging of roadway usage is the issue of environmental justice (EJ) and social equity. Despite the transportation network improvements resulting from the building of a toll road, environmental justice populations are claimed to receive fewer benefits from a toll road because of their inability to pay the toll. It is thus implied that toll road users would differ demographically from non-toll users in terms of education level, income, and ethnicity. However, it has also been argued that these EJ populations will benefit from less congested parallel non-toll roads if a segment of the commuting population is diverted to toll roads. At the same time, very little is known about truck usage of toll roads. This is partly attributable to a lack of understanding of the behavioral responses of different truck market segments to tolling, as well as the cost structures of these truck market segments and their influence on a trucker's decision to use tolls.

The objectives of this thesis are to develop a background of existing tolling facilities in the United States, explore the attitudes of potential Central Texas toll users and further analyze the actual usage of the turnpike system after its construction.

This chapter summarizes the available literature that examined the demographic characteristics of toll and non-toll freight and passenger users, including available data for Austin, Texas. Specifically, the focus has been on national studies that can inform the research approach and the demographic characteristics of the overall Austin commuter and resident populations. The aim is to provide initial general insight into prior research conducted and the results obtained.

BACKGROUND

Although the focus of this study is on the demographic characteristics of the users of toll and non-toll facilities in Austin, a number of previous studies and the methods adopted to consider demographic information were deemed important to inform the research approach. For this reason, this section summarizes the literature reviewed on other turnpikes and tollways.

John Kilpatrick Turnpike

The John Kilpatrick Turnpike – a 25.3 mile four lane highway - serves as a perimeter expressway around the northwest quadrant of Oklahoma City, Oklahoma. It runs from Interstate 40 in the western portion of the city, north and then east to Interstate 35, where it becomes the Turner Turnpike / Interstate 44. The toll expressway was constructed as a reliever road for traffic wanting to avoid delays in the central city (see Figure 1). The Kilpatrick Turnpike is owned by the Oklahoma Turnpike Authority (OTA), which also operates and maintains the toll road.

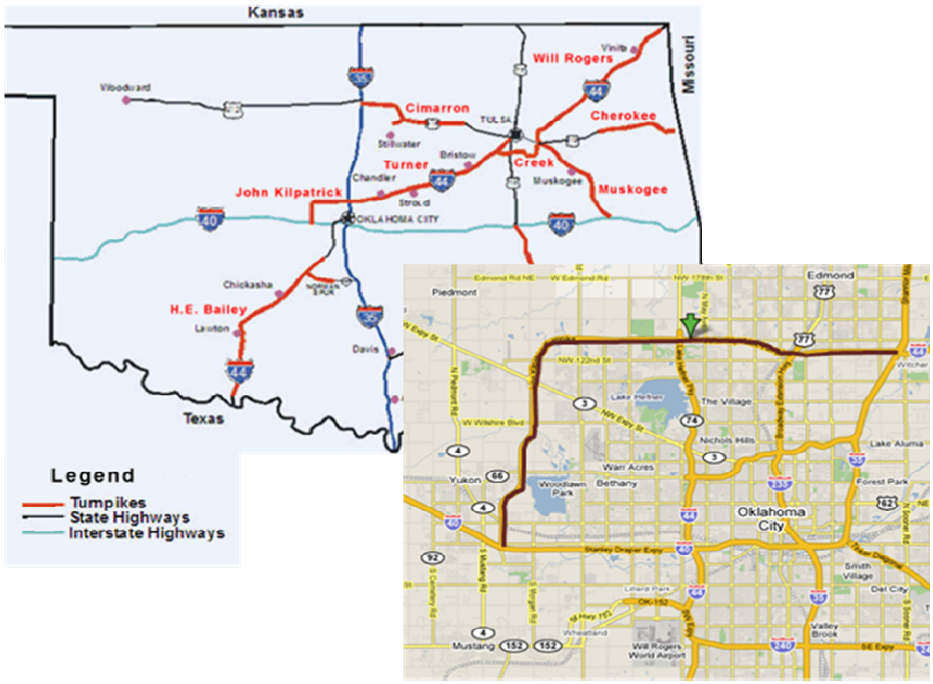

Figure 1: John Kilpatrick Turnpike

Opening in the 1990s, the OTA collects detailed statistics regarding the facility's usage each year. Data are available from 1997 to 2006 regarding the total miles traveled, total transactions, total revenue, as well as information regarding average trip length, average tolls collected and average toll per mile for both commercial and passenger vehicles. An analysis of the data revealed a number of interesting trends that are illustrated below

Figure 2 illustrates the percentage of total miles traveled on the Turnpike between 1997 and 2006 by commercial and passenger vehicles.

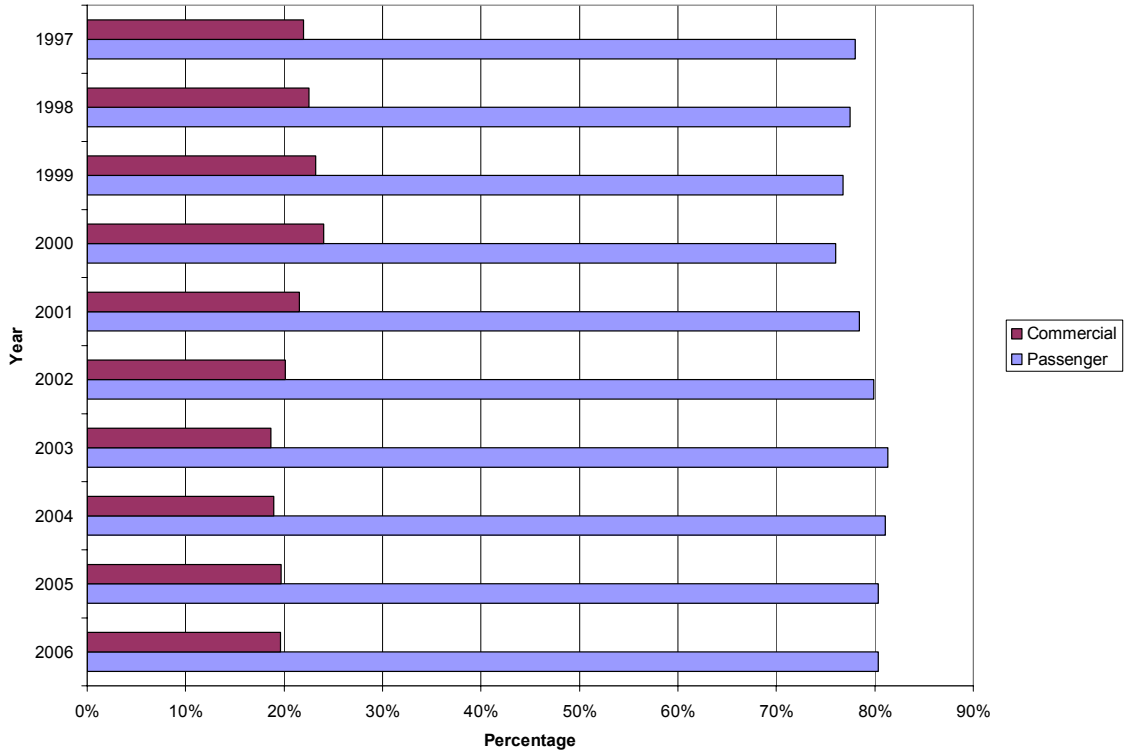

Figure 2: John Kilpatrick Turnpike Percentage of Total Miles Traveled

As is evident from Figure 2, passenger traffic dominates the usage of the turnpike in terms of vehicle miles traveled, representing roughly 80 percent of total miles traveled for the years 1997 to 2006.

Figure 3 illustrates the percentage of total transactions by passenger and commercial vehicles for the same time period.

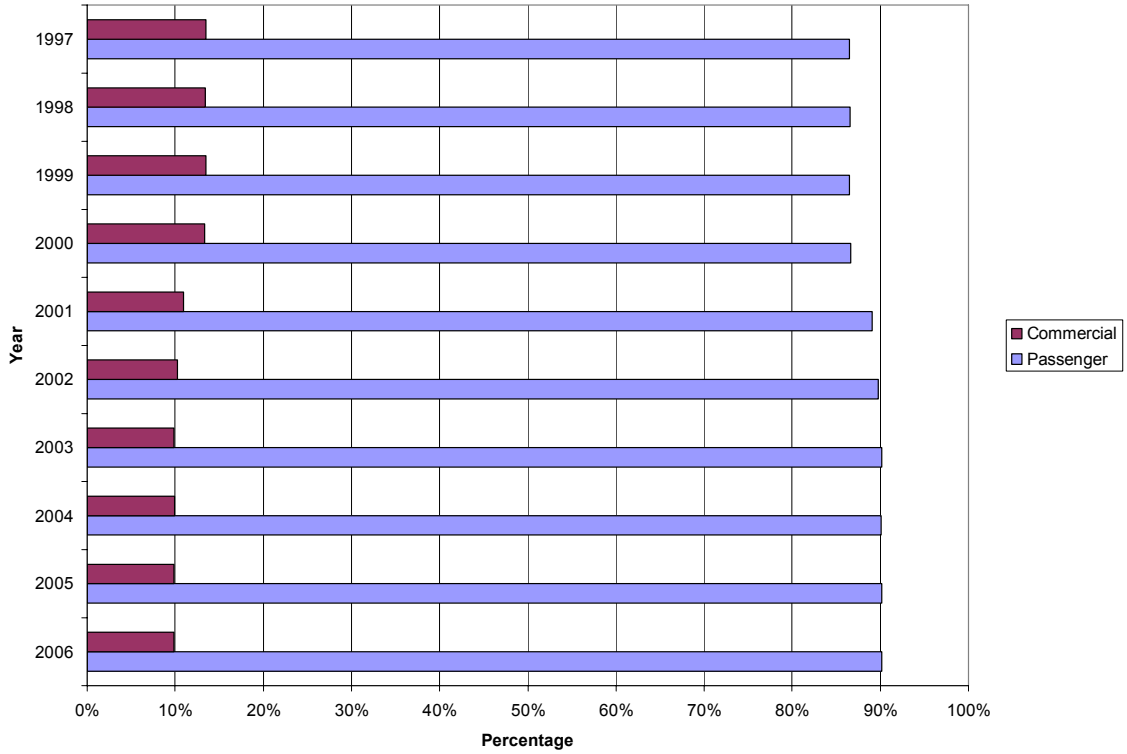

Figure 3: John Kilpatrick Turnpike Percentage of Total Transactions

Similar to total miles traveled, passenger traffic represents the largest share of total transactions – representing approximately 90 percent of total transactions since 2002.

However, as can be seen from Figure 4, commercial users account for more than 40 percent of the total revenue collected on the turnpike. Thus approximately 10 percent of the transactions – i.e., representing the commercial transactions – account for more than 40 percent of the toll road revenue. This can be explained by the higher toll charged to commercial users (see Figure 5 or 7) and the longer distances traveled (see Figure 6) by this market segment on the toll road.

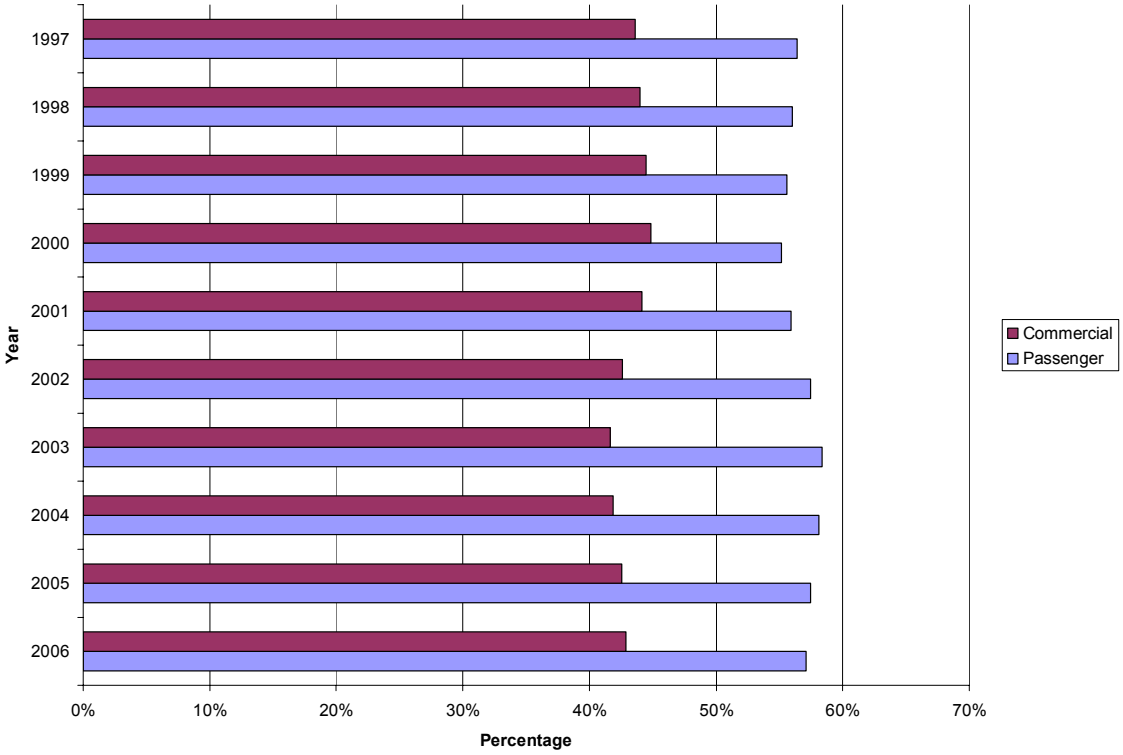

Figure 4: John Kilpatrick Turnpike Percentage of Total Revenue

Commercial users are charged a significantly higher toll rate than passenger vehicle users. Figure 5 illustrates that the average toll collected per commercial transaction exceeds $6.00 compared to around $1.00 per passenger transaction. The figure also illustrates that although the average toll collected per passenger transaction has remained relatively constant over the analysis period, the average toll collected per commercial transaction has increased sharply in 2001 after which it reduced slightly and has remained relatively constant since 2003.

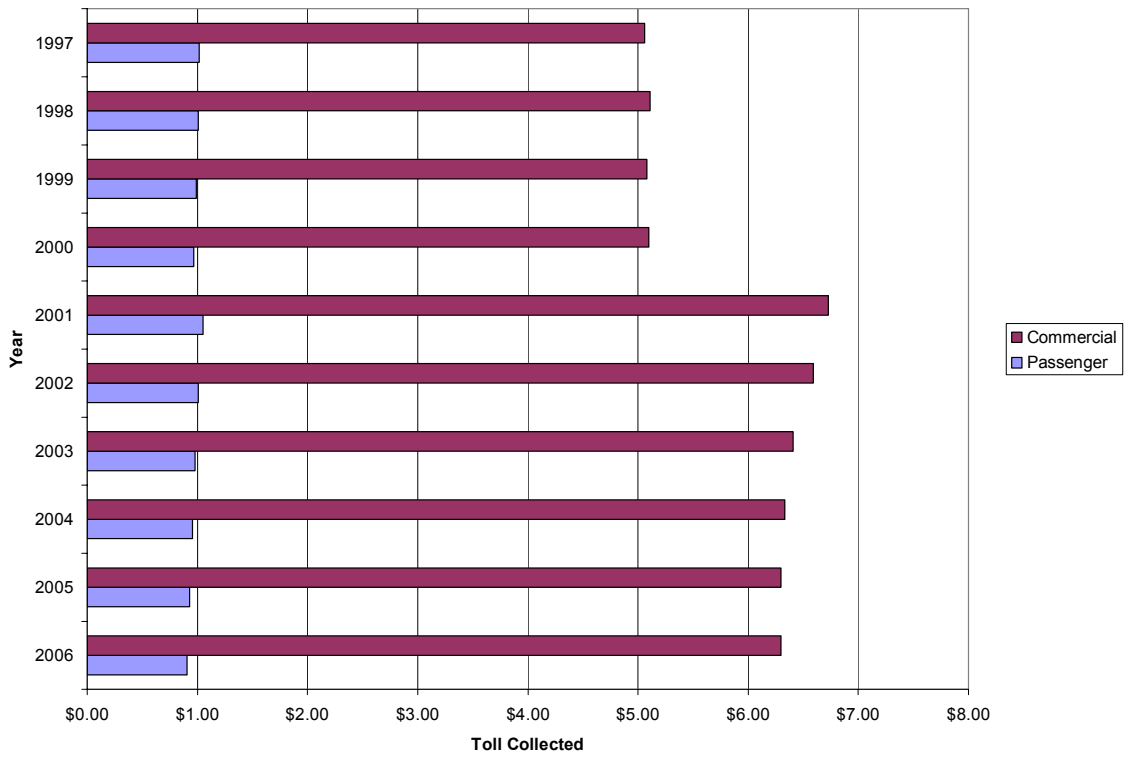

Figure 5: John Kilpatrick Turnpike Average Toll Collected

The average toll collected is a function of the toll rate structure (see Appendix) and the usage of the toll road, i.e., the average distance traveled on the toll road. Figure 6 illustrates the average trip length per transaction over the analysis period for passenger and commercial vehicles. The Figure clearly illustrates that commercial users tend to travel a longer distance on the turnpike per transaction, resulting in an average trip length of about 45 miles in 2006. Passenger users, on the other hand, tend to travel relatively shorter distances on the turnpike, i.e., resulting in an average trip length of approximately 20 miles in 2006. Also, the average trip lengths of both market segments have decreased between 1997 and 2006 – although more marginally in the case of commercial users.

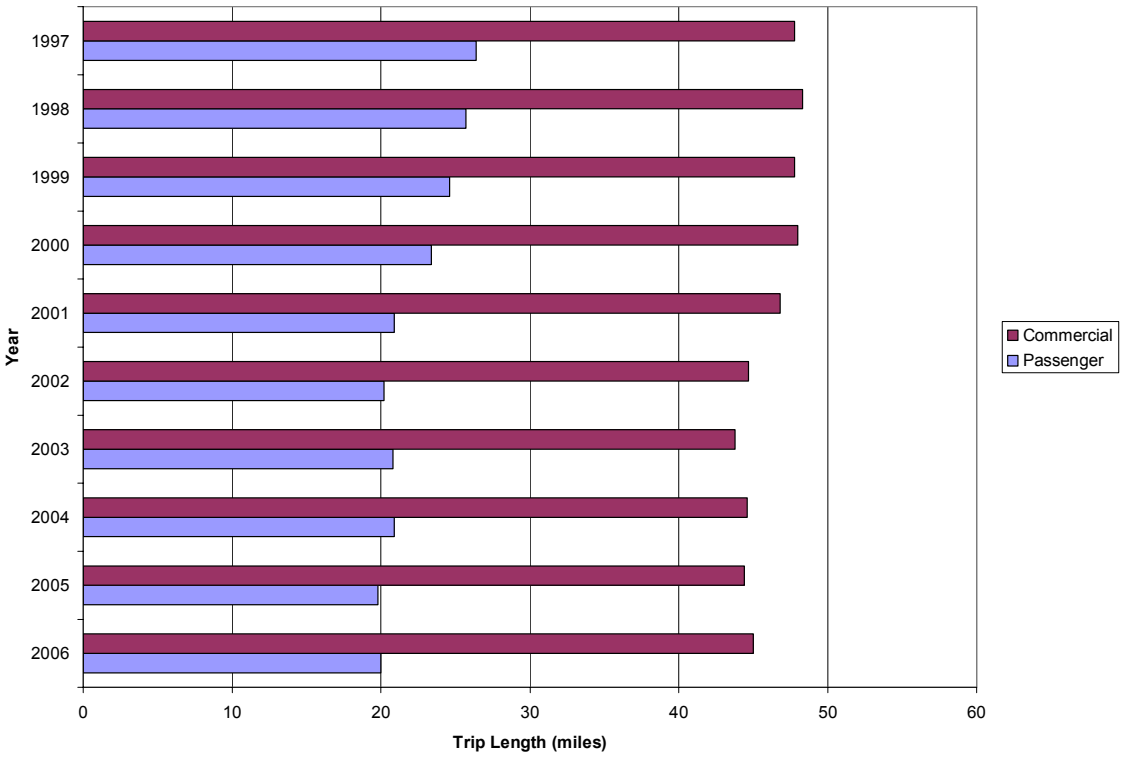

Figure 6: John Kilpatrick Turnpike Average Trip Length

Figure 7 illustrates the average toll charged per mile for commercial and passenger vehicles.

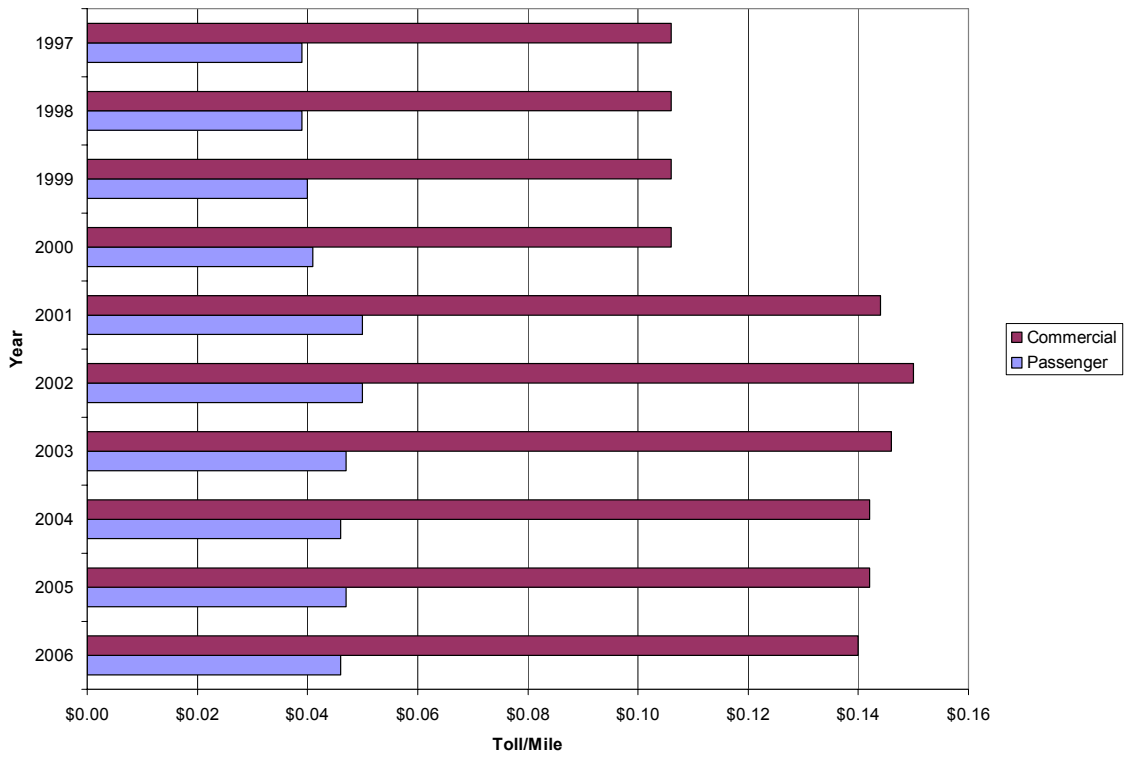

Figure 7: John Kilpatrick Turnpike Average Toll per Mile

From Figures 5 and 7, it is evident that commercial users pay a substantially higher average toll compared to passenger vehicles. Specifically noteworthy is the sharp increase in the average toll per mile charged to commercial users between 2000 and 2001.

Figure 8 below illustrates the transaction percentages by axle category. From Figure 8 it is evident that 88.5 percent of the transactions represented two axle vehicles. Although, it is unknown what percentage of the two-axle vehicles are commercial users, it can be hypothesized in the light of the trends illustrated in Figure 8 that the majority would be passenger vehicles.

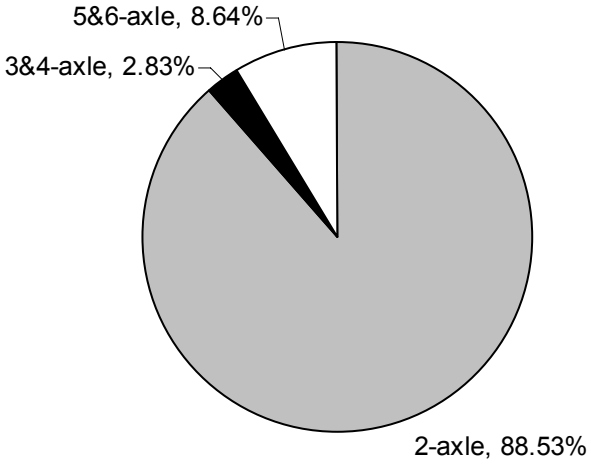

Figure 8: John Kilpatrick Turnpike Percentage of Transactions per Axle (2006)

Vehicles with more than 2 axles only accounted for 11.47 percent of total transactions in 2006 (John Kilpatrick, 2006).

(photo by Daniel R. Blume, May 9, 2007)

Figure 9: California State Route 91

One of the most comprehensive studies to date regarding the demographic characteristics of toll road users was performed in 2000 for California's SR 91. A telephone survey was conducted of 1,290 single occupant vehicle (SOV) commuters using the facility, 355 high occupancy vehicle commuters with two occupants per vehicle (HOV2), and 135 HOV3+

commuters. A statistical analysis of the responses revealed the following statistics in terms of facility usage and income, age, education, household structure, and gender.

- *Income:* Twenty one percent of the respondents in the lowest income level indicated frequent usage[1] of the roll roads compared to 51 percent for the highest income levels. This could be partly attributable to the fact that the route traverses a moderately high income area.
- *Age:* The analysis revealed comparatively lower toll road usage among the lowest and highest age brackets.
- *Education:* Higher levels of education correlated with higher usage. Users with only a high school education or less only comprised 22 percent of the SR 91 commuters, compared with 36 percent with a bachelor's degree and higher.
- *Household structure:* The study revealed no correlation between household structure and toll road usage.
- *Gender:* In terms of gender, 45 percent of the female respondents indicated that they preferred the tolled lanes compared to 31 percent of the male respondents. In reality, however, 65 percent of the corridor's users have been male. So although women respondents stated a higher preference for using the roads, males make up a larger share of actual users. The authors offered as an explanation that women's preference for the toll lanes might be attributable to women having a higher value of time compared to men when it comes to travel commute times. Despite this higher preference though, usage was dominated by men – suggesting circumstances that would give them a higher probability of usage[2] (Sullivan, 2000).

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1 Frequent usage comprised commuters who use the facility for at least half of their peak trips.

2 A study done in 1998 by Small and Parkany regarding the marketability of the corridor found that the primary advantage perceived by toll road users was travel time savings, whereas the main concern was the toll rate. The study also found that users making longer trips were more inclined to use the facility. Finally, the study found that women responded with a higher preference to use the facility than men, citing child-care and shopping as reasons for using the facility, as well as reduced travel time (Small & Parkany, 1998).

North Texas Tollway Authority

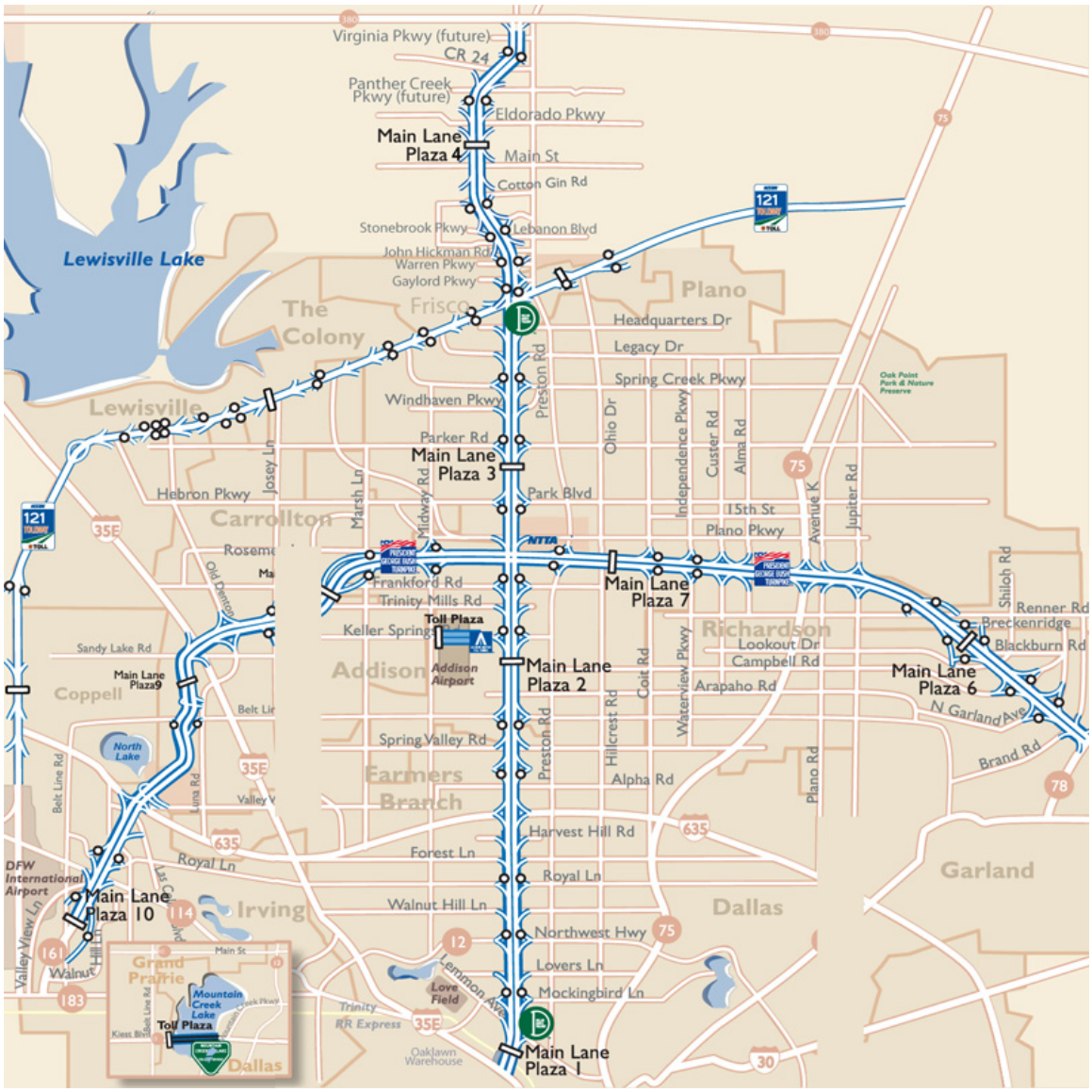


Figure 10: North Texas Tollway Authority

The two major tollways in Dallas, Texas – i.e., the Dallas North Tollway and the President George Bush Turnpike - are managed by the North Texas Tollway Authority (NTTA). These two commuter toll expressways run north south and east west, respectively, through the heart of the Dallas Metropolitan area (see Figure 10). The Dallas North Tollway, which was primarily constructed by 1968, is surrounded by dense

urban development. The President George Bush Turnpike, on the other hand, has been constructed in the last decade and is still experiencing development along the corridor.

In 2005, the NTTA conducted an email survey of their TollTag customers to obtain information regarding user demographics and opinions. The e-mail survey was distributed to 350,000 NTTA TollTag customers and approximately 38,000 responses were acquired, yielding a margin of error of 0.5 percent at a 95 percent confidence level (Tammer, 2005). Forty thousand survey forms were also distributed to cash users at toll plazas, of which slightly more than 8,000 were returned. Figures 10 to 14 characterize the cash and TollTag customers of the NTTA in terms of income, ethnicity, gender, education, and age.

Figure 11 illustrates the income characteristics of NTTA's cash and TollTag customers.

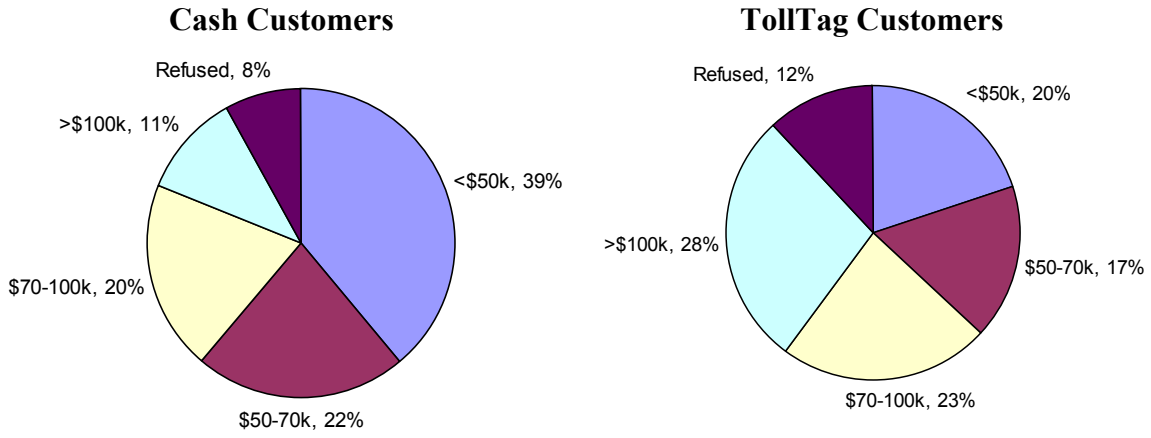


Figure 11: NTTA Respondent Breakdown by Annual Income

From Figure 11, it is evident that almost 40 percent of NTTA's cash customers earn less than $50,000 per year compared to 20 percent of its TollTag customers. On the other hand, approximately 28 percent of NTTA's TollTag customers earn more than $100,000 per year, compared to about 11 percent of its cash customers. Statistics such as these support concerns about environmental justice populations receiving fewer benefits from toll facilities than more affluent population groups. This also seems to indicate that low

income users will be disproportionately impacted by a policy to move to all electronic tolling.

Figure 12 illustrates the ethnicity characteristics of NTTA's cash and TollTag customers.

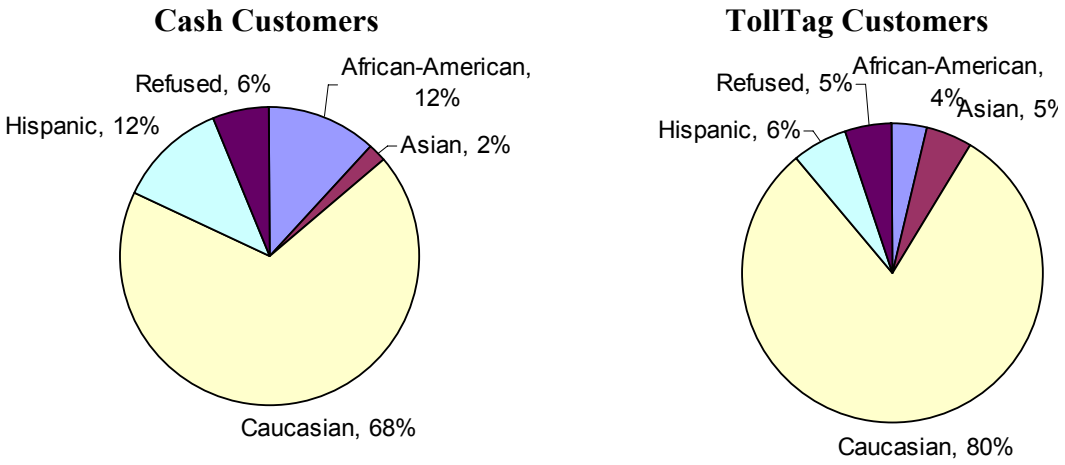


Figure 12: NTTA Respondent Breakdown by Ethnicity

Of users who frequent the Dallas tollway system using TollTags, an overwhelming majority (i.e., 80 percent) tend to be Caucasian. The remaining 20% of TollTag users are spread out consistently among remaining minority demographics. Of the surveys conducted among cash paying users of the system, a higher percentage of African Americans (12% vs 4 %) and Hispanics (12 % vs 6%) and lower percentage of Caucasians (68% vs 80 %) and Asians (2 % vs 5 %) were observed.

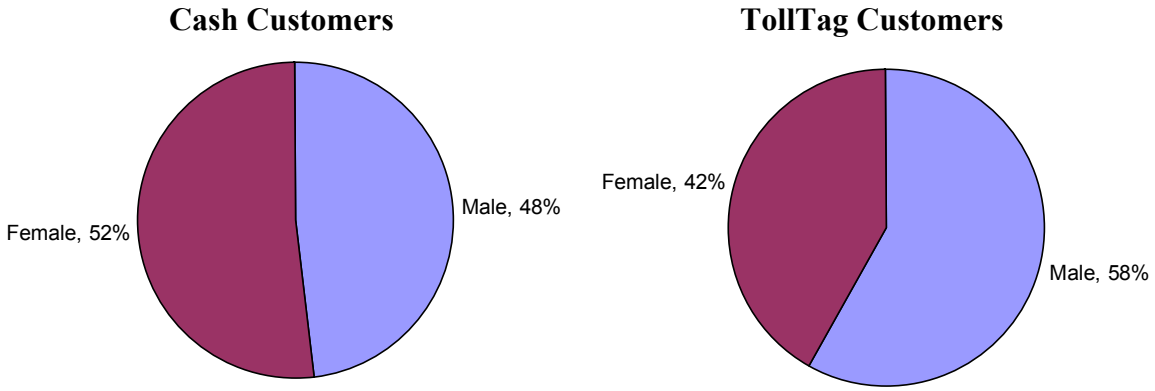


Figure 13: NTTA Respondent Breakdown by Gender

As shown in Figure 14, the majority of TollTag customers are male (58%). Cash customers yielded a 52% to 48% ratio in favor of females, which is within the margin of error of the cash customer sample (4%) (Tammer, 2005).

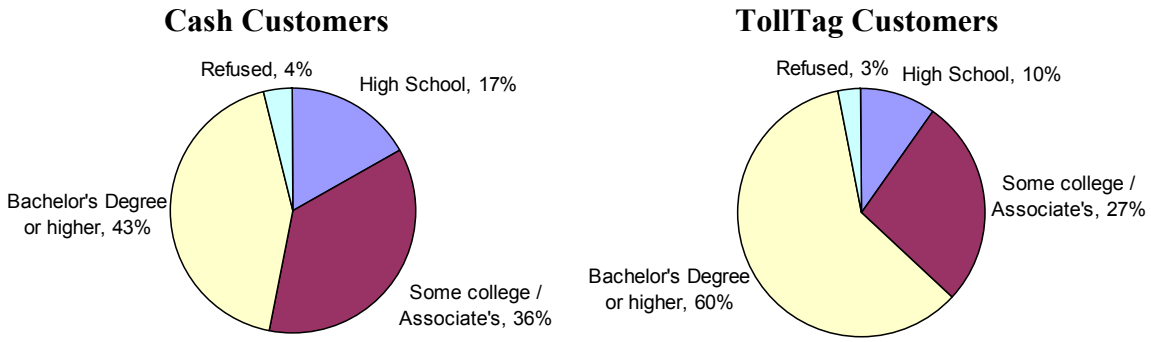


Figure 14: NTTA Respondent Breakdown by Education

As shown in Figure 15, the majority of TollTag customers (60%) reported an education level of at least a bachelor's degree. Cash customers revealed a lower percentage of respondents with a bachelor's degree or higher (43%).

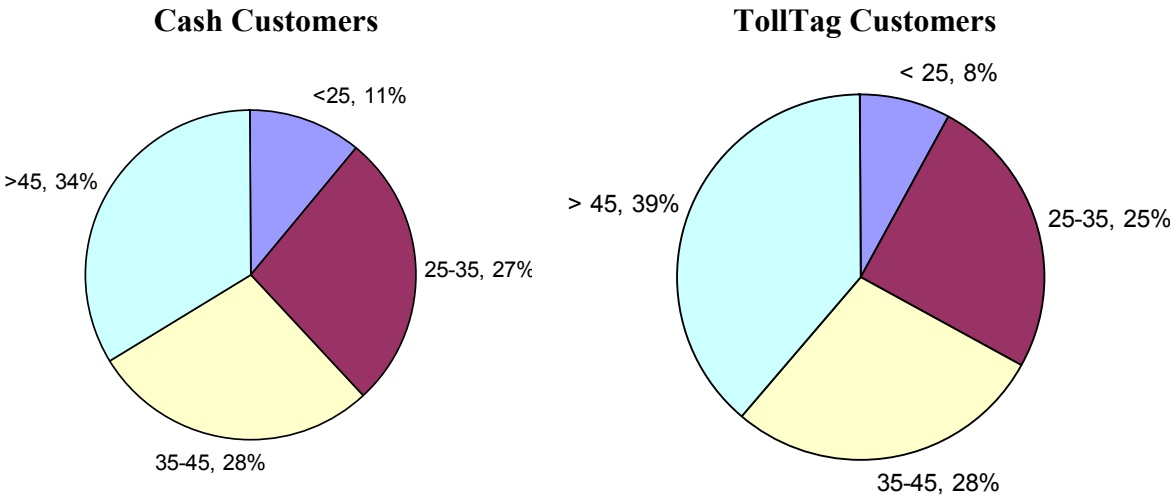


Figure 15: NTTA Respondent Breakdown by Age

TollTag and cash customers revealed a similar percentage breakdown in terms of the age of users (see Figure 15). Both groups reported that more than a third of the respondents

were over the age of 45, 55% and 53% reported to be between 25 and 45 in the case of cash users and TollTag users, respectively, while 11% and 8% of cash and TollTag users, respectively, reported to be less than 25 years old .

From these statistics, it appears that a Dallas TollTag user is typically an older Caucasian with a higher level of education and relatively higher income level. Gender preference for the system trends neutral of those cash customers who responded, with a slightly higher share of males among TollTag users. These attributes can be contributed to both the demographics of the Dallas area and the nature of the tollways. Both the Dallas North Turnpike and President George Bush Turnpike are commuter thoroughfares that run from the edge of the suburban outskirts into the city center. They are likely often frequented by Dallas commuters, who also likely more often than not embody similar demographic characteristics as found in this survey sample.

Georgia 400

The GA-400 is a non Interstate 6.2 mile four to eight lane toll road in Atlanta, Georgia. This toll road is an extension of the 31 mile GA-400. Owned and operated by the Georgia State Road and Tollway Authority (GSTA), the toll road has been open since August 1993. Tolling on GA-400 is set by the distance traveled and the axle count of vehicles. The toll road uses a combination of cash and ETC, as well as open road tolling lanes. Currently ETC users do not receive a discount. The average cost trip is estimated to be $0.50.

In 2004 revenue data relating to the usage of the GA-400 tollway in Atlanta, Georgia was mapped using the billing addresses of cruise card users. Figure 16 illustrates an area's (i.e., based on the billing address) contribution to the revenue of the facility and thus usage of the facility. The primary purpose of this report was to inform policy makers when considering the redistribution of toll revenues. (Bachman & Drake, 2004).

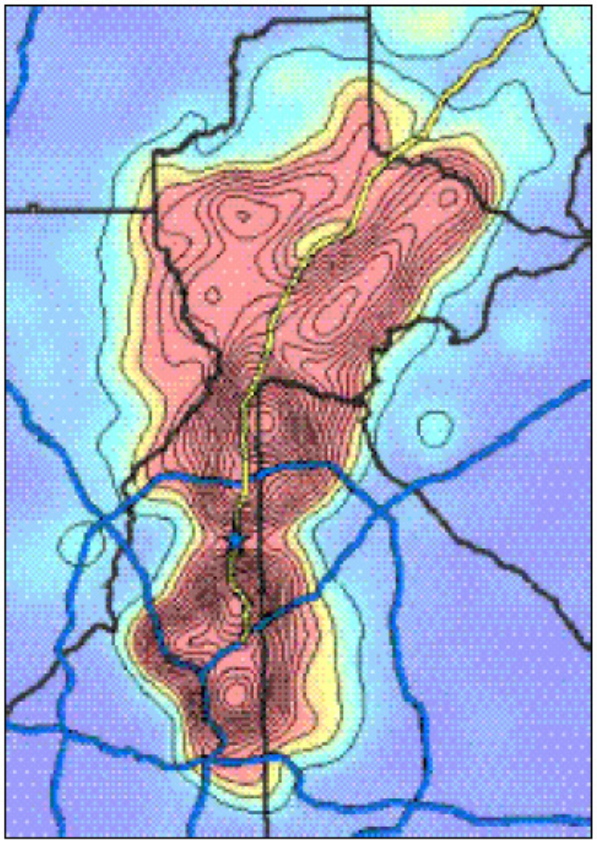


Figure 16: Origins of GA-400 Cruise Card Revenues

Visual maps are effective in illustrating the origins and thus usage of toll facilities spatially (assuming that most of the trips originate at the billing addresses of the cruise card users). As can be seen in the case of GA-400 in Atlanta, the majority of the billing addresses are along the corridor, with greater concentrations along the northern end. In the Atlanta metropolitan area, higher income households tend to live in the northern suburbs of the city and commute downtown using GA-400. The three major nodes along the system serve three major business and residential centers of the city. Furthest south being Midtown, Buckhead moving shortly north and Sandy Springs / Dunwoody just north of the I-285 perimeter. This data provides valuable insight into the usage of the facility.

Pennsylvania Turnpike

In 2003 Penn State University performed a study of the Pennsylvania Turnpike system. This study was conducted by distributing surveys to both passenger and commercial motorists who had stopped at service plazas along the toll route. The study captured responses from 1,528 passenger and commercial motorists, achieving slightly higher than a 95% confidence level (Patten & Pribyl, 2003).

Figure 17: Pennsylvania Turnkpike

The Pennsylvania Turnpike system consists of 532 miles in three sections and serves most of Pennsylvania's major urban areas including Pittsburgh, Harrisburg, Philadelphia, Allentown/Bethlehem and Scranton/Wilkes-Barre. Its main section is 359 miles and extends from the Ohio state line in the west to the New Jersey state line in the east. The Northeast Extension extends from Plymouth Meeting in the southeast to Wilkes-Barre and Scranton in the northeast and is 110 miles. There are also various access segments in Western Pennsylvania totaling 62 miles. Though the turnpike was originally opened in 1940 and was the first long-distance rural highway, several additions were constructed in the 1950s and have continued to be constructed since the 1980s. Users are able to pay using either cash or E-Z Pass.

The demographic information obtained from passenger motorists on the Pennsylvania Turnpike system allows for a comparison of the turnpike system users to the demographics of the entire state. The comparison can be seen in Table 1.

Table 1: Pennsylvania Turnpike Motorists Demographics

Demographic		Survey Respondents	Pennsylvania Demographics*
Median Age		46	38
Gender	Male	55.8%	48.3%
	Female	39.5%	51.7%
	No Answer	1.7%	N/A
Ethnicity	White	91.4%	85.4%
	African American	2.4%	10.0%
	Other	3.7%	4.6%
	No Answer	2.6%	N/A

* Based on Census 2000 counts

In the case of this turnpike system, several differences appear between the survey respondents and the census demographics of Pennsylvania. The data in Table 1 shows a higher percentage of male users - about 56 percent versus 40 percent female users. Also, Table 1 shows the substantially higher usage of the system by Whites compared to minorities – specifically African Americans.

Of further interest is information pertaining to income and education. The survey found that 99% of respondents reported graduating from high school (versus 82% for all of Pennsylvania) and that 58.2% of respondents had at least a bachelor's degree (versus 22.4% overall for the state). The case of income shows even further variations.

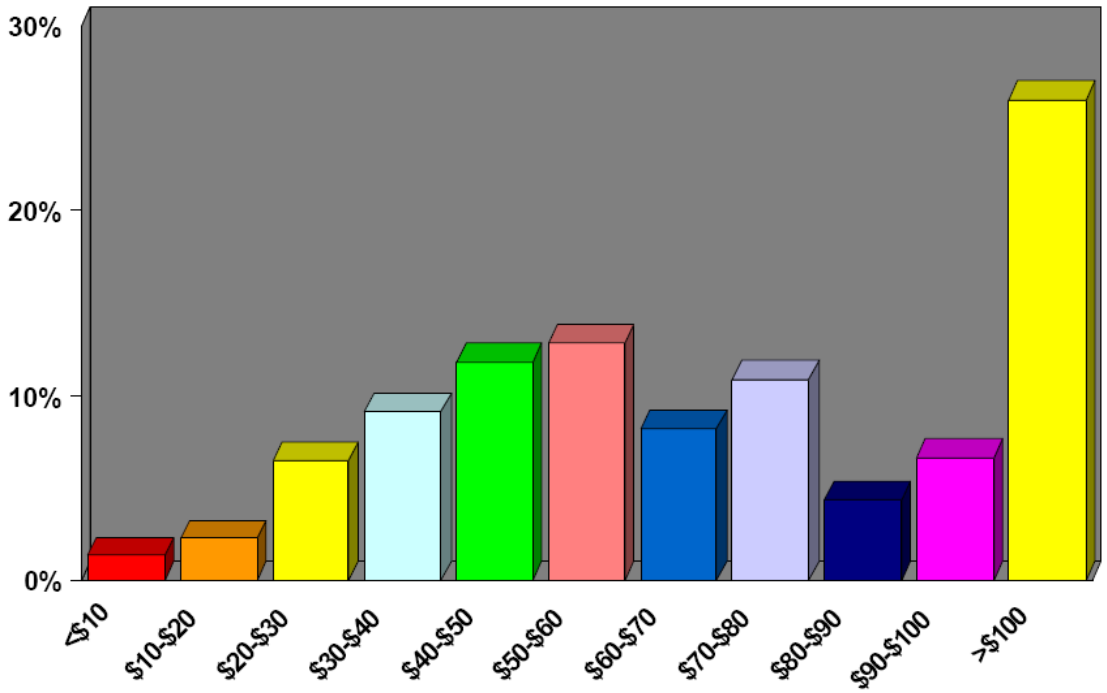


Figure 18: Pennsylvania Turnpike Income Distribution ($1,000's)

From the 2000 census, the median income in Pennsylvania was $40,106. As can be observed in Figure 18, survey participants showed somewhat higher levels of income than the state average. There appears to be a slightly higher tendency of usage among higher income earners. Respondents reporting incomes greater than $100,000 account for around 27% of the users and those between $50,000 and $99,999 comprise approximately 48% of the users.

As mentioned, the study was also conducted for commercial motorists. 889 surveys were collected for this group, achieving slightly less than a 95% confidence level based on overall commercial use of the turnpike.

Of interest in this section are the demographic characteristics of freight users. The survey was able to capture information on the gender, race, education, years as a commercial vehicle driver, and annual miles driven of truckers through the facility. It was also able to obtain more relevant information on the type of carrier and average trip length.

Table 2: Pennsylvania Turnpike Freight Demographics

Characteristic		Statistic
Median Age		45
Gender	Male	95.3%
	Female	3.6%
	No Answer	1.1%
Race	White	88.2%
	Black or African American*	4.7%
	Other	4.8%
	No Answer	2.2%
Education	Less Than High School	8.3%
	High School and Some Post-Secondary	80.4%
	College Graduates and Some Graduate School	7.9%
	Advanced Degrees	1.8%
	No Answer	1.6%
Years as a Commercial Vehicle Driver	•10	36.3%
	11-20	24.4%
	21-30	13.3%
	31-40	18.0%
	•41	2.0%
	No Answer	6.0%
Types of Carrier (multiple answers allowed)	For-Hire Truckload	51.1%
	For-Hire Less-Than-Truckload	20.6%
	Owner-Operator	21.1%
	Private Carrier	21.9%
	Passenger Motor Coach (Bus)	1.1%
	Specialized Hauling	16.3%
	Other	7.9%
Average Trip Length	1-100 Miles	2.8%
	101-200 Miles	6.9%
	201-499 Miles	38.5%
	500+ Miles	50.1%
	No Answer	1.8%
Annual Miles Driving a Commercial Vehicle	•50,000	10.2%
	51,000 to 100,000	33.4%
	101,000 to 150,000	38.9%
	•151,000	8.9%
	No Answer	8.5%

Key items of interest from this data include a median age similar to that of the passenger motorists of 45. As would be expected a high percentage (95.3%) of truck drivers were male. They were also predominately not of minority ethnicity – 95.3 % were White - and

approximately 80.4% had a high school education or some level of post secondary education. In terms of experience, 36.3 % of the truck drivers reported to have 10 or less years of experience as a commercial vehicle driver, 24.4 % reported between 11 and 20 years, and 21.3 % reported between 21 and 40 years of commercial vehicle driver experience. About half of the truck drivers (51.1 %) classified the type of trucking operation as for-hire truckloads. The average reported trip length supports the reported "type of carrier" information with 50.1 % of the respondents reporting an average trip length of over 500 miles. Lastly, over 70% of respondents seem to drive 51,000 to 150,000 miles annually (Patten & Pribyl, 2003).

Florida Turnpike System

Figure 19: Florida Turnpike Mainline

The Florida Turnpike System consists of 460 miles of limited-access toll facilities. The majority of the system constitutes the Florida Turnpike Mainline that began development in the 1950s. The mainline consist of a 320-mile facility that extends from Florida City in the south through Miami, runs along the eastern portion of the state north to Orlando and culminates in Wildwood, Florida on I-75. The state-wide system also consists of commuter and bypass routes in Tampa, Orlando, and Fort Lauderdale. Looking at principal commercial customers of the system over time reveals interesting characteristics of the turnpikes.

Table 3: Florida Turnpike System Principal Commercial Customers, Fiscal Years 1997 and 2006

	% Total Revenue	
Customer	**FY 1997**	**FY 2006**
United Parcel Service	0.19%	0.17%
Roadway Express	0.17%	--
Smalley Transportation	0.15%	--
Consolidated Freightways	0.11%	--
Penn Tank Lines	0.10%	--
Super Transport	0.10%	--
Martin Brower	0.10%	--
Southeastern Freight Lines	0.08%	0.12%
Eckerd Drug	0.08%	--
Publix Super Market	0.08%	--
Federal Express	--	0.21%
Werner Enterprises	--	0.16%
Wal-Mart Stores	--	0.15%
Kenan Transportation Co	--	0.12%
AAA Cooper Transportatoin	--	0.07%
Sysco Food Services	--	0.07%
Waste Management	--	0.07%
School Board of Miami Dade County	--	0.07%

In both years, the top ten commercial customers comprised less than 1.22% of the total turnpike system revenues. Also, only two of the top ten customers from 1997, United Parcel Service and Southeastern Freight Lines were also rated in the top ten in 2006. This is a reflection of the changing and diversified customer base of the system. The change in principal customers over the ten year period is likely more attributable to the growth of companies rather than the characteristics of the system. Companies such as FedEx and Wal-Mart both experienced significant growth in the late 1990s, attesting for this surge in their use of the turnpike system. As the carrier with the largest percentage, Federal Express spends approximately 2.5 million on tolls on the Florida Turnpike System in 2007 (Florida 2006).

FREIGHT CLASSIFICATION

In reports pertaining to road pricing for trucking, the necessity for freight classifications is often warranted. A large body of work as been performed under this topic by Holguin-Veras in New York and New Jersey, included primarily in reports from 2007 and 2005. Further work has also in regards to Pennsylvania freight traffic by Mullet and Poole from 2006.

Holguin-Veras 2007

In a report in 2007 by Holguin-Veras, the results of surveys dating back to 2000 were incorporated into several salient characteristics of the freight market in the New York and New Jersey area. The following breakdown of freight using tolling facilities in this area was presented: Intra-regional (70-80%) Trips characterized by numerous stops in a single urban area. Due to the nature and location of these trips, it is typically not possible to bypass the toll facility.

- Inter-regional (20-25%) - Trips characterized by very few stops in an urban area. Freight motorists may have some ability to bypass toll facilities.

- Thru trips (1-3%) - Through trips do not have the requirement of making a stop in a particular urban area. This allows carriers to bypass toll facilities as long as they meet delivery constraints.

The report also emphasizes the difference between private versus for-hire carriers, including scheduling flexibilities. Private carriers, which provide transportation services to a parent company, are allowed more flexibility with regards to late and early arrivals. Less flexibility is allowed to for-hire carriers, those that sell transportation service in an open market. Of surveys conducted, private carriers reported an average late arrival flexibility of 79.0 minutes and an early arrival flexibility of 55.1 minutes. For-hire carriers indicated flexibilities of 26.1 and 23.7 minutes, respectively. Because of this characteristic of carriers, travel time savings are more important among for-hire carriers as opposed to toll savings.

In terms of commodities, the presentation presents the case that toll savings are only attractive to carriers transporting low valued goods and non-perishables. This characteristic, however, could more likely be attributed to commodities being associated with industry segments (private or for-hire) than with actually proclivities towards travel time or toll savings. The survey also concludes that currently 9% of carriers pass the toll cost on to customers (Holguin-Veras, 2007).

Holguin-Veras 2005

The above discussed presentation and its findings were derived from a more extensive report of the subject in 2005. Attitudinal factors explaining the use of E-ZPass by freight carriers in the New York and New Jersey area was the prevalent focus in this study. Prior to the study in 2002, freight transactions using E-ZPass made up 9 percent less than those of autos. Previous research had found that business characteristics such as company size were directly associated with a carrier's acceptance of new tolling technologies. Surveys were distributed to local carriers to better assess the correlation of these attitudes.

Of the study sample, the most common commodities delivered were food, building materials, lumber, metal, cars, and general merchandise. More than three quarters of the companies had the majority of their deliveries originate in New York or New Jersey, and the majority of the destinations were located in New York City, New York State or New Jersey. Table 4 summarizes the percentage respondents by type of company.

Table 4: Company Types

Type of companies	Percentage
Common carriers:	
Trucking	46.00%
Moving	3.47%
Private carriers:	
Manufacturing	10.87%
Distributor	15.17%
Construction	4.41%
Service	7.12%
Others	11.51%
Missing data	1.45%
Total	100.00%

Concurrently of note were the fleet sizes reported by the respondents. The average fleet size of companies surveyed was 11 trucks. 46% of the respondents owned between 2 and 5 trucks and that almost half of the vehicles were smaller trucks (2 axles). This would indicate intra-city trips. Almost 25% or respondents indicated 5 axle trucks – the most popular inter-city truck. Also of interest were the breakdowns of company fleet size in relation to truck axles, as shown in Table 5 below.

Table 5: Breakdown of Fleet Trucks by Number of Axles

Number of trucks	2 axles	3 axles	4 axles	5 axles	6 axles	More than 6 axles	Total
1	11.19%	4.76%	1.23%	10.70%	1.70%	0.39%	29.97%
2~5	27.44%	7.90%	2.28%	6.60%	1.58%	0.24%	46.04%
6~10	6.15%	1.15%	0.71%	2.32%	0.00%	0.10%	10.42%
11~49	3.47%	2.33%	0.75%	3.63%	0.42%	0.45%	11.05%
>=50	1.01%	0.49%	0.10%	0.91%	0.00%	0.00%	2.51%
Total	49.26%	16.63%	5.06%	24.16%	3.71%	1.18%	100.00%

The data indicated a number of differences between the common and private carriers. Among the companies that used the tolling facilities considered in the study, the common carriers tended to be larger and used the toll roads more frequently than the private carriers. This was true for both cash and E-ZPass users. Another general finding is that, for the same type of companies (common carriers or private carriers), E-ZPass users were larger and used the roadways more frequently than the nonusers. This can be seen in more detail in the following table.

Table 6: Comparison between Common and Private Carriers

Key variables	Nonusers		Users	
	Common Carriers	Private Carriers	Common Carriers	Private Carriers
Frequency (1)	25	20	42	40
Number of trucks	7	6	16	11
Number of interstate drivers	6	5	17	7

Note: (1) Frequency of using the PANYNJ facilities during the last 90 days;
(2) The numbers in the table are the average values.

Overall, the study found that the most important factor influencing E-ZPass use was operational and cost considerations. Of the benefits noted by respondents, avoiding traffic congestion and toll plazas was the most frequently chosen. The most influencing factor against E-ZPass use involved a fleet's low frequency of use (see Table 7). Through model development, it was found cargo type, along with fleet size can play a role in using E-ZPass. Negative correlations were observed among cargo carriers of household goods, construction and building materials, general merchandise and cars. Mixed effects however, were observed from those carriers transporting food.

Table 7: Reasons for Using / Not Using E-ZPass

Reasons for not using E-ZPass			
Reasons	%	**Reasons**	%
1. Does not travel through E-ZPass areas often	31%	11. Driver reimbursement more difficult/tracking driver expenses more difficult	4%
2. We haven't gotten around to it	17%	12. Respondent not aware of E-ZPass	4%
3. Cost of maintaining pre-paid toll balance for fleet is too high/cost of equipping fleet with e-ZPass too high	14%	13. E-ZPass does not limit waiting at tolls	3%
4. We don't know how to sign up	8%	14. Privacy concerns	3%
5. Past problems with E-ZPass	6%	15. Customer pays tolls	2%
6. Billing is too cumbersome	5%	16. Drivers complain	2%
7. Makes record-keeping difficult	5%	17. Drivers pay tolls	2%
8. No specific reason	4%	18. Discounts not high enough	1%
9. Fear of equipment being stolen	4%	19. Transponder not transferable	1%
10. System is not reliable or accurate	4%	20. Other reasons	6%
Reasons for using E-ZPass			
Benefits	%	**Benefits**	%
1. Avoid traffic congestion at toll plazas	79%	7. No cash to drivers	16%
2. Basic discount	50%	8. Convenient	7%
3. No need for driver reimbursement	34%	9. Off-peak discount	6%
4. Better accountability for drivers	22%	10. Shows truck time and location	5%
5. No lost receipts	21%	11. Saves money	2%
6. It is faster/save time	19%	12. Other	4%

The study also observed attitudes towards discounts during off peak hours. It was established that time and not cost factors were the most important to attitudes of freight carriers. Only 16 carriers reported shifting travel to off-peak hours to save from discounted E-ZPass rates. The reason given for such a low number is the inflexibility of receivers. Overall, this report provides valuable insight into freight carriers in the New York and New Jersey area, and likely for carriers on similar toll facilities.

Mullet and Poole 2006

Similar to the study conducted by Holquin-Veras in the New York and New Jersey area, a similar classification of the freight sector was provided by Mullet and Poole (2006) in an article regarding trucking and road pricing (see Table 8). This breakdown closely resembles that of Pennsylvania.

Table 8: Freight Segment Classifications

Segment	Industry Structure	Hours of Operation	Payment Basis	Who Pays Toll?
Truckload (TL) for hire (Schneider, JB Hunt, etc.)	Large companies dominate; few terminal facilities	24/7	By the mile	Company
Owner / operator	Independent contractors or leased to large carriers	24/7	By the mile or percentage of revenue generated	Driver
Less than truckload (LTL) for hire (Yellow, Roadway, Con-Way)	Large companies dominate; large terminal networks	24/7 Monday through Friday, limited weekend operations	Hourly in local operations; by the mile in intercity operations	Company
Local delivery (Shenandoah's, Pride Dairy, Coca-Cola, Sysco Foods)	Varies widely-food, construction supplies, fuel, etc.	Daytime Monday through Friday, with some Saturday operations	Hourly	Company
Parcel/express (UPS, FedEx, DHL)	Dominated by UPS, FedEx, and DHL; large terminal networks	24/7 Monday through Friday, with limited weekend operations	Hourly in local operations; by the mile in intercity operations	Company
Private fleet (Wal-Mart, Kohl's, Tyson Foods)	Company fleet owns moving goods from central warehouses to retail locations	24/7 Monday through Friday, with limited weekend operations	Mix of hourly and by the mile	Company

This article reported that tolls are usually paid by the company - the exception being in the case of owner/operators when tolls are paid by the driver. The article also reported that truckers' belief that policy makers who favor road pricing fail to see truckers as stakeholders and rather just as revenue sources. They also belief that these policy makers

- favor social engineering as opposed to infrastructure development,
- favor tolling over taxes because tolls don't need public approval once the tolling authority is established, and
- are interested in local projects and not the interconnectedness of the national system (Mullet & Poole, 2006).

The article points out that truckers make operational changes to avoid congestion and delays, and that trucking companies are capable of making cost-benefit analysis regarding road pricing and alternatives on their own. Lastly, truckers do not always see the benefits of commuter congestion relief measures translating into benefits for trucks. Many trucks

and drivers are compensated by the mile rather than by the hour, and will alter their routes or hours of travel on their own to avoid congestion (Mullet & Poole, 2006).

Overall, the position of the trucking industry regarding tolls centers on not tolling existing interstate highway lanes, and only the pricing of voluntary lanes built to add capacity. Truckers prefer road pricing to incur a direct benefit to the user – whether in the form of increased size, weight, speeds and so forth and not just in relieved congestion (Mullett & Poole, 2006).

TOLL ROAD SAFETY & ENVIRONMENTAL JUSTICE

Aside from determining who uses toll roads, research into the impact of tolling facilities on various demographic sectors is pertinent. This impact should be weighed on both users and non-users. Improvements to the transportation facility should be weighed against the costs to both these groups as well. This analysis should also be studied from the approach of funding such infrastructure from other means as well.

Toll Road Safety

In a study conducted earlier this year, toll roads were found to be 36% safer on average than non tolling facilities. This is based on the 8.1 fatalities per billion vehicle miles traveled (VMT) on all the nation's expressways versus the 5.2 fatalities per billion VMT on toll facilities. This data was collected from 39 toll roads, 30 toll bridges and 6 toll tunnels in 20 U.S. states and the FHWA's Highway Statistics 2006 publication. Further analysis of fatality rates by facility type can be observed in Figure 20.

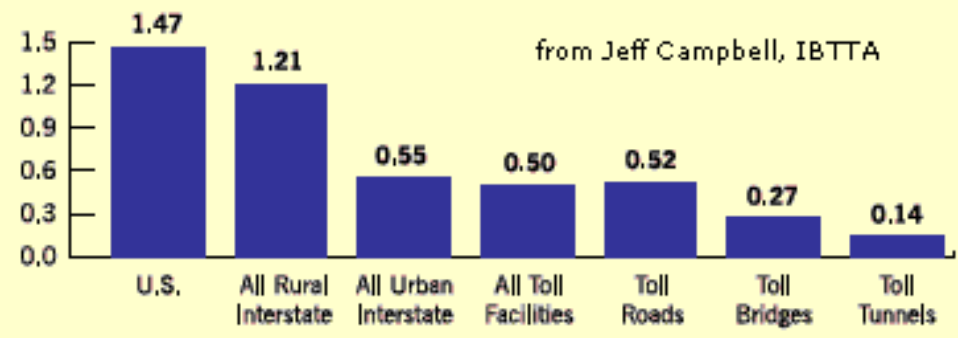


Figure 20: A Comparison of Fatality Rates on Toll Facilities and Non-Toll Facilities (Fatalities per 100 Million VMT, 2005)

This research concludes that overall, tolling facilities are safer in terms of fatalities per VMT than using non toll facilities (Campbell, 2008).

Environmental Justice

Superior safety results in a better service for users of tolling facilities compared to users of non-toll facilities, but the costs and benefits to those who do not use toll roads due to the toll road must also be considered. For example, the non-toll road users may benefit from decreased usage and improved travel times on the non-toll facilities because of the toll road's existence. Low income users unable to pay to use toll facilities, however, will not gain most of the benefits accessible to those with the ability to pay.

A recent study conducted by UCLA's Institute of Transportation Studies and USC's School of Policy, Planning, and Development of California's 91 express lanes - covered earlier in this literature review - concludes with some interesting findings regarding the fairness of such lanes versus other options of alleviating congestion. The study compares two possible funding mechanisms for transportation in the county and their impact on lower-income residents – i.e., a toll road and a sales tax measure.

As reported earlier, demographic research done on the 91 express lanes revealed that usage is disproportionately comprised of higher income individuals. The study compares this status quo case with the hypothetical scenario in which the lanes had instead been financed through tax revenues. The study found that under the sales tax scenario, current high users of the lanes would actually pay less – i.e., $26 million a year less. On the other hand, the lowest income residents would pay $3 million more a year. The study concludes that although toll roads are a regressive form of funding roadway systems, a sales tax is even more regressive (Schweitzer & Taylor, 2008).

AUSTIN TOLL ROAD DEMOGRAPHIC DATA

Unlike other metropolitan areas in the U.S. toll roads are a relatively new concept to funding transportation infrastructure in the Central Texas region. Faced with budget

constraints and a new investment vehicle through Comprehensive Development Agreements (CDAs), the Texas Department of Transportation (TxDOT) and Texas Transportation Commission has adopted innovative methods of raising revenue and developing road infrastructure projects to improve the mobility in Central Texas.

Initiated in 2002, the Central Texas Turnpike Project (see Figure 21) consists of 65 miles of new roadway in the Austin area. The majority of the system comprises 49 miles of State Highway (SH) 130, which runs north south in parallel with I-35 on the eastern side of the city. Approximately 3 miles of the system comprises the Loop 1 Extension, which runs north as a continuation of Loop 1 to the new SH 45N. SH 45N is also part of the system and runs east west from SH 130 in the east to US 183 in the west. All three these toll roads are managed by the TxDOT and were opened in November of 2006. In addition, US 183A opened in March 2007 and is managed by the Central Texas Regional Mobility Authority. The tolls on all four these toll roads can be paid for by using TxTag.

Figure 21: Central Texas Turnpike System Map

State Highway 130 Corridor Population Density

A study conducted by the Greater Austin Chamber of Commerce documented land development around non-tolled and tolled facilities in Texas cities, including Austin. The report compared the percentages of types of land development along facility corridors, such as the Dallas North Tollway, the Sam Houston Tollway, Loop 1 (Mopac), I-35 through Austin, and SH 130 in Austin. Table 9 provides the reported population densities per square mile along the tolling corridors.

Table 9: Toll Road Population Densities per Square Mile (SH 130, 2005)

Toll Road Corridor	Pop. Density per mi^2
Dallas North Tollway	3,281
President George Bush Turnpike	2,938
Loop 1 (Mopac)	2,428
I-35 (Central Texas)	2,185
Sam Houston Tollway	2,174
Hardy Toll Road	1,797
SH 130	213

The study found that SH 130 had a similar population density as the E-470 in Colorado, which points to the fact that both facilities are Greenfield projects in rural corridors. Both E-470 and SH 130 are also bypass roads. The Sam Houston Tollway is similarly classified, but has since experienced development along the corridor since its construction in the 1970s. All the other roads studied can be classified as commuter routes, serving local commuters, business and through traffic, and with higher population densities along the corridors (SH 130, 2005).

Toll Road Choice

In a study conducted by Wang, Persad and Walton entitled "The Impact of Traveler Information on Commuter's Travel Behavior and Toll Road Choice" (2005), an online survey of 473 Austin commuters was used to identify toll road choice characteristics for the Austin area. The overall objective of this study was to determine the changes in behavior of commuters based upon the availability of various levels of traveler information regarding potential routes of travel. An analysis of the sample data revealed

that willingness to pay (WTP) for toll facilities - if Toll Road information is provided - is directly related to household income. For the highest household income level ($150,000 to $199,999) 61.9% of the respondents in that income category were WTP for a toll facility. This compares to a 39% WTP for the lowest household income level ($25,000 to $34,999). However, the relationship between income and WTP does not linearly increase given higher income categories. WTP for usage of the toll road ranged from 39% to 47.1% for the four income categories between $35,000 and $149,999 - thereby not reaching the 62% indicated by the highest household income level. Interestingly, respondents in the $75,000 to $99,999 income category revealed a higher WTP for toll road usage than the respondents in the $100,000 to $149,999 income category. These results are summarized in Table 10 below. The authors also calculated based upon the reported WTP for toll facilities, a travel value of time of about $10.50 per hour for Austin commuters.

Table 10: Austin Commuters' Willingness to Choose Toll Roads by Income Levels

Household Income Level	Willingness to Choose Toll Roads if Information is Provided		Total
	No	Yes	
$25,000 to $34,999	61.0% (25 respondents)	39.0% (16 respondents)	100.0%
$35,000 to $49,999	56.9% (29 respondents)	43.1% (22 respondents)	100.0%
$50,000 to $74,999	61.0% (61 respondents)	39.0% (39 respondents)	100.0%
$75,000 to $99,999	52.9% (55 respondents)	47.1% (49 respondents)	100.0%
$100,000 to $149,999	55.5% (48 respondents)	44.8% (39 respondents)	100.0%
$150,000 to $199,999	38.1% (8 respondents)	61.9% (13 resondents)	100.0%

The authors also explored the relationship between gender and WTP to use toll roads if information is provided. Males reported a 46.9% WTP versus a 40.6% WTP for females (see Table 11). This finding contradicted the survey results at other toll facilities – specifically the SR 91 express lanes in California that indicated a higher support of toll facilities by female respondents - but the authors did not elaborate on these findings.

Table 11: Austin Commuters' Willingness to Choose Toll Roads by Gender

Gender	Willingness to Choose Toll Roads if Information is Provided		Total
	No	Yes	
Male	53.1%	46.9%	100.0%
Female	59.4%	40.6%	100.0%

Another finding from this research effort informs the marketing of toll facilities. When asked if the respondent would choose a toll road when traveler information indicated that he/she could save time on the roll road, 45% of respondents indicated that they would choose a toll road, while 55% said using the toll road was not an option. The primary reason cited for not choosing toll roads was "tax already paid" (Wang, Persad & Walton, 2004).

Characteristics of Austin Commuters

In a 2004 survey conducted by Dr. Chandra Bhat at The University of Texas at Austin, demographic information was obtained from a sample of 699 commuters who resided and worked within the three-county area of Hays, Williamson, and Travis counties. This sample data were subsequently weighted to account for the bias introduced by the web-based survey that was used. Specifically, the sample was weighted based on a multivariate distribution of race, income earnings, sex, household size, household type, and commute travel mode choice, using the 2000 census of population and housing survey summary file for the Austin area.

This survey found that only 2.5% of Austin area commuters telework. Also, an average commuter is willing to pay $12.00 for an hour of commute time savings – similar to the survey findings of Wang, Persad, and Walton (2004). The remainder of this section highlights the survey findings that characterize Austin commuters in terms of demographics.

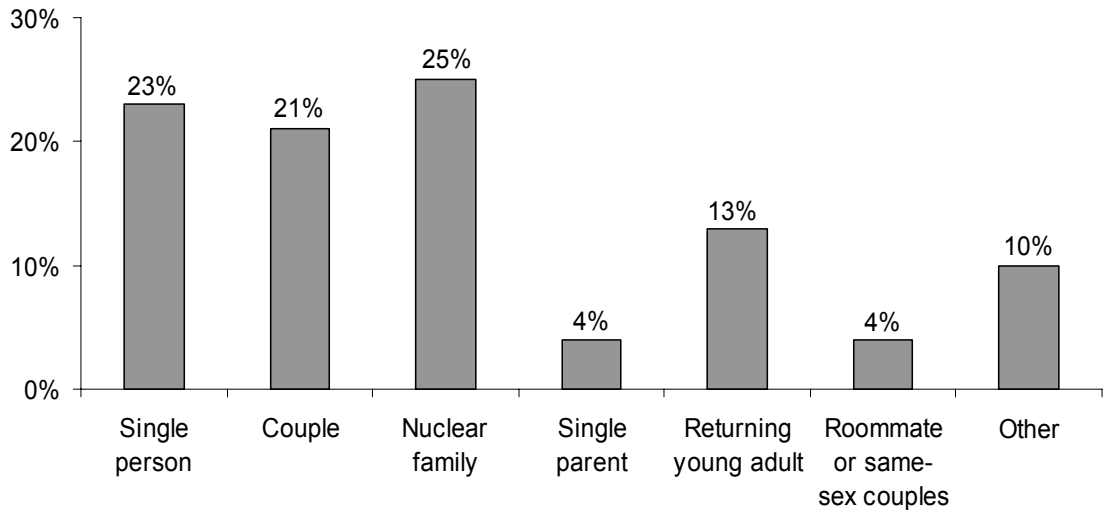


Figure 22: Distribution of Family Types

In comparison to the 2000 census for the city of Austin, the findings related to commuter household type and the overall population are fairly similar. This can be attributed to the sample being weighted to account for the bias introduced by the web-based nature of the survey. (See Figure 22 above.)

Slight variations are noticeable in higher commuter percentages among couples and nuclear families than the general census (19.6% Couple, 18.5% Nuclear family in the census). Discrepancies in the numbers could be present, due to the census not including the characterization of "Returning young adult", which the commuter survey uses to categorize households where a progeny over the age of 18 dwells in the same residence as parents, either during or after the attainment of higher education.

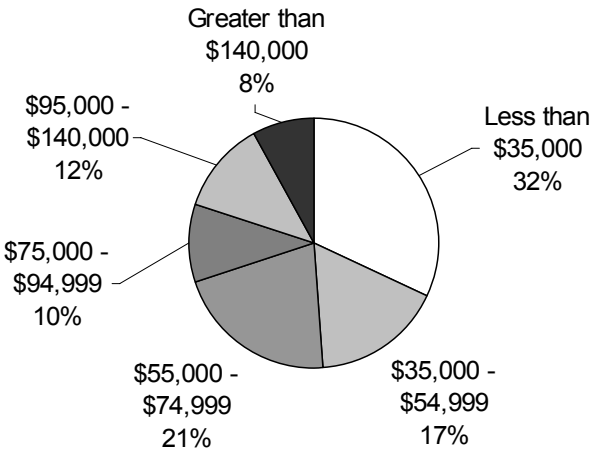


Figure 23: Distribution of Household Income

As with the survey analyzing toll road choice, little variation between the commuter survey and the 2000 census is apparent in intermediary income levels. Low and high income levels do present the usual trend, with lower incomes under represented in the commuter survey (32% for less than $35,000) when they comprise 40.5% of the census. In the case of higher levels of household income, households with income greater than $95,000 account for 20% of commuters but only 13.5% of the actual city population.

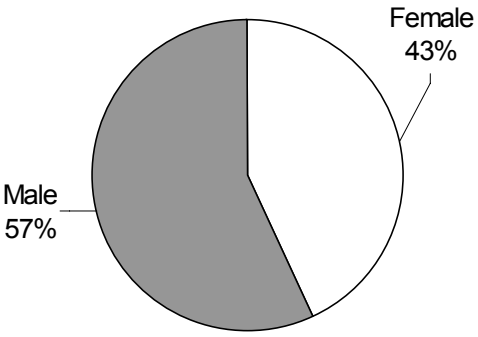


Figure 24: Gender Composition of the Commute Population

The findings of the commuter survey versus the census (see Figure 24) show a larger representation of males, who make up 51.4% of the census but represent 57% of commuters.

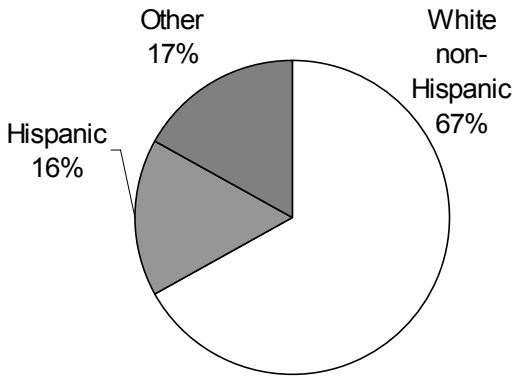


Figure 25: Racial Composition of the Commute Population

In the case of racial composition of commuters, those races characterized as other are equally represented in comparison to corresponding census findings. On the other hand, though Hispanics only make up 16% of commuters, they comprise 30.5% of Austin's population. Whites make up 52.9% of the census population. (See Figure 25)

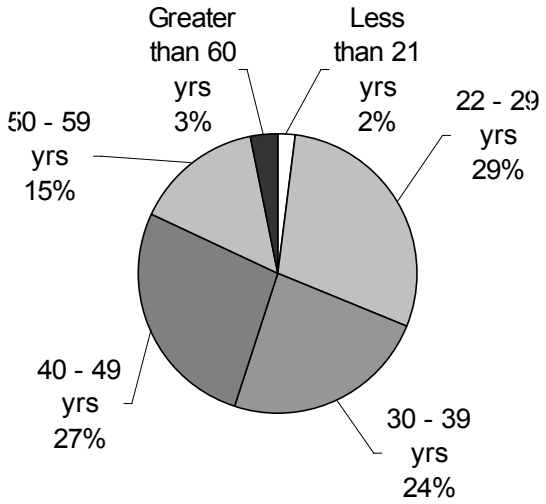


Figure 26: Age Distribution of Commuters

Other than the obvious under representation of individuals under the legal driving age, the distribution of percentages among the age of commuters, (see Figure 26), is fairly comparable to the census.

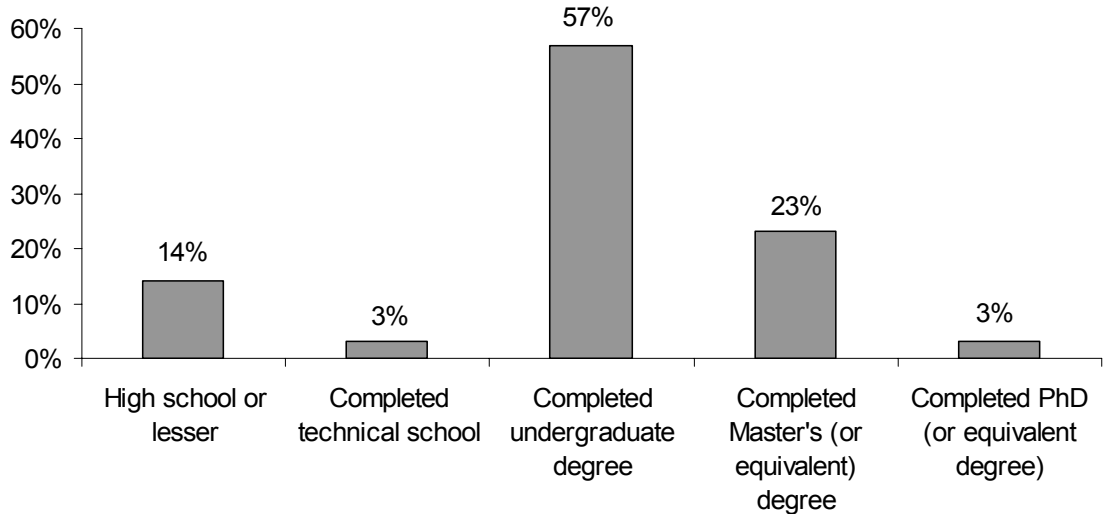


Figure 27: Distribution of Highest Level of Education

As with income, higher levels of education represent a higher share of commuters in comparison to the overall population. Individuals who have completed a masters or higher make up 14.7% of Austin represent 26% of commuters. Concurrently, Austin residents having an education of high school or less and completed technical school comprise 16.6% and 5.0% of the population, respectively – both values are lower among commuters, as shown in Figure 27.

As has been noted, the findings of the Austin Commuter Survey (Bhat, 2004) are particularly relevant when comparing to the overall census data (Census 2000) of the area.

CONCLUDING REMARKS

Overall, there have been significant variations in approaches to analyzing toll facility usage. The most significant work in terms of characterizing toll road user demographics uncovered in the literature has been for California's SR 91 Express Lanes. This study provided revealing results as to the typical characteristics of the SR 91 toll user. Also information regarding the North Texas Turnpike System, Pennsylvania Turnpike, John Kilpatrick Turnpike, the Florida Turnpike System, and the Georgia 400 users have

provided some insight and offered interesting approaches to analyze the demographic characteristics of toll road users.

Based on these studies, there seem to be a correlation between toll usage and higher incomes, as well as higher education levels. However, the findings relating to usage and gender seem to be contradictory. CA SR-91 finds a higher level of female users, whereas Pennsylvania and potential Austin users trend towards males. Data on Dallas tollways trends gender neutral among cash users, but favors males among those who use the electronic TollTag option available on the system. The only data on trip purpose, provided for CA SR-91 shows toll usage corresponding with child care pickup and shopping – justifying the larger share of females in some instances.

With regards to truck usage of toll roads, the information obtained by the Pennsylvania Turnpike shows that the majority of trips is long distance trips in excess of 500 miles. This differs from the findings of Holquin-Veras (2007) who reported that thru-trips only utilize toll facilities 1 to 3% of the time. One reason for this discrepancy could be that the Pennsylvania turnpike traverses the length of the state, while Holquin-Veras's study pertains to the New York/New Jersey area.

In the subsequent chapters, information obtained from potential toll road users – i.e., prior to the Central Texas Turnpike System's construction and operation – are analyzed. Also, recent data obtained from a telephone survey of users and non users of the Central Texas toll facilities are analyzed in Chapter 3. Chapter 4 will analyze the actual usage of commuters in the Central Texas area by analyzing transaction data linked to account types and zip codes. Finally, Chapter 5 provides some concluding remarks in terms of the demographic characteristics of toll and non-toll road users in Central Texas.

CHAPTER 2: CHARACTERISTICS OF POTENTIAL CTTS USERS

INTRODUCTION

In the summer of 2005, TxDOT funded NuStats to perform surveys of potential Central Texas Turnpike System (CTTS) users. This survey, conducted prior to the completion of the CTTS aimed primarily at obtaining information regarding users' knowledge of the central Texas road facilities, their support of different methods to fund transportation improvements, and their likelihood of using the CTTS once completed. The survey sought to obtain information regarding knowledge of toll road locations, transportation funding sources, and the respondents' sources of daily traffic information. Respondents were also asked about their inclination to acquire an electronic toll tag and factors influencing that inclination. A number of responses were linked to the demographic information obtained. The most interesting findings of this analysis are summarized in this section.

SURVEY METHODOLOGY

Conducted during the month of May 2005, the survey of 60 questions was administered via telephone in both English and Spanish to 1,500 individuals. The survey area that was targeted was defined as the Capital Area Metropolitan Planning Organization (CAMPO) planning area that contains the following five counties: Bastrop, Caldwell, Hays, Travis, and Williamson. The survey was conducted and an attempt was made to preserve participation percentages representative of county residence.

Due to discrepancies between the sample responses and the 2000 census data, both income and ethnicity were weighted in the final analysis. Under representation manifested in the sample for both Hispanics and lower income households. Education exhibited a similar under representation, but because this variable is related to income it was not weighted. Other under representations occurred among males and the lower age brackets. However, these were not weighted because of the relatively small margin of underrepresentation and legal restrictions on road usage of the demographic, respectively.

For additional information about the survey methodology, see Nustats report entitled *Central Texas Toll Road Baseline Marketing Survey, Final Report* (2006).

OVERALL STUDY FINDINGS

Given the objectives of the survey, the conclusions and recommendations revolved primarily around knowledge of transportation issues, the attitudes towards potential tolling facilities in Central Texas, and alternatives to these facilities. Key findings include the fact that most respondents were found to be knowledgeable of transportation issues and the Central Texas toll projects, but were evenly split regarding the need for toll roads. The most supported traffic relief strategy among those surveyed was the creation of high occupancy toll (HOT) lanes, while the least favorable was an increase in local gas taxes. Most respondents had a positive perception of the TxTag. The primary reason given for not acquiring a TxTag was that there were no toll road alternatives for their current route. The study found that those most likely to use toll roads are more inclined to acquire information online than those that indicated that they would not use a toll road. Finally, the study found that television is the best medium for marketing, especially for targeting ethnic minorities.

Most of the study recommendations pertained to marketing toll roads. It was proposed that TxDOT concentrated their marketing efforts on Williamson County because of its high proportion of toll road supporters and potential users. Marketing efforts should also target those with moderate to higher income levels (i.e., $25,000 and above) with the highest potential users having an income ranging between $25,000 and $75,999. The study also recommended that the TxTag be used for more applications than just paying tolls and that TxDOT communicates the need for toll roads due to budget constraints and the need for additional infrastructure sooner. Finally, it was considered important that the message be conveyed that all toll road revenues will stay in the area.

FURTHER STUDY ANALYSIS

For the purpose of this research, the collected data were further analyzed in an effort to characterize the potential toll road users. Slight discrepancies may exist between the data

tables included in the Nustats report and this document, as the baseline marketing survey analysis was based on weighted data (for income and ethnicity as noted in the survey methodology), while the analysis included in this chapter is based on the sample data.

Overall Study Demographics / Comparison to Commuter Survey

In an effort to characterize potential toll road users, the demographic variables, such as gender, ethnicity, age, income, education, and employment were analyzed. However, before these variables were related to potential usage, a number of cross-tabulations were prepared to explore the correlation between various demographic variables. Before these can be immediately compared to variables concerning usage however, they should first be viewed against each other to determine associated correlations. It was deemed important to understand these associations.

Table 12: Ethnicity by Income (% within Ethnicity, n=1500 sample data)

Income	Ethnicity					Total
	White	Hispanic	African American	Asian American	Other	
less than $25,000	8%	26%	20%	0%	8%	11%
$25,000 to $49,999	21%	24%	27%	4%	22%	21%
$50,000 to $74,999	21%	15%	16%	18%	24%	20%
$75,000 to $99,999	22%	15%	20%	29%	5%	21%
$100,000 to $149,999	20%	15%	14%	29%	30%	20%
$150,000 or above	8%	5%	4%	21%	11%	8%

From Table 12, it is evident that about 50 % of the Asian American respondents earned more than $100,000, while only 4% earned less that $50,000. On the other hand, 50% of the Hispanic and 47% of the African American respondents earned less than $50,000. Comparing the Nustats responses by income category with the Austin commuter survey responses seems to suggest that the lowest income category (i.e., less than $25,000) were under presented in the Nustats survey.

Table 13: Age by Income (% within Age, n=1500 sample data)

Income	Age						Total
	16 - 24	25 - 34	35 - 44	45 - 54	55 - 64	65+	
less than $25,000	30%	11%	6%	5%	12%	18%	11%
$25,000 to $49,999	33%	19%	18%	21%	20%	28%	21%
$50,000 to $74,999	11%	25%	16%	21%	18%	26%	20%
$75,000 to $99,999	8%	25%	25%	21%	16%	19%	21%
$100,000 to $149,999	15%	16%	24%	22%	25%	5%	20%
$150,000 or above	3%	4%	8%	6%	9%	0%	6%

In terms of age and income, it is evident from Table 13 that the lowest and highest income categories have the largest percentage of respondents earning less that $50,000. On the other hand, most of the respondents (i.e., 57%) aged 35 to 44 years earn more than $75,000.

Table 14: Ethnicity by Education (% within Ethnicity, n=1500 sample data)

Education	Ethnicity					Total
	White	Hispanic	African American	Asian American	Other	
High School or less	15%	44%	32%	16%	11%	19%
College or Technical	64%	48%	58%	39%	65%	62%
Graduate Degree	21%	8%	10%	45%	24%	19%

In terms of ethnicity and education level, it is clear from Table 14 that almost half of the Asian American respondents had a graduate education compared with 21% for White, 8% for Hispanic, and 10% for African American. On the other hand Hispanic and African American respondents with less than a high school or high school education amounted to 44% and 32%, respectively.

Table 15: Income by Education (% within Income, n=1500 sample data)

Education	Income						Total
	<$25k	$25-49.9k	$50-74.9k	$75-99.9k	$100-149.9k	>$150k	
High School or less	44%	27%	17%	12%	12%	7%	19%
College or Technical	53%	59%	66%	66%	63%	51%	62%
Graduate Degree	3%	13%	17%	22%	26%	42%	19%

Table 15 illustrates the results when income and education is cross-tabulated. As can be seen from Table 15, 44% of the respondents earning less than $25,000 have less than a high school or high school education. In comparison 42% of the respondents earning more than $150,000 have a graduate degree. In general, the results in Table 15 seem to suggest that higher incomes are associated with higher education levels.

Table 16: Survey by Ethnicity (% within Survey, n=1500 sample data)

Ethnicty	TxTAG
White	78%
Hispanic	11%
African American	5%
Asian American	2%
Other	4%

Table 16 illustrates the ethnicity of the respondents surveyed as part of the TxTAG marketing survey. As can be seen from Table 16, the majority of the respondents were White – representing the ethnic profile of the Central Texas commuter.

In terms of gender, males were 41.1% of the respondents and females were 58.9%.

Compared with census data, the survey found a slight oversampling of higher incomes and education, along with Whites. This was weighted accordingly in the initial findings of the original report. For the purpose of the following analysis however, the original sample data was used.

Will you use toll roads?

The TxTag marketing survey allows for a detailed analysis of the attitudes of potential toll road users in terms of acquiring a toll tag and more importantly in terms of their likelihood of using the Central Texas toll roads. Overall, 53.8% of the respondents indicated that they would use the toll roads, 38.1% indicated that they would not use the toll roads, and 8.1% did not know whether they would use the toll roads. These responses were further analyzed given specific demographic characteristics.

Table 17: Gender by Will you use toll roads? (% within Gender, n=1353 sample data)

Will you use toll roads?	Gender	
	Male	Female
Yes	52.9%	54.5%
No	40.2%	36.6%
Don't Know	7.0%	8.9%

As can be seen from Table 17, a slightly higher percentage of female respondents (54.5%) indicated that they would use the toll roads compared to the male respondents (52.9%). In total, 42.5% of the respondents who answered this question were male and 57.5% were female.

Table 18: Ethnicity by Will you use toll roads? (% within Ethnicity, n=1353 sample data)

Will you use toll roads?	Ethnicity				
	White	Hispanic	African American	Asian American	Other
Yes	52.5%	64.9%	57.8%	58.1%	46.2%
No	39.1%	29.8%	34.4%	29.0%	53.8%
Don't Know	8.4%	5.3%	7.8%	12.9%	0.0%

In terms of ethnicity, almost 65% of the Hispanic respondents indicated that they would use the toll roads, compared to 58.1% of the Asian American respondents, 57.8% of the African American respondents, and 52.5% of the White respondents. This was a surprising result, as the Hispanic respondents were found to earn comparatively lower incomes (see Table 12), which is typically associated with lower toll road usage. Finally, almost 40 % of the White respondents indicated that they would not use toll roads – the largest percentage of respondents when the other category is ignored.

Table 19: Income by Will you use toll roads? (% within Income, n=1353 sample data)

Will you use toll roads?	Income						
	<$25k	$25-49.9k	$50-74.9k	$75-99.9k	$100-124.9k	$125-149.9k	>$150k
Yes	53.9%	49.1%	50.5%	59.2%	57.1%	63.2%	65.6%
No	35.3%	44.6%	43.2%	33.2%	31.8%	32.4%	30.0%
Don't Know	10.8%	6.3%	6.4%	7.6%	11.0%	4.4%	4.4%

In terms of income, more than 63% of the respondents earning more than $125,000 – more than 65% of those earning more than $150,000 – indicated that they would use the toll roads. On the other hand, about 54% of those earning less than $25,000 indicated that they would use the toll roads. It seems that $75,000 is the pivoting point as around 50% of the respondents earning less than $75,000 indicated that they would use the toll roads compared to about 60% of the respondents earning more than $75,000.

Table 20: Education by Will you use toll roads?
(% within Education, n=1353 sample data)

Will you use toll roads?	Education				
	Grade School	GED or High School	Some college	College Graduate	Graduate Degree
Yes	51.1%	50.5%	48.5%	57.7%	58.4%
No	34.0%	41.1%	42.5%	35.0%	35.5%
Don't Know	14.9%	8.3%	9.0%	7.3%	6.1%

Similar to income, Table 20 shows that higher percentages of respondents with higher education levels indicated that they would use the toll roads compared to respondents with lower education levels, i.e., 58.4% of respondents with a graduate degree compared to 51.1% of respondents with less than a high school or high school education. Specifically, around 58% of respondents with a college degree or higher indicated that they would use the toll roads.

Table 21: Age by Will you use toll roads? (% within Age, n=1353 sample data)

Will you use toll roads?	Age					
	16 – 24	25 – 34	35 – 44	45 – 54	55 – 64	65+
Yes	54.7%	61.8%	59.1%	50.2%	44.8%	48.2%
No	33.7%	30.1%	34.2%	44.7%	43.8%	43.9%
DK	11.6%	8.1%	6.7%	5.1%	11.3%	7.9%

With respect to age, approximately 60% of respondents age 25 to 44 indicated that they would use the toll roads compared to 44.8% that are between 55 and 64 years old and 48.2% that are older than 65. Also, about 55% of the respondents that are between 16 and 24 years old indicated that they would use the toll roads. This seems to indicate that the younger demographic is more accepting of providing additional road infrastructure through toll roads.

Table 22 and 23 list the reasons provided by respondents for not using and using the toll roads, respectively. These tables were included in the TxTAG Baseline Marketing survey report, but were included in this report for the sake of completeness.

Table 22: Reason for Planning Not to Use New Toll Road (n=537 weighted data)

REASON FOR NOT USING	PERCENT TOTAL
Don't travel that area regularly/ No need to travel toll road	66%
I want to avoid paying a toll	22%
I'm against toll roads in general	8%
Other	1%
Don't know/Refused	3%
Total	100%

Among those choosing not to use toll facilities, the majority of respondents replied that the choice was mainly due to a toll road alternative not being an option for their route. Only just under a quarter of respondents expressed the aversion to having to pay a toll.

Table 23: Reason for Planning to Use New Toll Road (n=670 weighted data)

REASON FOR USING TOLL ROAD	PERCENT
Visiting, social, or recreational purposes	28%
Shopping or other errands	24%
Personal business or medical appointments	24%
Commuting to work or school	19%
Dropping off or picking up a child at school or daycare	4%
Don't know/Refused	1%
Total	100%

With respect to those who did state a preference for using a future toll facility, the reasons were varied. Near equal responses were given for recreational purposes, shopping and personal business. Commuting only accounted for almost a fifth of responses.

From the results, it appeared that the most likely users of Central Texas toll roads would be educated, female, Hispanic, have higher incomes, and be between 25 and 44 years old.. These survey findings can assist TxDOT when marketing both TxTags and tolling facilities in Central Texas.

Other Study Findings

Several other interesting observations can also be made when the demographic variables are cross-tabulated with attitudes towards tolling facilities and the acquisition of a toll tag, “knowledge” and “use of roadways”, and the sources from which respondents receive information about transportation.

Table 24 provides the results from cross-tabulating ethnicity with the respondent’s mode of travel to work.

Table 24: Ethnicity by Mode of Travel to Work
(% within Ethnicity, n=1047 sample data)

Work Mode	Ethnicity					Total
	White	Hispanic	African American	Asian American	Other	
Drive by yourself	81.6%	77.8%	80.4%	85.2%	85.7%	81.3%
Drive with someone else in your vehicle	6.7%	11.9%	9.8%	0.0%	4.8%	7.2%
Ride as a passenger in a vehicle	1.4%	6.3%	2.0%	3.7%	2.4%	2.1%
Ride as a passenger in a bus	.9%	1.6%	0.0%	0.0%	0.0%	.9%
No Response	9.4%	2.4%	7.8%	11.1%	7.1%	8.4%

Overall, more than 80% of the respondents travel to work by themselves. About 85.2% of Asian American respondents, 81.6% of White respondents, and 80.4% of African American respondents drove to work by themselves. However, a higher percentage of the Hispanic respondents (18.2%) drove with someone else in their vehicle or rode as a passenger in a vehicle to work (i.e., carpool).

The variable "user type" was defined as follows: regular user is someone that uses Central Texas roadways on average 5 or more days a week, occasional user uses the Central Texas roadways less than 5 days a week, and non-user rarely uses the Central Texas roadways.

Table 25: Ethnicity by User Type (% within Ethnicity, n=1500 sample data)

User Type	Ethnicity					Total
	White	Hispanic	African American	Asian American	Other	
Regular User	75.1%	82.4%	85.9%	93.5%	82.1%	77.1%
Occasional User	14.6%	9.1%	4.2%	6.5%	10.7%	13.2%
Non-User	10.3%	8.5%	9.9%	0.0%	7.1%	9.7%

From Table 25, it is evident that Asian American (93.5%), African American (85.9%), and Hispanic (82.4%) respondents tended to use the Central Texas roadways more frequently compared to White respondents (75.1%). In other words, a larger percentage

(almost 25%) of White respondents were occasional or non- users of the Central Texas roadways.

Table 26: Ethnicity by Central Texas Road Use (% within Ethnicity, n=1500 sample data)

Do you use these roads at least 3 times per week?	Ethnicity					Total
	White	Hispanic	African American	Asian American	Other	
None	24.5%	17.6%	14.1%	6.5%	17.9%	22.6%
FM 1325 (Burnet)	18.0%	14.5%	25.4%	35.5%	14.3%	18.2%
Anderson Mill Rd	12.4%	13.3%	21.1%	16.1%	8.9%	12.9%
McNeil Rd	3.5%	7.3%	1.4%	9.7%	5.4%	4.0%
RR 620	9.3%	7.3%	14.1%	6.5%	8.9%	9.2%
Lake Creek Pkwy	1.5%	0.0%	0.0%	0.0%	1.8%	1.2%
Parmer Ln	7.0%	7.3%	4.2%	6.5%	8.9%	6.9%
IH35, Round Rock	8.5%	18.8%	9.9%	3.2%	10.7%	9.7%
FM 973	1.5%	2.4%	1.4%	0.0%	3.6%	1.6%
FM 1625	0.4%	0.0%	0.0%	0.0%	0.0%	0.3%
Ed Bluestein	1.3%	2.4%	0.0%	0.0%	1.8%	1.4%
Decker Ln	0.2%	0.6%	2.8%	0.0%	0.0%	0.3%
Pflugerville Loop	0.3%	0.6%	0.0%	0.0%	0.0%	0.3%
FM 1460	0.4%	0.0%	0.0%	0.0%	0.0%	0.3%
US 183	10.8%	7.9%	5.6%	16.1%	17.9%	10.6%
Don't Know/Refused	0.4%	0.0%	0.0%	0.0%	0.0%	0.3%

These results are most clearly analyzed when compared with the ethnicity concentrations of the Central Texas area. For instance, in the case of African and Asian Americans more likelihood is apparent in the use of FM 1325 (Burnet Rd). This can be explained more clearly when shown the high concentration of African and Asian Americans in the north part of Travis County (see Appendix).

In the case of Hispanics, a large differentiation is apparent in this ethnic group's use of IH35. This characteristic can also be related to the large concentration of Hispanics along this facility (see Appendix). This trend could also explain the higher preference of

Hispanics towards potential toll road usage, as SH 130 serves as a direct alternative to the Austin interstate.

The last noted characteristic of this data is the low percentages of Hispanics and African Americans who use US 183. This can be correlated to their low population percentages in the northwest portion of Travis County, where this facility services.

Table 27: Income by Central Texas Road Use (% within Income, n=1500 sample data)

Do you use these roads at least 3 times per week?	Income							Total
	<$25k	$25-49.9k	$50-74.9k	$75-99.9k	$100-124.9k	$125-149.9k	>$150k	
None	33.6%	24.3%	23.7%	17.3%	19.6%	21.4%	14.1%	22.1%
FM 1325 (Burnet)	9.9%	11.0%	14.1%	24.8%	22.0%	32.9%	25.0%	18.2%
Anderson Mill Rd	9.2%	16.5%	12.0%	11.4%	11.9%	7.1%	23.9%	13.1%
McNeil Rd	3.1%	2.7%	3.7%	3.5%	8.3%	2.9%	5.4%	4.1%
RR 620	3.8%	8.2%	7.5%	9.4%	13.1%	8.6%	13.0%	8.9%
Lake Creek Pkwy	1.5%	1.6%	2.5%	1.2%	0.0%	0.0%	0.0%	1.2%
Parmer Ln	6.9%	7.8%	9.5%	6.3%	4.2%	7.1%	2.2%	6.8%
IH35	18.3%	10.6%	6.6%	10.6%	8.9%	10.0%	4.3%	9.9%
FM 973	0.8%	2.4%	1.2%	3.1%	1.8%	0.0%	1.1%	1.8%
FM 1625	0.0%	0.4%	0.0%	0.0%	0.6%	1.4%	1.1%	0.3%
Ed Bluestein	0.8%	0.8%	3.7%	2.0%	0.6%	1.4%	0.0%	1.6%
Decker Ln	0.8%	0.4%	0.0%	1.2%	0.0%	0.0%	0.0%	0.4%
Pflugerville Loop	0.0%	0.8%	0.4%	0.4%	0.0%	0.0%	0.0%	0.3%
FM 1460	0.8%	0.0%	1.2%	0.4%	0.0%	0.0%	0.0%	0.4%
US 183	10.7%	11.4%	13.3%	8.3%	8.9%	5.7%	9.8%	10.2%
Don't Know/Refused	0.0%	1.2%	0.4%	0.0%	0.0%	1.4%	0.0%	0.4%

Among this data, there is a certain trend among lower incomes and use of I-35 and US 183. Higher incomes tend to trend higher is use along FM 1325 (Burnet). This trend was also present among Asian Americans, who are also often of higher income. Higher incomes also tend to use RR 620 and Anderson Mill Rd in higher percentages. This

coincides with the makeup of Austin, as higher incomes tend to live in the west and to the north, where these two roadways are located (see Appendix).

Table 28 summarizes the respondents' knowledge of the location of toll roads in Central Texas. This variable was computed through inquiring of respondents the location to new tolling facilities being constructed in the Central Texas area. A respondent's knowledge level was determined through the number of correct responses to these inquiries.

Table 28: Gender by Knowledge of Toll Road Location
(% within Gender, n=1500 sample data)

Where the toll roads are?	Gender		Total
	Male	Female	
Knows where roads are	0.3%	0.0%	0.1%
Has a general idea	18.6%	7.5%	12.1%
Has no idea	81.0%	92.5%	87.8%

Most telling in this data is the fact that only one tenth of a percent of respondents knew the location of the toll roads at the time of the survey. Most of the respondents – i.e., 87.8% - had no idea as to the location of the toll roads. Finally, 12.1% of the respondents had a general idea as to the location of the toll roads. In this regard, 18.6% of the male respondents had a general idea of the location of the toll roads compared to only 7.5% of the female respondents.

Table 29: Ethnicity by Knowledge of Toll Road Location
(% within Ethnicity, n=1500 sample data)

Where the toll roads are?	Ethnicity					Total
	White	Hispanic	African American	Asian American	Other	
Knows where roads are	0.2%	0.0%	0.0%	0.0%	0.0%	0.1%
Has a general idea	13.7%	3.6%	5.6%	12.9%	10.7%	12.0%
Has no idea	86.2%	96.4%	94.4%	87.1%	89.3%	87.9%

Cross-tabulating ethnicity with knowledge of the toll road location (see Table 29) revealed that White (13.7%) and Asian American 12.9%) of the respondents had a general idea as to the location of the toll roads. On the other hand, Hispanic (96.4%) and African American (94.4%) respondents had no idea as to the location of the toll roads. The fact that only 3.6% of the Hispanic respondents had a general idea as to the location of the toll roads makes the results on potential toll road usage by this ethnic group (see Table 25) questionable.

Table 30 summarizes the results for responses to the question "Do you support toll road construction?" cross-tabulated against ethnicity.

Table 30: Ethnicity by Support of Toll Road Construction
(% within Ethnicity, n=1500 sample data)

Do You support toll road construction?	Ethnicity					Total
	White	Hispanic	African American	Asian American	Other	
Yes	38.4%	50.3%	45.1%	45.2%	32.1%	40.0%
Yes, under certain conditions	15.9%	7.9%	9.9%	16.1%	10.7%	14.5%
Not at all	41.3%	37.0%	43.7%	25.8%	50.0%	40.9%
Don't Know	4.2%	4.8%	1.4%	12.9%	7.1%	4.5%
Refused	0.2%	0.0%	0.0%	0.0%	0.0%	0.1%

It is interesting to note that more than 50% of Hispanic respondents indicated that they support toll road construction unconditionally. On the other hand, high percentages of White (41.3%) and African American (43.7%) respondents did not support toll road construction at all. Finally, about 16% of White and Asian American respondents provided conditional support for toll road construction.

Table 31 summarizes the results for responses to the question "Will you get a TxTAG?" cross-tabulated against ethnicity.

Table 31: Ethnicity by Will you get a TxTag? (% within Ethnicity, n=1500 sample data)

Will you get a TxTag?	Ethnicity					Total
	White	Hispanic	African American	Asian American	Other	
Yes	34.6%	46.7%	31.0%	61.3%	26.8%	36.1%
No	56.0%	50.3%	59.2%	32.3%	71.4%	55.6%
Don't Know	9.3%	3.0%	9.9%	6.5%	1.8%	8.2%
Refused	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%

An important finding of these results is the high percentage of Asian American respondents (61.3%) that indicated that they would obtain a TxTAG. On the other hand, 56% of White and 59.2% of African American respondents indicated that they would not get a TxTag.

Table 32 summarizes the results for responses to the question "Will you get a TxTAG?" cross-tabulated against income.

Table 32: Income by Will You Get a TxTag? (% within Income, n=1500 sample data)

Will you get a TxTag?	Income						
	<$25k	$25-49.9k	$50-74.9k	$75-99.9k	$100-124.9k	$125-149.9k	>$150k
Yes	32.1%	25.5%	31.1%	39.0%	53.0%	37.1%	60.9%
No	62.6%	68.6%	61.0%	51.2%	38.7%	55.7%	33.7%
Don't Know	5.3%	5.9%	7.9%	9.8%	8.3%	7.1%	5.4%

The results in Table 32 seem to suggest that the likelihood of acquiring a TxTag increases with income – the exception being respondents that earn between $125,000 and $149,999. Conversely, 62.6% of respondents earning less than $25,000 and 68.6% of respondents earning between $25,000 and $49,999 indicated that they would not get a TxTag.

Respondents who initially expressed disinterest in acquiring a TxTag were then asked whether they would be willing to get one if it could be used in Houston or Dallas.

Table 33: Ethnicity by Willingness to Get a TxTag if Usable in Dallas & Houston (% within Ethnicity, n=964 sample data)

Would you get a TxTag if you could use in Houston or Dallas?	Ethnicity					Total
	White	Hispanic	African American	Asian American	Other	
Yes	15.9%	27.3%	51.0%	33.3%	12.2%	18.9%
No	79.5%	69.3%	44.9%	50.0%	82.9%	76.5%
Don't Know	4.4%	3.4%	4.1%	16.7%	4.9%	4.5%
Refused	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%

When informed of added usability in Dallas and Houston, African Americans who were originally unfavorable to acquiring a TxTag appear to be the more likely to acquire TxTags. This characteristic also has merit among Asian Americans, though minimal among Whites and Hispanics. For Whites it almost appears to be a non factor in their decision making process towards acquiring a TxTag.

Respondents who initially expressed disinterest in acquiring a TxTag were then asked whether they would be willing to get one if it could be used for other services.

Table 34: Ethnicity by Willingness to Acquire a TxTag if Could be Used for Other Services (% within Ethnicity, n=787 sample data)

Would you get a TxTag if you could use for other services?	Ethnicity					Total
	White	Hispanic	African American	Asian American	Other	
Yes	17.9%	32.8%	16.7%	50.0%	22.2%	19.7%
No	75.2%	67.2%	75.0%	37.5%	77.8%	74.2%
Don't Know	6.7%	0.0%	8.3%	12.5%	0.0%	6.0%
Refused	0.2%	0.0%	0.0%	0.0%	0.0%	0.1%

When the option to use TxTag for other services is presented, Asian Americans originally unfavorable to acquiring an electronic reader seem the most enticed by this benefit. Again, Whites appear to be the least affected by such an added characteristic of TxTag. This benefit also seems to be minimally beneficial the African Americans, despite the trend when usability was increased to Dallas and Houston.

Table 35: Sources of Transportation Information (n=1130 sample data)

Source	Percent
Newspaper	3.7%
Television	58.2%
Radio	26.8%
Web site	8.2%
Other	3.0%

Finally, of interest to the objectives of this research effort, was the question relating to which form of media respondents rely on for transportation information. Of primary note in this data is the high percentage of individuals (58.2%) who receive their information on transportation from television.

Table 36: Ethnicity by TV Station Preference (% within Ethnicity, n=1192 sample data)

Which TV stations?	Ethnicity					Total
	White	Hispanic	African American	Asian American	Other	
KGBS (Fox)	28.4%	36.2%	46.9%	16.7%	33.3%	30.3%
KEYE (CBS)	20.0%	15.9%	18.8%	33.3%	33.3%	20.2%
KVUE (ABC)	21.3%	15.2%	17.2%	8.3%	11.9%	19.7%
KXAN (NBC)	14.0%	9.4%	0.0%	16.7%	9.5%	12.6%
KLRU (PBS)	1.5%	0.7%	0.0%	0.0%	0.0%	1.2%
TXCN (Cable)	0.7%	2.9%	1.6%	0.0%	0.0%	0.9%
News8	8.6%	15.2%	10.9%	25.0%	4.8%	9.7%
Don't Know	0.9%	0.0%	0.0%	0.0%	2.4%	0.8%
Refused	4.6%	4.3%	4.7%	0.0%	4.8%	4.5%

The data in Table 36 clearly shows that most respondents receive their information on transportation issues from mainly four TV stations: Fox, CBS, ABC, and to a lesser extent NBC. African American (46.9%), Hispanic (36.2%), and White (28.4%) respondents relies more on Fox, while Asian American (33.3%) respondents relies more on CBS for obtaining transportation information.

CONCLUSION

The data and analysis presented in this chapter aimed to characterize the potential users of the Central Texas toll road system, their knowledge of the toll road system, and their willingness to acquire a TxTag.

It is important to note, that this survey was conducted prior to the opening of the Central Texas toll roads and aimed mainly at informing marketing strategies for the distribution of TxTags in Central Texas. As it was conducted prior to the construction of the Central Texas Turnpike System, most respondents were unfamiliar with the facilities, their location, and the logistics of paying for using the facilities. Probably the best indicator of this fact is the extremely low numbers of respondents who where characterized as having a good knowledge of where these toll roads were located in Central Texas.

The survey also aided in characterizing the potential toll road users. From the results, it appeared that the most likely users of Central Texas toll roads would be educated, female, Hispanic, have higher incomes, and be between 25 and 44 years old. The data also showed that higher education levels are associated with higher income levels, suggesting some correlation between these two variables.

The survey also recorded the respondents' mode of travel to work, frequently used roadways, inclination towards acquiring a TxTag given different functionalities, general support for toll road construction, and finally the media sources accessed to obtain transportation information. These variables were analyzed to further characterize potential toll road users and to identify avenues for marketing the TxTAG. For example, information on frequently used roadways in the Central Texas area can serve as an indicator of a user's likelihood to use a parallel toll road, given it is an alternative route to such frequented roadway. The high usage of IH35 by Hispanics and their overwhelmingly favorable responses to the question about toll road usage can thus potentially have positive implications for the usage of SH130 by this ethnic group as it serves as a parallel facility to IH35.

The next chapter presents the findings of a survey of actual users of the CTTS and those who do not the use the system.

CHAPTER 3: CHARACTERISTICS OF CTTS USERS AND NON-USERS

INTRODUCTION

As a study had been done in 2005 to determine the interest in and potential usage of a toll road network in Central Texas, a follow up survey was done in 2008 to characterize the users of the system that had been constructed, as well as the non-users of the Central Texas Toll System. Similarly to the survey performed in 2005, the 2008 survey inquired about user preferences not only regarding toll road usage for different trip types, but also regarding payment method, potential additional services, reasons for using or not using the toll roads, and the demographic characteristics of both users and non-users.

The following section summarizes the salient findings of this survey – most notably the demographic characteristics of those using and not using the toll road system and their respective reasons. These findings may help to inform marketing strategies and future expansions of the system.

SURVEY METHODOLOGY

In the spring of 2008, a telephone survey was developed by the Center of Transportation Research and the Texas Turnpike Authority. It was then conducted by Harris Interactive of 1,507 Central Texas residents in five counties (Bastrop, Caldwell, Hays, Travis and Williamson) to characterize their use and non-use of the recently constructed Central Texas Turnpike System. Questions were also included to obtain information about the various trip purposes that toll roads are used for as well as how to improve the likelihood of non-users to use the system.

The unweighted sample data were obtained from Harris Interactive and analyzed. In other words the sample data was not weighted to account for the under of over representation of, for example, income and ethnicity in the sample. This should be kept in mind when considering the findings of the survey.

STUDY FINDINGS

The survey questions were developed in such a manor as to differentiate between the users and non-users of the Central Texas Turnpike System. This allowed for the characterization of both the users and non-users in terms of their trip types and demographic attributes.

Demographic Attributes

Of primary interest were the differences between the demographic attributes – ethnicity, income, gender, and education - of users and non-users of the CTTS. One of the survey questions asked whether the respondent has used any of the four toll roads in the Central Texas area: i.e., SH 130, Loop 1 North, SH 45 North or 183A. Those who replied "No" were considered non-users of the CTTS. Of the total 1,507 respondents surveyed, 55% were considered users, and 45% were considered non-users.

A cross tabulation of the income and ethnicity sample data revealed that about 33% of the White respondents and 36% of the Asian American respondents earned $75,000 or more. In comparison, 10% of the Hispanic and 10% of the African American respondents earned $75,000 or more. On the other hand, approximately 63% of the Hispanic and 55% of the African American respondents earned less than $50,000 compared to 32% of the White and 40% of the Asian American respondents. These results were similar to the findings of the 2005 Nustats survey.

Table 37: Ethnicity by Income (% within Ethnicity, n=1507 sample data)

Income	Ethnicity					Total
	White	Hispanic	African American	Asian American	Other	
$25,000 or less	13%	31%	26%	12%	19%	18%
$25,000 to $49,999	19%	32%	29%	28%	9%	23%
$50,000 to $74,999	19%	15%	20%	12%	24%	18%
$75,000 to $99,999	12%	7%	3%	12%	9%	9%
$100,000 and above	21%	3%	7%	24%	13%	14%

Also, similar to the 2005 Nustats survey, an analysis of the sample data revealed that 62% of those earning more than $75,000 have a college degree or higher. On the other hand 62% of the respondents earning less than $25,000 have a grade or high school education.

Table 38: Income by Education (% within Income, n=1507 sample data)

Education	<$25k	$25-49.9k	$50-74.9k	$75-99.9k	>$100k
Grade School	15%	9%	9%	0%	1%
High School	47%	37%	18%	13%	7%
Some College	23%	26%	21%	26%	15%
College Degree	12%	18%	32%	39%	44%
Graduate Degree	4%	10%	21%	23%	33%

Table 39 below compares the ethnicity profile of the CTTS users and non-users. As stated before, 55% of the respondents reported being users of the CTTS and 45% reported not using the system.

Table 39: Survey by Ethnicity (% within User Type, n=1507 sample data)

Ethnicity	CTTS	Non-User
White	53%	55%
Hispanic	27%	26%
African American	8%	9%
Asian American	4%	2%
Other	3%	4%

In terms of ethnicity, the sample profile of the CTTS users and non-users seems very similar. There therefore does not appear to be a substantial difference between the ethnic characteristics of the users and non-users of the CTTS. A notable difference between this sample and the 2005 Nustats marketing survey that was conducted before system construction is that Hispanic respondents indicated a higher intention of using the CTTS that what the 2008 survey revealed.

Table 40: Income Profile of CTTS Users and Non-Users
(% within User Type, n=1507 sample data)

Income	CTTS	Non-User
<$25k	13%	26%
$25-50k	22%	25%
$50-75k	18%	18%
$75-100k	11%	7%
>$100k	19%	8%

In terms of income, a substantial difference exists in the profile of the CTTS users and non-users. As can be seen from Table 40, 30% of the CTTS users earn more than $75,000 compared to 15% of the non-users. Also, 51% of the non-users earn less than $50,000 compared to 33% of the CTTS users. This finding corresponds to previous findings that concluded that lower income respondents tend not to use toll roads, and as income increases the tendency to use a tolling facility increases. This was also concluded in the 2005 Nustats survey.

Table 41: Education Profile of CTTS Users and Non-Users
(% within User Type, n=1507 sample data)

Education	CTTS	Non-User
Grade School	8%	7%
High School	25%	28%
Some College	20%	24%
College Degree	28%	26%
Graduate Degree	18%	15%

Similar to ethnicity, the education profile between CTTS users and non-users appear very similar. Although a slight higher percentage of CTTS users have a college or graduate degree, the difference is not as pronounced as in the case of income.

Table 42: Gender Profile of CTTS Users and Non-Users
(% within User Type, n=1507 sample data)

Gender	CTTS	Non-User
Male	54%	47%
Female	46%	53%

As has been evident from the literature, female survey respondents sometimes state a higher preference for toll roads that do not always translate into higher usage compared to male respondents. The gender profile of the 2008 sample data revealed that 54% of the CTTS users are male respondents and 46% are female respondents. On the other hand 47% of the non toll road users are male respondents and 53% are female respondents.

Road Specific Attributes

The previous section compares the demographic attributes of the users and non-users of the CTTS, i.e., looking at all four toll roads together. This section of the report explores the demographic attributes by individual toll road. This type of analysis can provide some insight into the user demographic profile of the individual toll roads.

Table 43: Ethnicity Profile by Toll Road (% within Facility, n=1507 sample data)

Ethnicity	SH 130	Loop 1 N	SH 45 N	183A
White	65%	60%	65%	52%
Hispanic	17%	19%	17%	29%
African American	7%	6%	6%	8%
Asian American	3%	4%	6%	5%
Other	2%	4%	3%	2%
Refused	6%	7%	5%	4%

The users of SH130 and SH 45N exhibit a very similar ethnicity profile: 65% of the users are White, 17% are Hispanic and 6% and 7%, respectively are African American. On the other hand, 52% of the users of 183A are White, 29% are Hispanic, and 8% are African American.

Table 44: Income Profile by Toll Road (% within Facility, n=1507 sample data)

Income	SH 130	Loop 1 N	SH 45 N	183A
less than $25,000	8%	8%	9%	14%
$25,000 to $49,999	16%	17%	14%	23%
$50,000 to $74,999	20%	20%	20%	15%
$75,000 to $99,999	12%	10%	14%	10%
$100,000 or more	23%	23%	25%	19%
Refused	21%	23%	19%	19%

The income profile of the users of SH130, Loop 1 N, and SH 45 N appears very similar with 23%, 23%, and 25% of the users respectively earning $100,000 or more. However, in the case of 183A 37% of the users earn less than $50,000 – compared to 24%, 25%, and 23% of the users of SH130, Loop 1 N, and SH 45 N, respectively.

Table 45: Toll Facility by Gender (% within Facility, n=1507 sample data)

Gender	SH 130	Loop 1 N	SH 45 N	183A
Male	58%	54%	51%	55%
Female	42%	46%	49%	45%

In accordance with the aggregate analysis, higher percentages of the individual toll road users are males. In the case of SH 130, 58% of the respondents were male. However, in the case of SH 45 N users almost half the respondents were female (49%).

Why Do You Use Toll Roads?

Respondents that indicated that they have used the CTTS (i.e., 824 of the 1,507 respondents surveyed) were asked their reasons for using the toll roads. The responses were grouped as follows:

- They are faster,
- They are safer,
- They are more reliable,
- Fewer trucks on the road,
- I use them for emergencies, and
- Other.

Respondents were allowed to select multiple reasons, so therefore a larger sample set was developed.

Table 46: Why Do You Use Toll Roads? (% within Demographic, n=1024 sample data)

	Faster	Safer	Reliable	Trucks	Emergencies	Other
Overall	58%	2%	3%	6%	0%	31%

Ethnicity	Faster	Safer	Reliable	Trucks	Emergencies	Other
White	56%	3%	3%	6%	1%	31%
Hispanic	61%	1%	1%	6%	0%	31%
African American	66%	5%	9%	3%	0%	17%
Asian American	49%	5%	0%	7%	0%	39%
Other	41%	0%	0%	4%	0%	56%
Refused	58%	0%	0%	6%	0%	35%

Income	Faster	Safer	Reliable	Trucks	Emergencies	Other
Less than $25,000	39%	4%	4%	6%	0%	46%
$25,000 to $49,999	60%	1%	3%	5%	1%	31%
$50,000 to $74,999	59%	2%	3%	8%	0%	28%
$75,000 to $99,999	55%	3%	3%	8%	0%	31%
$100,000 and more	63%	2%	3%	4%	1%	28%
Refused	61%	4%	1%	4%	1%	29%

Gender	Faster	Safer	Reliable	Trucks	Emergencies	Other
Male	74%	3%	4%	6%	0%	35%
Female	69%	3%	3%	8%	1%	44%

Overwhelmingly, most responses (58%) were that respondents use the toll facilities because they were faster. The second reason was given as “Other”, while each of the remaining reasons (e.g., they are safer) were mentioned by less than 6% of overall responses from respondents. The “Other” reasons were, however, not recorded.

In terms of demographic breakdowns, Hispanics and African Americans appeared to have the highest preference for toll roads due to their being faster. Safety was marginal among all most demographics as well, except again among Hispanics and African Americans, who both reported a 5% preference due to the reason. African Americans also responded the lowest for “Other” reasons.

With regards to income, most preferences are spread evenly – except among those less than $25,000, who reported a low preference due to the roads being faster and a higher

rationalization due to "Other" reasons. Females exhibited a similar difference compared with males, but not as pronounced.

Why Don't You Use Toll Roads?

It was also important to understand why non-users of the CTTS do not use the toll roads. Those respondents that indicated that they have not used any of the CTTS toll roads (i.e., 683 respondents) were asked why they have chosen not to use toll roads. Their responses were grouped as follows:

- No toll road on my route,
- Too expensive,
- Wouldn't save me any time,
- Privacy concerns, and
- Other[3]

Each respondent could state more than one reason for not using a CTTS toll road for their commute, recreational (non-work related), and business travel, respectively. The responses for not using a toll road for each trip type are illustrated below in light of the demographic attributes of the respondents. Again, sample size varies as respondents could select multiple reasons and the questions were aimed at identifying the preference not to use toll roads for particular trips.

[3] The specific reason was not recorded.

Table 47: Why Don't You Use Toll Roads for Work Commute Trips?
(% within Demographic, n=287 sample data)

	No Route	Expensive	Time Save	Privacy	Other
Commute-Trips	60%	6%	6%	0%	29%

Ethnicity	No Route	Expensive	Time Save	Privacy	Other
White	63%	6%	6%	0%	25%
Hispanic	48%	6%	8%	0%	38%
African American	69%	0%	0%	0%	31%
Asian American	64%	18%	9%	0%	9%
Other	55%	0%	9%	0%	36%
Refused	73%	0%	0%	0%	27%

Income	No Route	Expensive	Time Save	Privacy	Other
Less than $25,000	22%	0%	0%	0%	78%
$25,000 to $49,999	58%	6%	1%	0%	34%
$50,000 to $74,999	67%	4%	4%	0%	24%
$75,000 to $99,999	42%	15%	18%	0%	24%
$100,000 and more	73%	5%	9%	0%	14%
Refused	59%	2%	2%	0%	37%

Gender	No Route	Expensive	Time Save	Privacy	Other
Male	59%	50%	63%	0%	60%
Female	41%	50%	38%	0%	40%

With regards to work related trips, not having a route alternative is the largest reason for deciding not to use a toll road. In terms of specific demographic characteristics, Asians reported several reasons for not using toll roads, including that of expense and no time savings. Respondents in the lowest income bracket (less than $25,000) listed "Other" as the predominant reason for not using the facilities. Males and females appear equal in reasons not to use toll roads for work related trips.

Table 48: Why Don't You Use Toll Roads for Non-Work Related Trips?
Overall and by Demographic (% within Demographic, n=266 sample data)

	No Route	Expensive	Time Save	Privacy	Other
Non-Work Trips	25%	20%	12%	0%	43%

Ethnicity	No Route	Expensive	Time Save	Privacy	Other
White	35%	18%	12%	1%	33%
Hispanic	11%	13%	16%	0%	60%
African American	35%	15%	8%	0%	42%
Asian American	35%	55%	0%	0%	10%
Other	8%	25%	0%	0%	67%
Refused	13%	40%	13%	0%	33%

Income	No Route	Expensive	Time Save	Privacy	Other
Less than $25,000	18%	10%	3%	0%	69%
$25,000 to $49,999	23%	25%	8%	0%	45%
$50,000 to $74,999	23%	17%	18%	0%	42%
$75,000 to $99,999	21%	32%	16%	0%	32%
$100,000 and more	39%	18%	7%	0%	36%
Refused	28%	22%	15%	2%	33%

Gender	No Route	Expensive	Time Save	Privacy	Other
Male	23%	22%	16%	0%	38%
Female	27%	18%	5%	1%	50%

When it comes to non-work related trips, expense and time savings appear to have a larger share of impact compared with trips for commuting to work. "Other" also takes a larger overall share as a reason against use. Again, Asian Americans report a larger share of concern over the expense of trips than other demographics. The lowest income bracket again also reports "Other" as their major reason for not using toll roads for non-work trips. Lastly, males have a slightly higher response to expense and lack of time savings for not using toll roads during these trips.

Table 49: Why Don't You Use Toll Roads for Business Trips?
Overall and by Demographic (% within Demographic, n=416 sample data)

	No Route	Expensive	Time Save	Privacy	Other
Business Trips	29%	8%	7%	2%	55%

Ethnicity	No Route	Expensive	Time Save	Privacy	Other
White	29%	8%	2%	0%	60%
Hispanic	22%	11%	11%	5%	51%
African American	39%	0%	19%	0%	42%
Asian American	45%	5%	5%	0%	45%
Other	57%	0%	7%	0%	36%
Refused	24%	0%	12%	0%	64%

Income	No Route	Expensive	Time Save	Privacy	Other
Less than $25,000	31%	0%	7%	7%	55%
$25,000 to $49,999	30%	10%	4%	3%	53%
$50,000 to $74,999	24%	10%	15%	0%	50%
$75,000 to $99,999	25%	8%	8%	2%	57%
$100,000 and more	31%	8%	2%	0%	58%
Refused	34%	3%	4%	1%	57%

Gender	No Route	Expensive	Time Save	Privacy	Other
Male	34%	7%	8%	2%	48%
Female	22%	8%	5%	1%	64%

When it comes to business trips, "Other" again dominates the percentages with "No Route" being the next largest reason. "Other" also seems to prevail among the demographic breakdowns, with only slight variations among gender and income. In terms of ethnicities, African Americans report a higher percentage of feeling the toll roads would not save as much time.

Payment Preferences

Respondents were asked a question regarding their preferred method of payment for using a toll facility. This question was presented to both toll road users and non-users. The data revealed the following preferences in terms of method of payment:

- Paying tolls in cash at tollbooths, 28%,
- Paying a monthly bill sent in the mail, 15%, and
- Paying with an electronic toll tag like TxTag, 57%

These results were further analyzed to distinguish the payment method preferences between CTTS users and non-users and in light of the demographic attributes of the respondents.

Table 50: Payment Preference by User Type (% within User Type, n=1507 sample data)

User Type	Cash	Mail	TxTAG
CTTS	19%	13%	68%
Non-User	39%	18%	43%

The data revealed that 68% of the CTTS users prefer to pay by TxTAG. On the other hand, only 43% of non-users indicated that they prefer to pay by TxTAG, while 39% indicated that they prefer to pay cash. This could be a factor in their status as non-users to begin with. Only 13% of the CTTS users and 18% of the non-users indicated that they prefer to pay a monthly bill that is received in the mail.

Table 51: Payment Preference by Ethnicity (% within Ethnicity, n=1507 sample data)

Ethnicity	Cash	Mail	TxTAG
White	28%	11%	61%
Hispanic	27%	24%	49%
African American	29%	20%	51%
Asian American	16%	10%	73%
Other	55%	5%	39%

In terms of ethnicity, Asian Americans overwhelming preferred to pay tolls via the TxTAG (73% of the respondents), while only 16% preferred to pay cash at tollbooths and 10% preferred to pay a monthly bill. White respondents also preferred to pay via TxTAG (61% of respondents), although about 28% (more than a quarter) preferred to pay cash. Hispanic and African American respondents indicated a higher preference for paying a monthly bill – 24% and 20% of respondents, respectively – compared with White (11%) and Asian American (10%) respondents.

Table 52: Payment Preference by Income (% within Income, n=1507 sample data)

Income	Cash	Mail	TxTAG
$25,000 or less	38%	19%	42%
$25,000 to $49,999	30%	15%	55%
$50,000 to $74,999	27%	22%	51%
$75,000 to $99,999	15%	16%	69%
$100,000 or above	15%	8%	77%

From the data in Table 52, there seems to be a relation between income and payment method preference. While 77% of respondents that earn $100,000 or more preferred to pay via the TxTAG only 42% of respondents earning $25,000 or less preferred this payment method. Conversely, while 38% of respondents that earn $25,000 or less preferred to pay cash, only 15% of respondents earning $100,000 or more preferred this payment method.

Table 53: Payment Preference by Gender (% within Gender, n=1507 sample data)

Gender	Cash	Mail	TxTAG
Male	25%	15%	60%
Female	31%	15%	53%

In terms of gender, 60% of males preferred the TxTAG payment method (compared to 53% of females) and 25% of male respondents preferred the cash method compared to 31% of female respondents.

TxTag Usage

Given that 57% of respondents indicated that their preferred payment method for using toll roads is the TxTAG, this section explored the reported usage of the technology by the respondents. Of all those surveyed, only 35% claimed they had a TxTag on their vehicle. The responses to the question whether the respondent had a TxTAG on his/her vehicle are reported in this section in light of the respondents' demographic attributes.

Table 54: Do You Have TxTag on Your Vehicle? by Ethnicity
(% within Ethnicity, n=1313 sample data)

Ethnicity	Yes	No
White	42%	58%
Hispanic	20%	80%
African American	26%	74%
Asian American	41%	59%
Other	21%	79%

As can be seen from Table 54, 80% of the Hispanic and 74% of the African American respondents did not have a TxTAG on their vehicle. This supports their indicated preference for using cash to pay for toll road usage or to pay a monthly bill (see Table 51). White and Asian American respondents, on the other hand, reported that they have TxTAG's on their vehicles (42% and 41%, respectively). This supports their indicated preference for using the TxTAG as a preferred payment method (see Table 51). However, it seems that the strong preference expressed for this (61% and 73%, respectively for White and Asian American respondents) payment method have not translated in the same level of TxTAG penetration for these ethnicity groups.

Table 55: Do You Have TxTag on Your Vehicle? by Income
(% within Income, n=1313 sample data)

Income	Yes	No
$25,000 or less	11%	89%
$25,000 to $49,999	25%	75%
$50,000 to $74,999	31%	69%
$75,000 to $99,999	51%	49%
$100,000 or above	57%	43%

Table 55 illustrates that 89% of respondents earning $25,000 or less do not have a TxTAG on their vehicle compared to 43% of respondents earning $100,000 or more. These results seem to support the findings of Table 52, although again it is evident that the preference for using the TxTAG as the preferred payment method has not resulted in the same level of TxTAG penetration for all these income categories.

Table 56: Do You Have TxTag on Your Vehicle? by Gender
(% within Gender, n=1313 sample data)

Gender	Yes	No
Male	36%	64%
Female	33%	67%

Similarly, comparing the results in Table 53 and Table 56, it seems that the respondents overstated their preference for using the TxTAG as the preferred payment method. Or at least, that this preference has not translated into respondents acquiring a TxTAG for their vehicles. For example, 60% of male respondents (53% of female respondents) have indicated that they prefer the TxTAG as method for paying tolls, yet only 36% of the male respondents (33% of female respondents) have acquired a TxTAG.

Service Improvements

The survey also included questions that aimed to obtain information to inform marketing strategies to enhance the usage of the CTTS and to increase the market penetration of the TxTAG. First, respondents who initially indicated disinterest in acquiring a TxTAG were asked if they would acquire one if they knew that they could use it in Houston and Dallas to pay tolls. About 35% of the respondents answered "yes". Those that answered "no" were asked it they would acquire a TxTAG if it would save them 10% on all Texas toll roads. About 16% of these respondents answered "yes". The remaining "no" respondents were then asked if they would acquire a TxTAG if it could be used to pay for other public services. About 29% of these respondents answered "yes". The results to these questions and corresponding sample sizes are summarized in Table 57.

Table 57: Service Improvement Preference (n=978, 588, & 467 sample data respectively)

Would you get a TxTag if you knew it could be used for paying tolls in Houston or Dallas?	35%
What if you knew that it saves you 10% or more on tolls statewide?	16%
What if it could be used for paying for other public services, such as parking at the airport or city or private parking garages?	29%

These responses were also cross-tabulated with the various demographic variables, but the responses appeared similar across ethnicity, income, and gender.

Finally, respondents were asked about additional services that can be offered at toll plazas to enhance usage of the facilities. Table 58 summarizes the responses received. As can be seen most respondents favored the addition of gas stations (53%), restrooms (44%), and convenient stores (32%) at the toll plazas. Again, responses in the "Other" category were not recorded.

Table 58: Service Addition Preference (n=1507 sample data)

Gas Stations	53%
Convenience Stores	32%
Fast Food Franchises	29%
Dry Cleaning Franchises	7%
Banking Locations	19%
TxTag Customer Service	30%
Restrooms	44%
None	17%
Other	9%

These responses were also cross-tabulated with the various demographic variables, but the responses appeared similar across ethnicity, income, and gender.

CONCLUSION

This analysis provides significant insight into the characteristics of the users and non-users of the CTTS, as well as their reasons for using and not using the Central Texas toll roads. The available data was furthermore analyzed to characterize the users of each of the four toll road facilities in Central Texas. The information on preferred toll payment method, the responses to the question whether the respondent have a TxTAG on his/her vehicle, as well as the responses to the questions asking about initiatives that could enhance the facilities and increase TxTAG market penetration could be useful in marketing and improving usage of the CTTS.

Highlights of this data include the direct correlation between income and toll usage, along with education and toll usage – those these two characteristics are in themselves related. Also of note among demographics and usage was the tendency for males to prefer toll roads more than females, despite the potential user survey reporting a preference of females to use the system.

Road specific findings included the fact that 183A draws more minority users and users of lower incomes. The survey also found that most use toll roads because they are faster. Those who do not use toll roads are not as decisive about such a decision, but higher percentages are present in there not being a route available and the expense of toll roads.

Analysis of actual users however shows that those less willing to get a TxTag are more unlikely to use the toll road. The conclusion could therefore be drawn that not using a toll road is more due to the fact that an individual does not have a TxTag. Those who actually own TxTags also tend to be more educated and have higher incomes. They also tend to be White or Asian American.

Of improvements suggested in the survey to the system, the most popular were adding restrooms and gas stations to tolling plazas as well as allowing for TxTag use in Houston and Dallas – the later currently already being available.

CHAPTER 4: ANALYSIS OF TRANSACTION DATA

INTRODUCTION

Although surveys are useful in gathering opinions and respondents' preferences regarding a toll facility, they reflect only perception and intention and do not necessarily translate into usage of the CTTS. It is therefore important to evaluate the usage of a toll facility by analyzing usage data. Toll roads are unique in that actual records exist of those who use the roads and when they use them. A substantial amount of information can be gathered from each tag that crosses a toll plaza. Acquiring and analyzing this data provides a unique insight into the actual usage of the toll facility. However, because of the nature of the data there are some limitations to the analysis. For example, specific demographic data, such as income, is often not linked to toll tag records nor are reasons for using the toll roads. These types of information can only be obtained from surveys. On the other hand, available data from toll transactions include the registered billing address, type of account (commercial or non-commercial), axle count, payment type, and time-of-day that the transaction occurred. Such data can thus be used to characterize the users of specific toll facilities in terms of these attributes.

A sample of 931,360 toll transactions was analyzed for the CTTS – specifically, Loop 1, SH 130, and SH 45. All transactions occurred during the week of November 5th to November 11th, 2007. The transaction data included the day and time of the transaction, the plaza where recorded, account type (commercial or non-commercial), axle count and the billing zip code where the toll tag is registered. The results of this data analysis are summarized in this chapter.

COMMERCIAL USE

Given the nature of the CTTS, it can currently be regarded as mostly a commuter system. Both Loop 1 and SH 45 are relatively short sections that aim to provide congestion relief to commuters, while SH 130 which will eventually serve as a bypass around Austin is not fully constructed yet. At the time the data was obtained, SH 130 only went as far south as

TX-71. Given the characteristics of the CTTS at the time the sample was collected, the commercial transactions as a percentage of total transactions appear reasonable (see Table 59). Commercial accounts are registered as such when applying for an account – they consist of fleets of vehicles with a single billing address. From Table 59 it is evident that about 11% of the transactions were conducted by commercial account holders.

Table 59: CTTS Commercial vs. Non-Commercial Traffic

Account Type	**Frequency**	**Percent**
Commercial	98,460	10.6%
Non-Commercial	832,900	89.4%
Total	931,360	100.0%

Table 60 below provides the breakdown of commercial and non-commercial transactions by toll facility.

Table 60: Commercial vs. Non-Commercial Traffic by Roadway

	Percent within Roadway			Total
Account Type	Loop 1	SH 45	SH 130	
Commercial	6.70%	8.20%	18.70%	10.60%
Non-Commercial	93.30%	91.80%	81.30%	89.40%

As could be anticipated, commercial transactions represent a low percentage of total transactions – i.e., less than 10% - on Loop 1 (6.7%) and SH 45 (8.2%). On the other hand, commercial transactions represent almost 20% of total transactions on SH130. This percentage is anticipated to increase when the road is completed further to the south, thereby forming a bypass around Austin.

WEEKDAY VS. WEEKEND, PEAK HOUR VS. OFF PEAK

The data was also analyzed in terms of day-of-week travel by commercial and non-commercial accounts.

Table 61: Account Type by Weekday/Weekend

Percent within Account Type		
Account Type	Weekday	Weekend
Non-Commercial	80.70%	19.30%
Commercial	90.79%	9.21%
Total	81.77%	18.23%

As can be seen approximately 80% of non-commercial transactions occur on a weekday and 90% of commercial transactions occur on a weekday. It is understandably that weekday usage for both account types are a larger share of total transactions. Interesting to note though is that non-commercial weekend transactions comprise almost 20% of total transactions.

Also of interest is whether a transaction was recorded during a peak hour or off peak hour. Peak hours were defined as the hours between 6 and10am and 3 and 7pm on a week day. Overall for the CTTS, 62.3% of the transactions took place during peak hours and 37.7% during off peak hours. Table 62 below illustrates the percentage transactions by account type in the peak and off-peak hours.

Table 62: Account Type by Time of Transaction (% within Account Type)

	Off Peak	Peak	Total
Non-Commercial	37.20%	62.80%	100.00%
Commercial	41.79%	58.21%	100.00%
Total	37.68%	62.32%	

Though there is a slightly larger share of commercial traffic during off peak hours, the share is likely not large enough to be too significant. This can be attributed to the fact that users (particularly commercial ones) shift use to off peak hours to avoid congestion. In the case of these roadways, congestion has yet to be an issue during peak hour traffic. This would lead to a small correlation between transaction time and increased commercial users.

AXLE COUNTS

The transaction data obtained also recorded the number of axles associated with each toll transaction. Table 63 summarizes the percentage transactions by number of axles.

Table 63: Axle Count by Roadway

	Percent within Roadway			Total
Axles	Loop 1	SH 45	SH 130	
0	0.77%	0.89%	0.93%	0.87%
2	97.53%	96.39%	91.30%	95.36%
3	1.05%	1.59%	3.71%	2.00%
4	0.39%	0.52%	1.35%	0.71%
5	0.21%	0.50%	2.50%	0.94%
6	0.04%	0.07%	0.11%	0.07%
7	0.01%	0.03%	0.09%	0.04%
8	0.00%	0.00%	0.00%	0.00%
9	0.00%	0.00%	0.00%	0.00%
10	0.00%	0.00%	0.01%	0.00%

As can be seen from Table 63, two axle vehicles account for the majority of transactions recorded on the CTTS and specifically on Loop 1 and SH 45. A slightly lower percentage of two axle transactions are recorded on SH 130 (91.3%) compared to Loop 1 (97.5%) and SH 45 (96.4%), which seems to correspond to the slightly higher percentage of commercial transactions on SH 130.

Axle counts of 0 are likely due to reader error, and thus are negligible. Table 64 below summarizes the percentage of non-commercial and commercial transactions by axle count and the percentage transactions by axle category for non-commercial, commercial, and total transactions.

Table 64: Axle Count by Account Type

Axles	Percent within Axle Count: Non-Commercial	Percent within Axle Count: Commercial
0	89.12%	10.88%
2	92.19%	7.81%
3	19.37%	80.63%
4	41.48%	58.52%
5	6.65%	93.35%
6	1.15%	98.85%
7	0.00%	100.00%
8	0.00%	100.00%
9	25.00%	75.00%
10	19.05%	80.95%
Total	89.43%	10.57%

Axles	Percent within Account Type: Non-Commercial	Percent within Account Type: Commercial	Total
0	0.87%	0.90%	0.87%
2	98.30%	70.48%	95.36%
3	0.43%	15.25%	2.00%
4	0.33%	3.90%	0.71%
5	0.07%	8.34%	0.94%
6	0.00%	0.70%	0.07%
7	0.00%	0.41%	0.04%
8	0.00%	0.01%	0.00%
9	0.00%	0.00%	0.00%
10	0.00%	0.02%	0.00%

Though a small percentage of the two axle transactions are commercial transactions (7.81%), more interesting to note is the fairly high percentages of the 3+ axle transactions that are non-commercial transactions – for example 41 % of the four axle transactions. This is likely vehicles towing a two axle trailer (for example with a boat) that are registered to non-commercial accounts. Also interesting to note is that 70.48% of the commercial transactions are 2-axle transactions, 15.25% are 3-axle transactions, and about 9.5% are 4+ axle transactions. 5-axle commercial vehicles only comprised 8.34% of the total commercial transactions on the system.

ZIP CODE ANALYSIS

The transaction data also captured the zip code of the billing address of each electronic toll tag account. This data allowed for a geographical analysis of the transactions by the registered account holders in the Central Texas area. Though this data represents a one week period during November, some inferences can be deduced about the residence or base location of users of the system.

Initially, the data was analyzed in terms of the number of transactions per zip code to determine those zip codes with the highest levels of toll transactions. However, because

zip codes vary in size, the transaction data was normalized by the area of the corresponding zip code. Table 65 summarizes the top ten zip codes in terms of the number of toll transactions per square mile.

Table 65: Zip Codes with the Top 10 Highest Transaction Concentrations on CTTS

Zip code	Transactions/mi^2
78717	5825
78664	4967
78728	3140
78660	2564
78681	2145
78727	2105
78613	1759
78759	1534
78634	1375

Table 65 shows that the highest transactions per square mile were recorded in billing zip codes that are relatively close to SH 45, with 78634 (Hutto) in the East and 78613 (Cedar Park) in the West. The billing zip code with the highest transactions per square mile was 78717 located in the Cedar Park area just northeast of the intersection of SH 45 and US-183 (see Figure 28). In terms of actual transactions, 44,587 transactions were billed to 78717 in the one week period, representing 4.8% of the total transactions during the sample period. Zip code 78664, which had the second highest transactions per square mile, recorded the most transactions, i.e., 155,479 transactions or 16.7% of the system's total. Zip code 78664 is located in Round Rock, just north of SH 45 and between I-35 and SH 130.

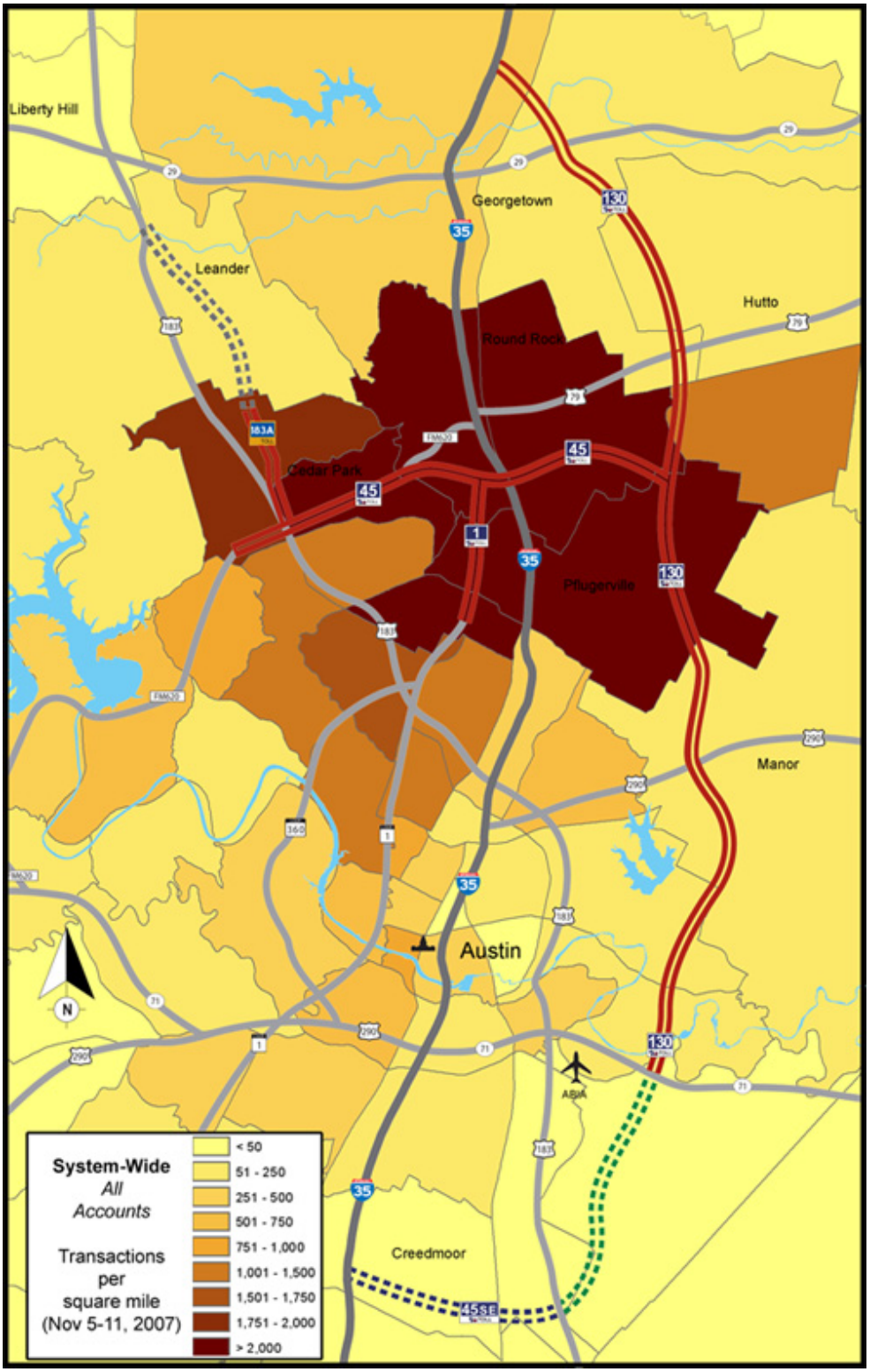


Figure 28: Transaction Data by Zip Codes

The same analysis was conducted to identify the top ten zip codes in terms of the number of transactions per square mile for non-commercial transactions. The results were similar to the results for all the toll transactions. This is likely due to the fact that non-commercial transactions account for almost 90% of the transactions on the CTTS. The associated demographic information of these zip codes can reveal some interesting characteristics of the account holders. As per the City of Austin's ethnicity maps, all these zip codes are predominantly middle to upper middle class, White neighborhoods. Zip code 78717 comprises 76% White residents and has a median household income of $87,290. Also, 59.1% of the residents have a bachelor's or higher education. Zip code 78664, on the other hand, is 62.9% White (23.7% Hispanic), has a median household income of $59,829, and only 29.4% of the residents have a bachelor's or higher education.

The same analysis for the commercial transactions, which represents slightly more than 10% of the total transactions, resulted in a slightly different top ten zip codes (see Table 66 below).

Table 66: Top 10 Zip Codes for Commercial Accounts

Zip Code	**Transactions/mi^2**
78708	582
78742	476
78664	379
78758	350
78727	335
78728	309
78754	294
78709	243
78704	237

These zip codes are slightly more dispersed around the area. Zip code 78708 is located in downtown Austin. Since the zip code is linked to the address to which the transactions are billed, it is likely that these commercial transactions are only billed at this location and not necessarily that the commercial traffic originates at this downtown location. Zip code 78742 is located just north of the Austin airport, 78664 is in Round Rock and 78758 is located just north of US-183 between I-35 and Loop 1. Dell Computers is registered in zip code 78758, which potentially explains the large number of commercial transactions associated with this zip code.

Spatial Analysis of Data

The above analysis provided the number of transactions per square mile in the Central Texas zip codes. The Figure 28 used colors to graphically represent different transaction densities among zip codes. However, zip codes vary in size and the transaction densities are not necessarily the same throughout the area. An alternative method for representing this data is through interpolation of zip code centroid point data. Thus, instead of shading an entire zip code based on its transaction density, zip codes are instead represented as points on the map. These points are determined by calculating the centroid (or essential middle) of the zip code area. Since the latitudinal and longitudinal references are known for zip code centroids from the United States census, these data points can then be associated with the corresponding transaction densities, i.e., number of transactions per square mile.

Given the zip code point data, it would then be possible to interpolate the areas between the points using Tobler's First Law of Geography: "*Everything is related to everything else, but near things are more related than distant things.*" This law is used to illustrate the transaction densities of the areas between the centroid point data. Specifically, the technique used in determining these values between centroid points is "*Inverse Distance Weighting (IDW)*". IDW interpolates estimates based on values at nearby locations weighted by distance from the interpolation location. The only assumption is that points near the interpolation location are more closely related than points more distant from the interpolation location.

This technique allows for the generation of interpolated maps of Austin, showing the billing address densities of the users of the CTTS. This data can be presented for all transactions, for commercial and non-commercial transactions, for individual toll facilities, for weekend and weekday transactions, and for peak and off-peak transactions.

Geographic Profile of Toll Transactions

The Figure 29 illustrates that the billing addresses of CTTS users are concentrated in the north portion of the city around SH 45 and in the Pflugerville area between SH 130 and Loop 1 (i.e., Far West area). The lowest concentrations are observed on the southwest side of the city and on the southeast side between the airport and downtown. Demographically and land use wise, these two areas are quite different – the southwest being mostly middle to upper middle class residential, and the southeast being lower income and less developed residentially. The latter could explain the low concentration of billing addresses on the east, and distance from the CTTS could explain that of the west. An anomaly that is present entails zip code 78681 in Round Rock just northwest of SH 45 and I-35. The 5th highest transactions per square mile for the CTTS are billed to this zip code, yet it does not appear as such on the map. This is due to a large number of small, PO Box type zip codes that are concentrated in that area with associated low levels of transactions. The low transaction values per square mile calculated and the spatial approach adopted seems to under represent the transaction densities billed to 78761.

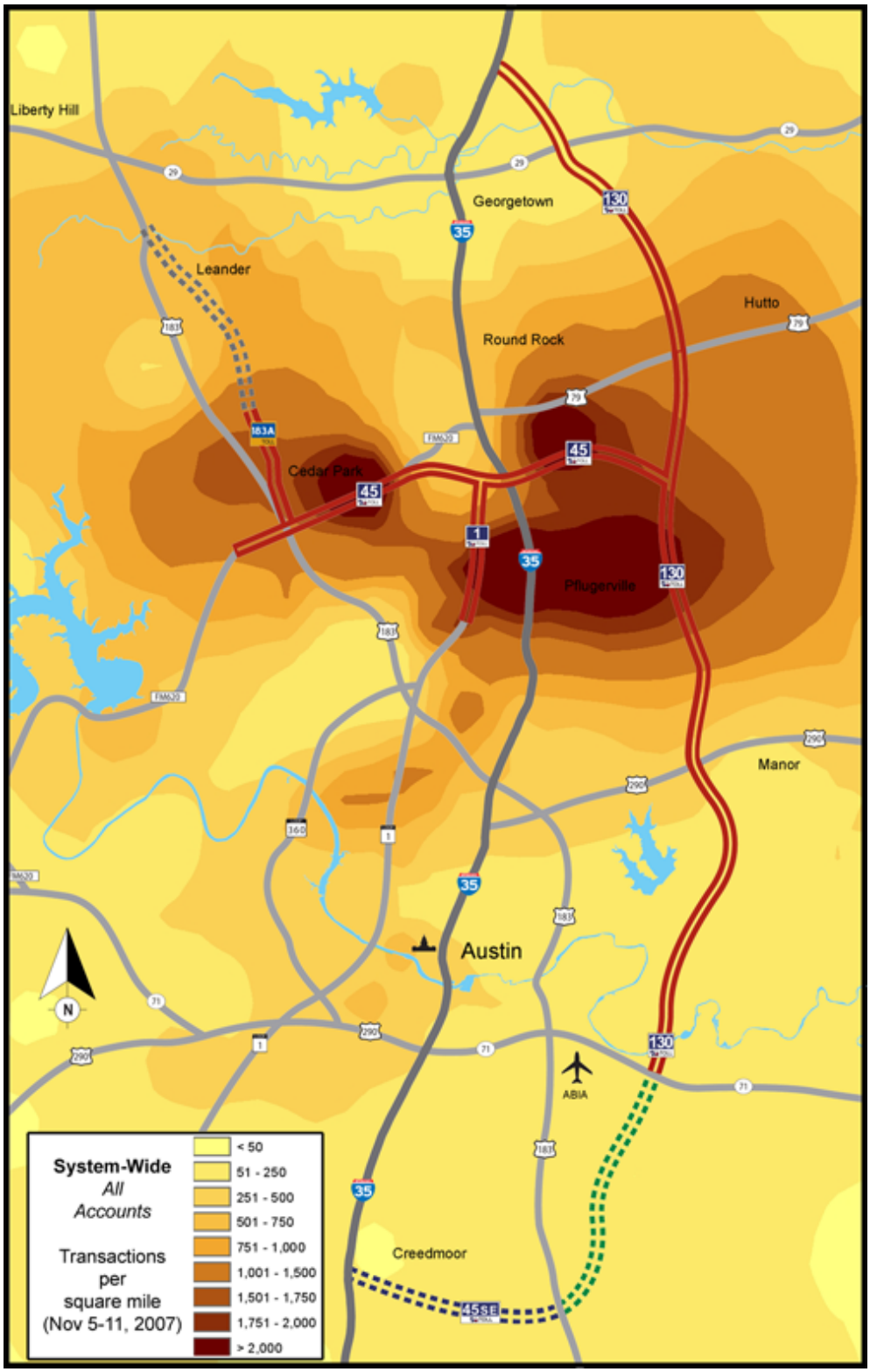


Figure 29: Transaction Data by Geographic Profile

As mentioned earlier, non-commercial transactions account for nearly 90% of the total transactions and therefore there appears to be little difference between the total transaction and the non-commercial transaction profiles (see Figure 30).

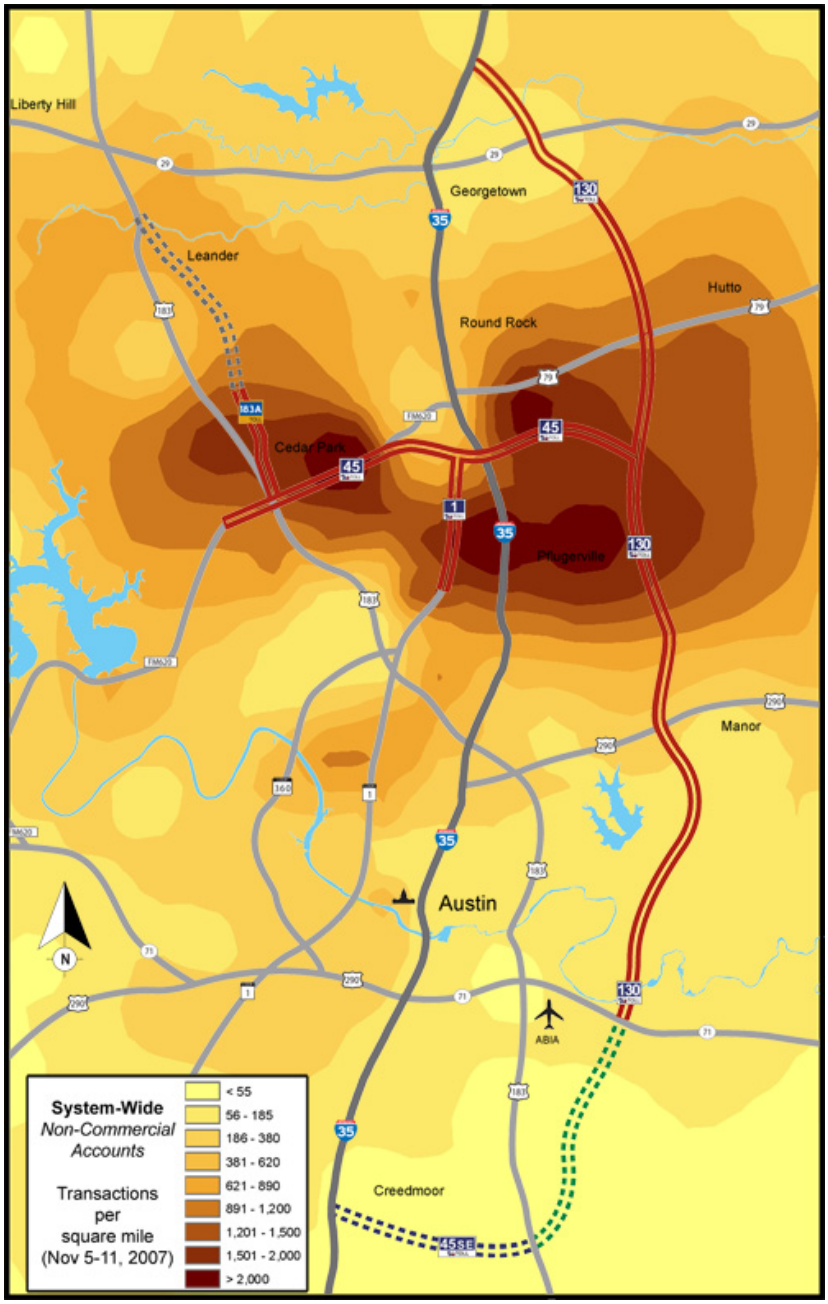


Figure 30: Transaction Data of Non-Commercial Accounts

Figure 31 illustrates the transaction densities for the billing addresses of the commercial transactions. The billing addresses appears to be concentrated just north of US-183 and west of Pflugerville - between I 35 and Loop 1 - as well as just south of the Capitol and around the airport.

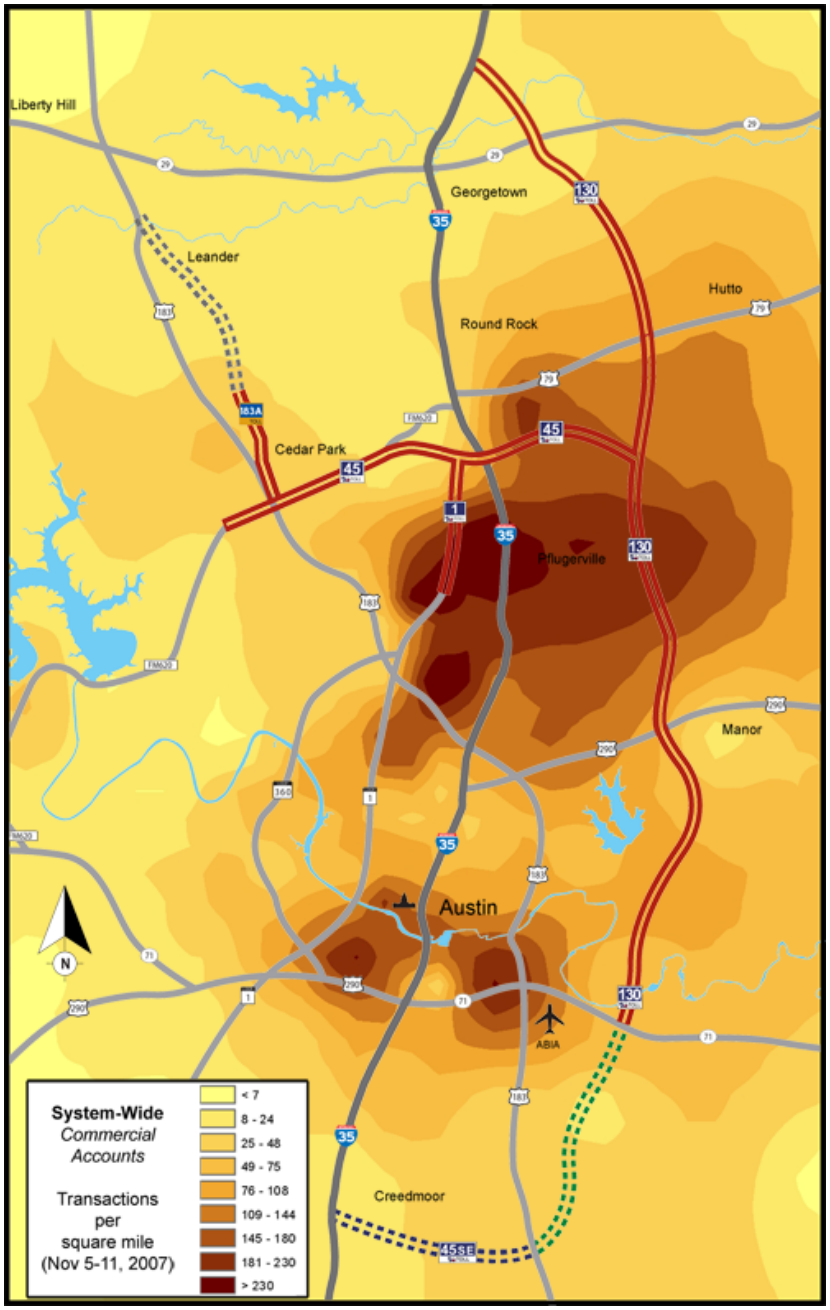


Figure 31: Transaction Densities for the Billing Addresses of Commercial Accounts

Weekday versus Weekend

Figures 32 and 33 illustrate the billing address concentrations of the weekday and weekend day transactions, respectively. As can be seen, the billing profiles look fairly similar for weekday and weekend day transactions. However, the billing addresses of the weekday transactions seem to be more pronounced in the Pflugerville area compared to the weekend transactions.

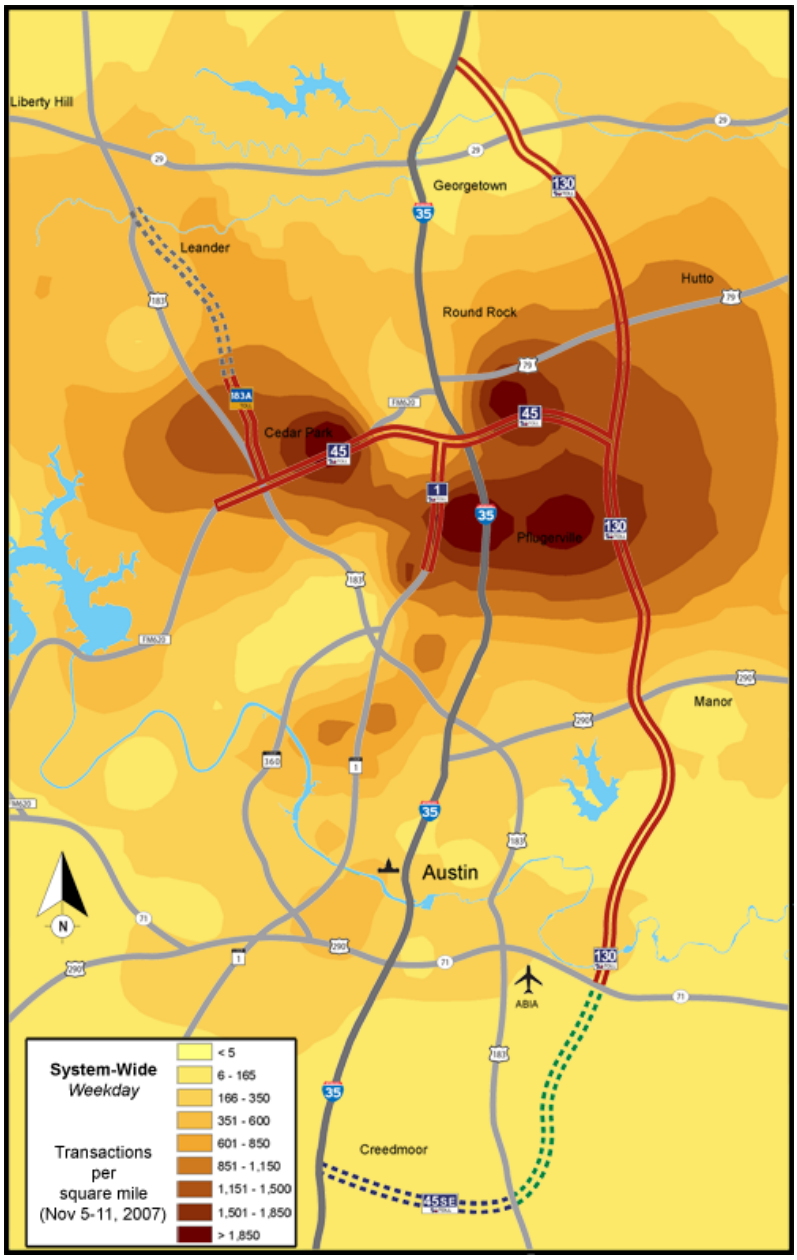


Figure 32: Weekday Transactions

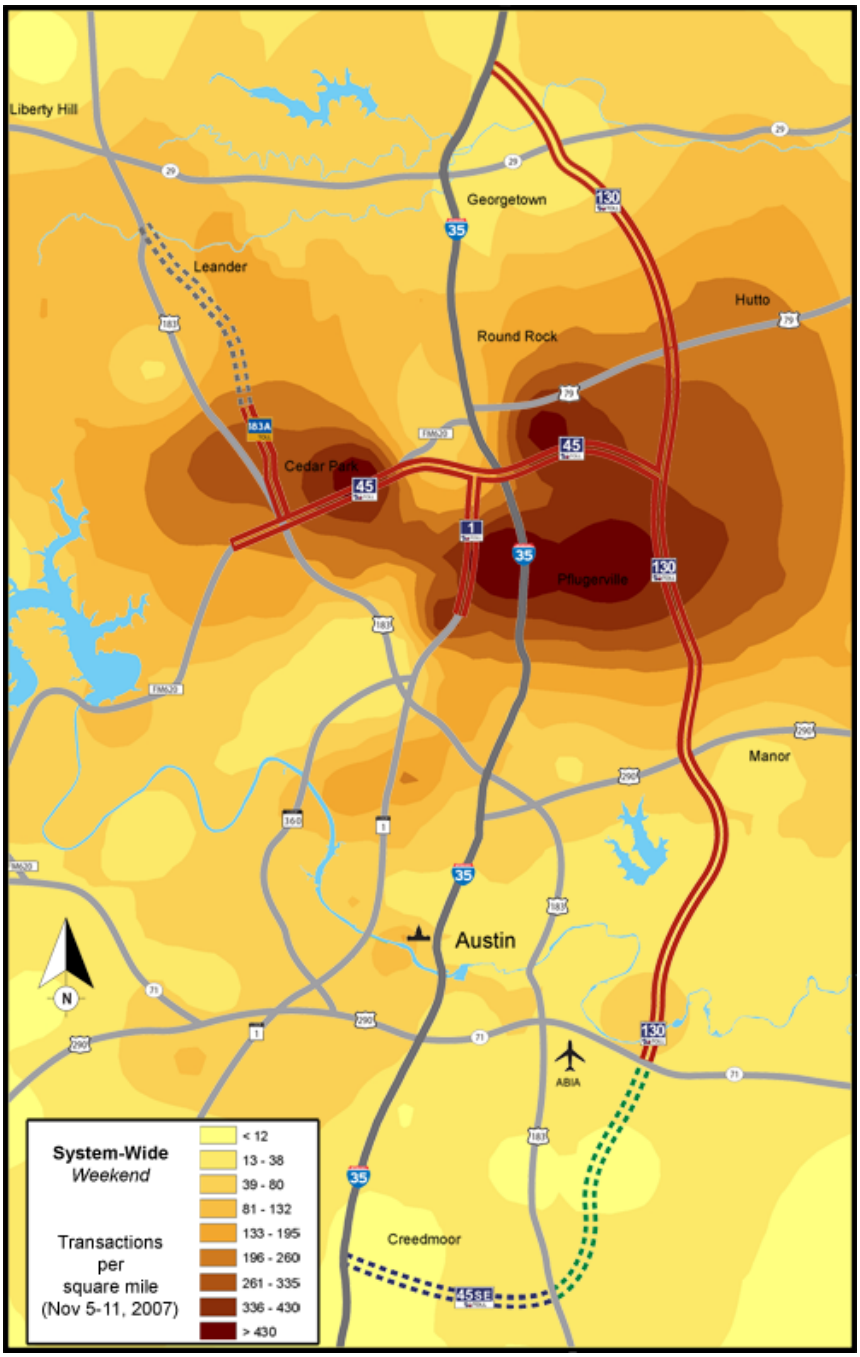


Figure 33: Weekend Day Transactions

Peak Hour versus Off Peak Hour Transactions

Figures 34 and 35 illustrate the billing address concentrations of the weekday peak hour and weekday off peak hour transactions, respectively. As can be seen the billing profiles look fairly similar for weekday peak hour and weekday off peak hour transactions.

However, the billing addresses of the peak hour transactions seems to be more narrowly concentrated to Cedar park, just north of SH 45, and west of I-35 in the Pflugerville area.

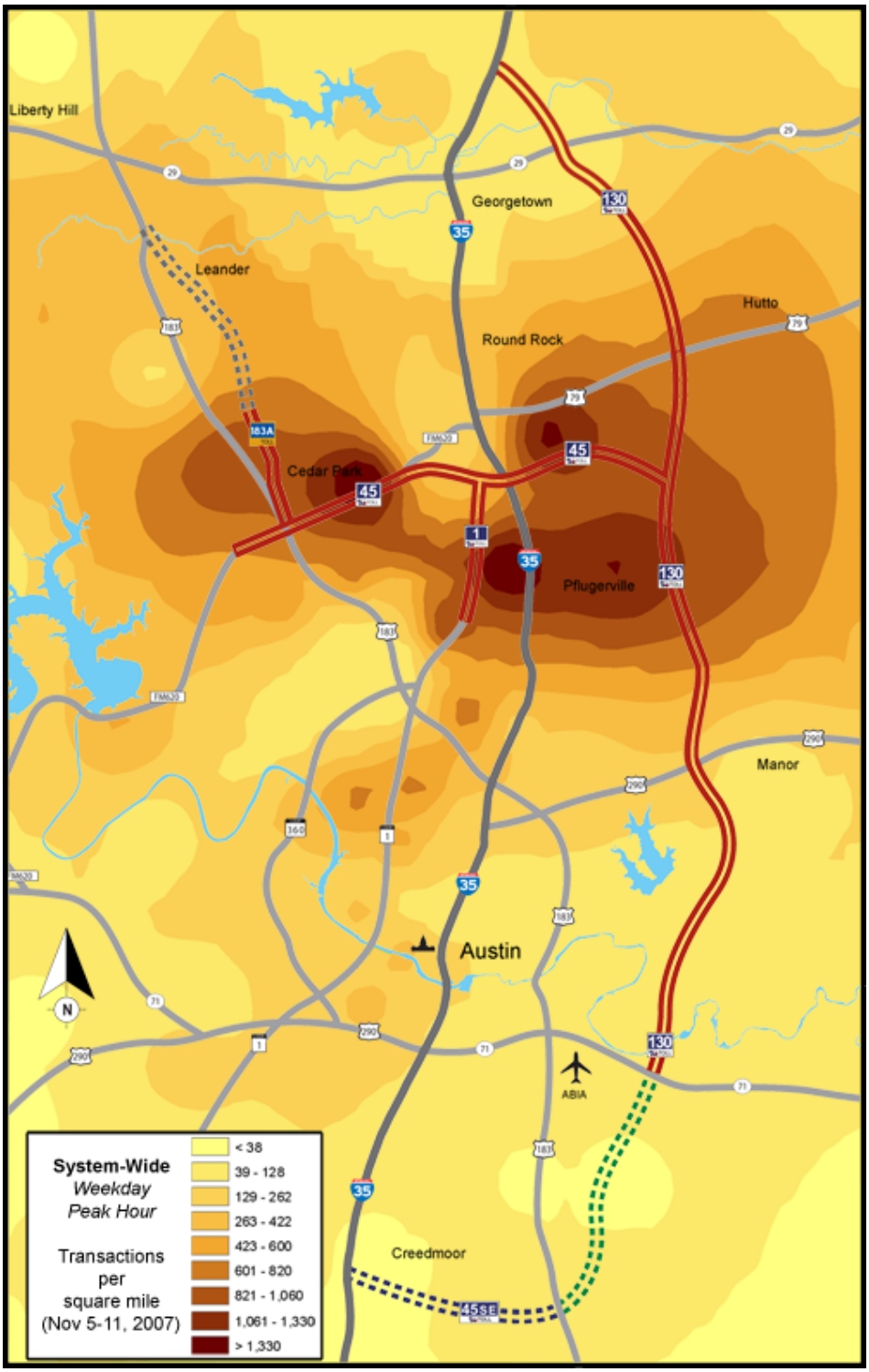


Figure 34: Peak Hour Transactions

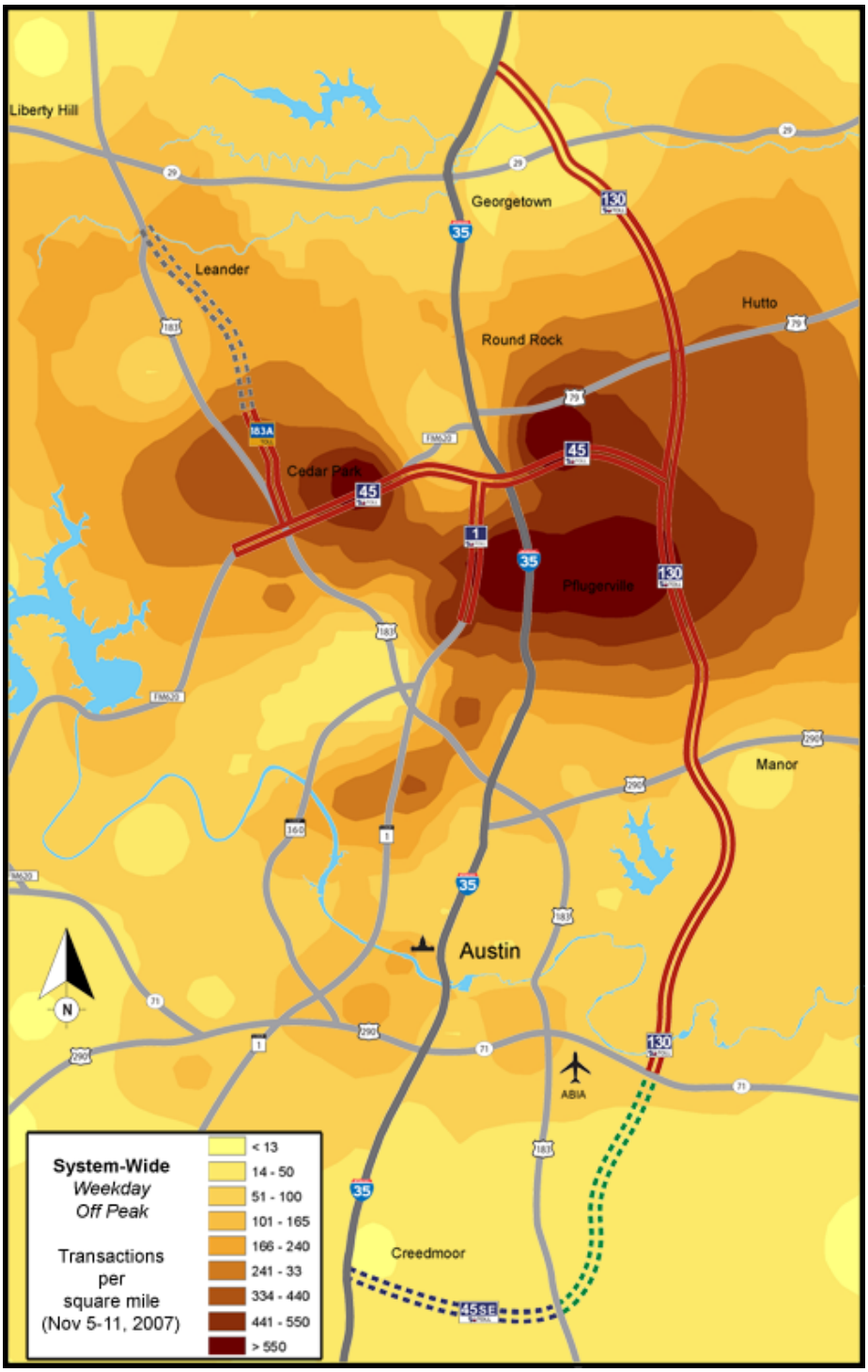


Figure 35: Off Peak Hour Transactions

Loop 1

Figures 36 and 37 illustrate the billing addresses for the commercial and non-commercial transactions on Loop 1, respectively. As can be seen, the billing addresses for the commercial transactions appear to be concentrated in the corridor between Loop 1 and I-35, and northwest of the airport. On the other hand, the billing addresses for the non-commercial transactions are concentrated in the Pflugerville area, between I-35 and Loop 1.

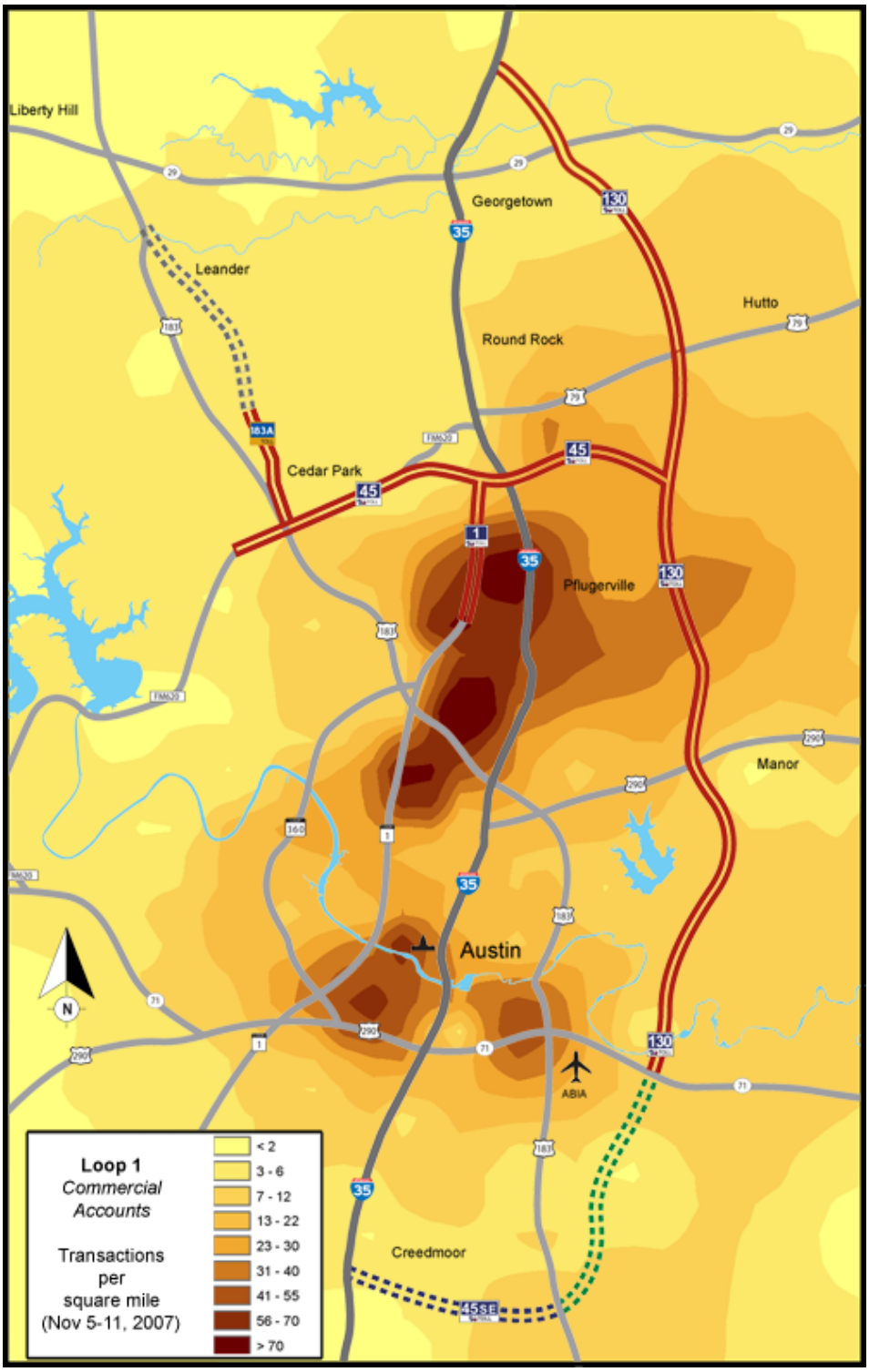


Figure 36: Loop 1 Transactions for Commercial Accounts

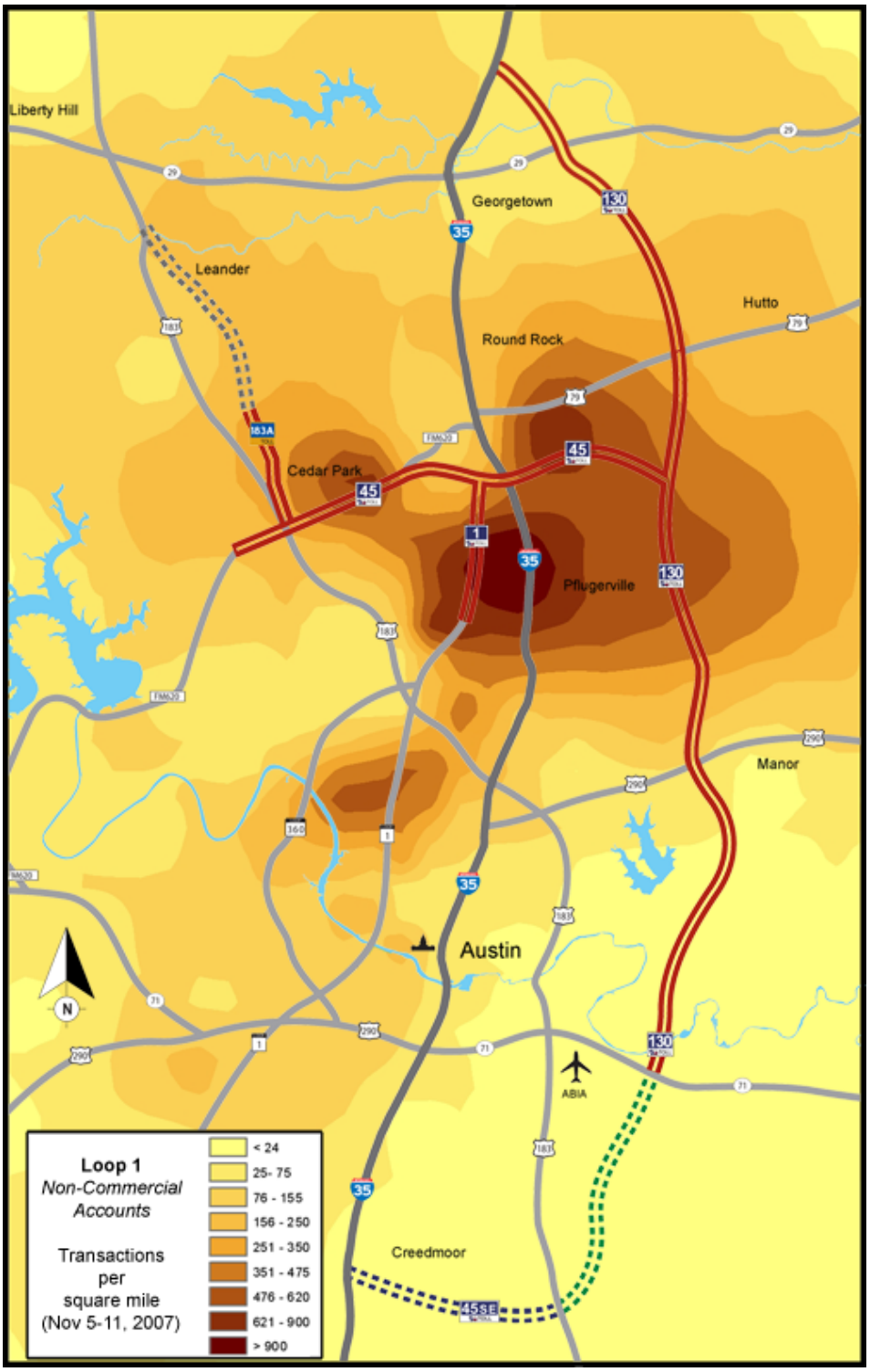


Figure 37: Loop 1 Transactions for Non-Commercial Accounts

State Highway 45

Figures 38 and 39 illustrate the billing addresses for the commercial and non-commercial transactions on SH 45, respectively. As can be seen, the billing addresses for the commercial transactions appear to be concentrated in the corridor between Loop 1 and I-35 (north of 183), and northwest of the airport (south of the river). On the other hand, the billing addresses for the non-commercial transactions are concentrated in the Cedar park area with a substantially lower concentration in the Pflugerville and Round Rock areas.

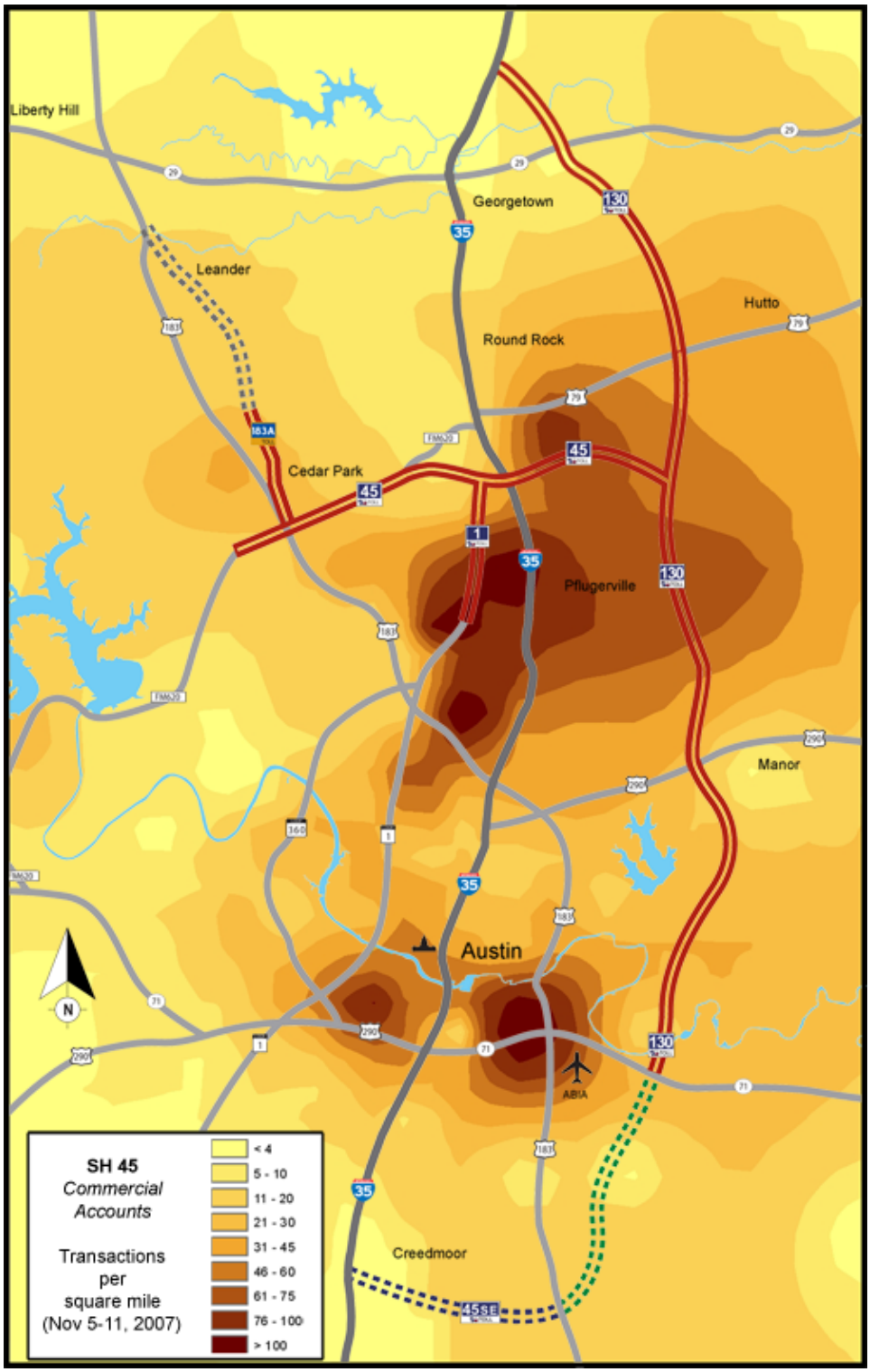


Figure 38: SH 45 Transactions for Commercial Accounts

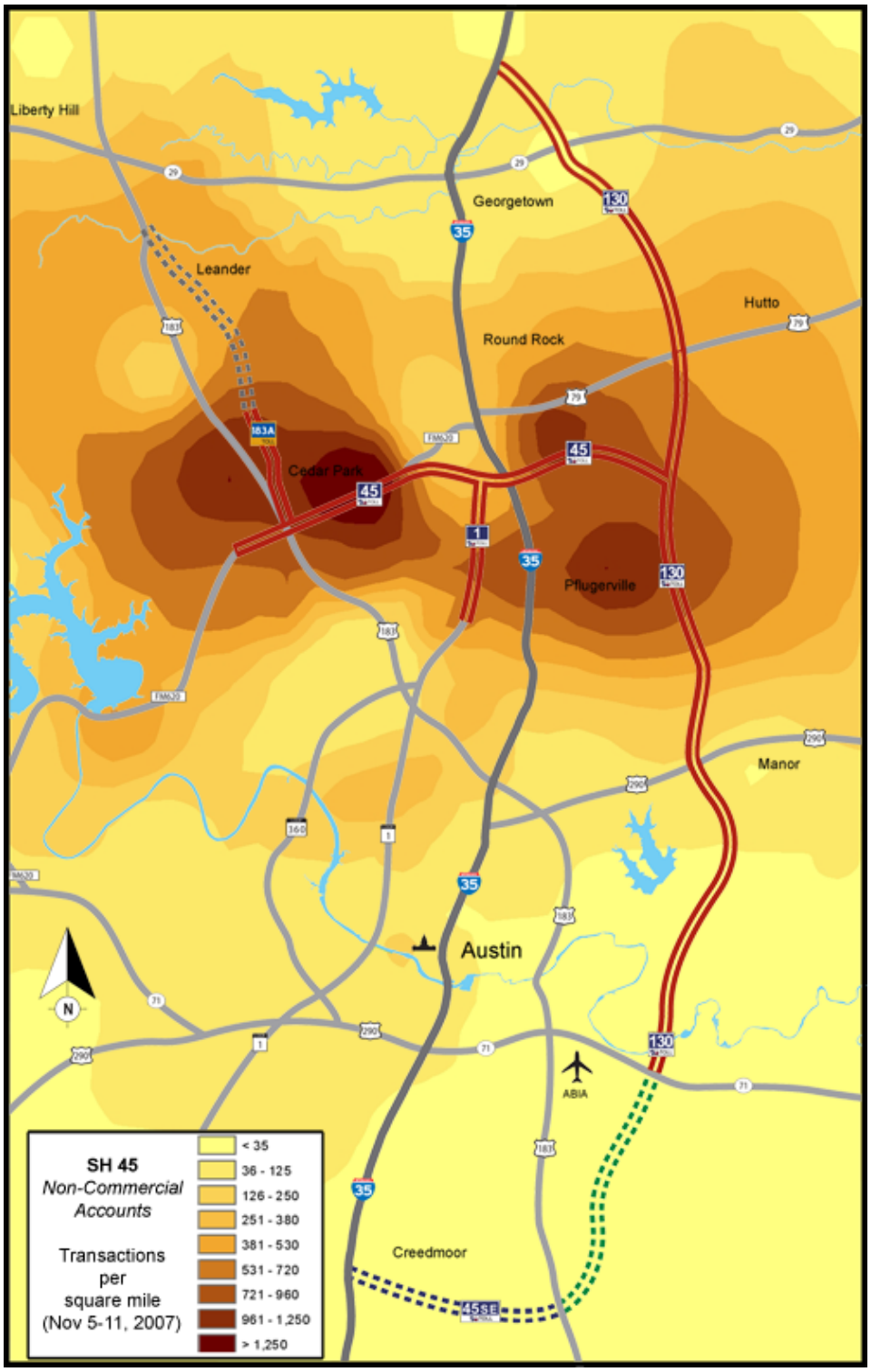


Figure 39: SH 45 Transactions for Non-Commercial Accounts

State Highway 130

Figures 40 and 41 illustrate the billing addresses for the commercial and non-commercial transactions on SH 130, respectively. As can be seen, the billing addresses for the commercial transactions appear to be concentrated in the corridor between I-35 and SH 130 (north of SH 290 and south of SH 45). The highest concentration of commercial transactions was billed to zip code 78754, located just north of US-290 between I-35 and SH 130. The billing addresses for the non-commercial transactions are concentrated in the Hutto and Pflugerville area.

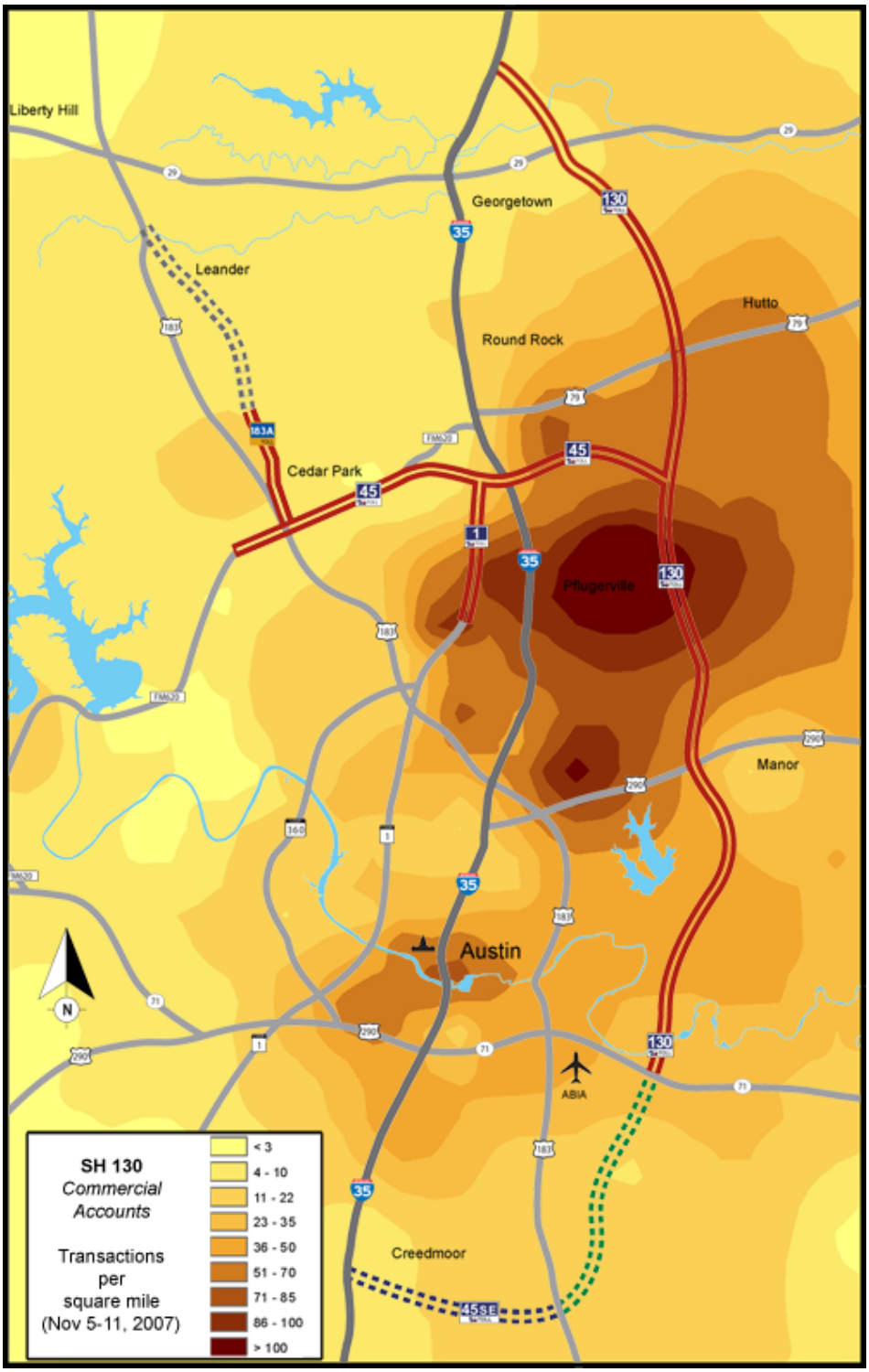


Figure 40: SH 130 Transactions for Commercial Accounts

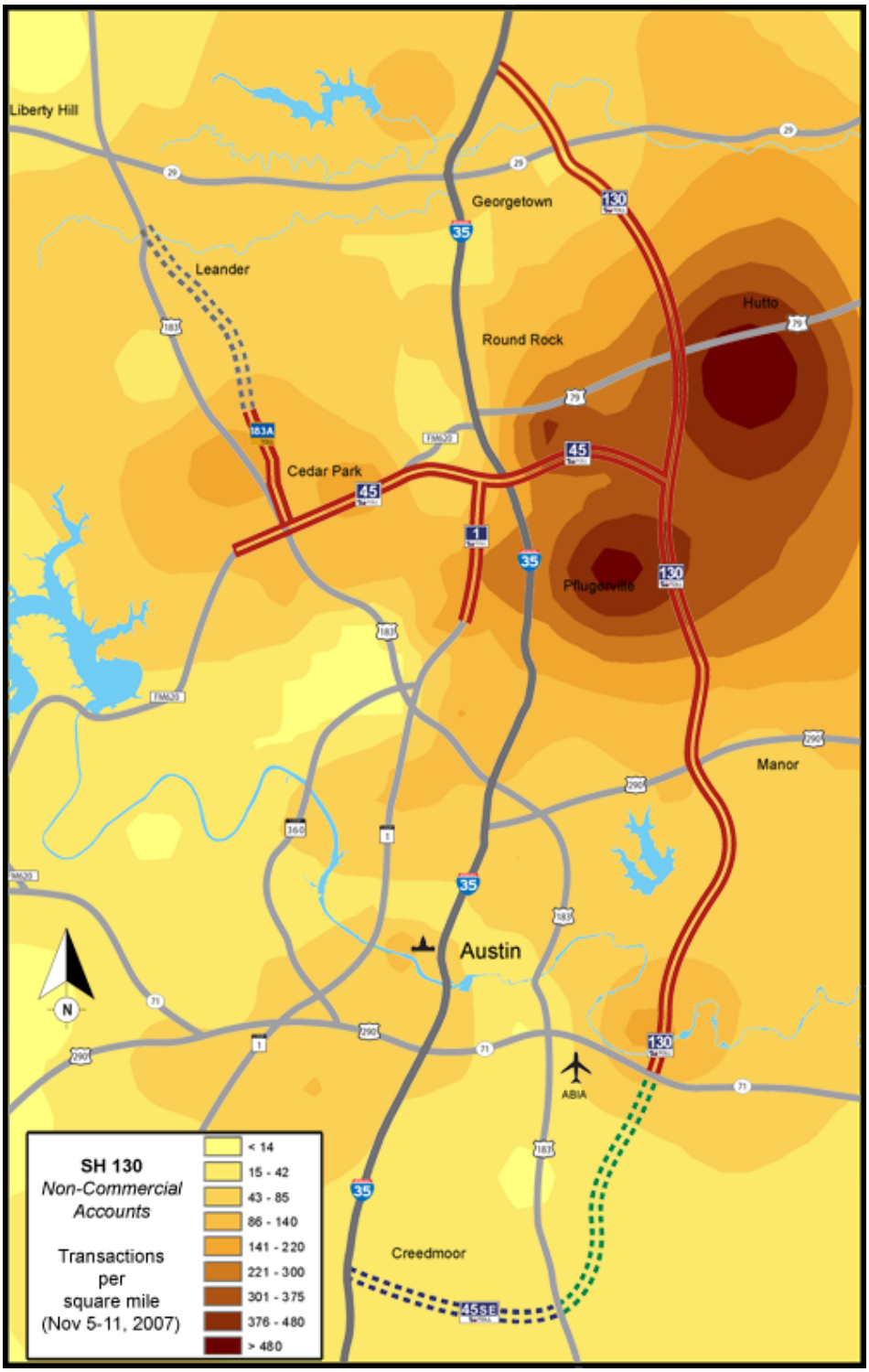


Figure 41: SH 130 Transactions for Non-Commercial Accounts

CONCLUSION

Overall, this type of spatial analysis is very useful to visualize the billing addresses of the CTTS users. Although the geographical characteristics were thus based solely on billing address information (and actual origins were unknown), it can be assumed that in the case of the non-commercial transactions, most of these addresses represent the homes of the TxTAG users and thus the trip origins during peak hour weekday traffic. On the other hand, for the non-commercial transactions, these billing addresses may or may not represent the trip origins of the vehicles.

CHAPTER 5: CONCLUSION

The analysis conducted in this report provided insight into numerous aspects concerning toll roads in Central Texas. Chapter 1 provided a review of the published literature on the subject that provided a framework for the analysis conducted in the Austin area, as well as characteristics for comparing the results. Survey data gathered in Austin regarding user preferences both before and after the construction of the CTTS were analyzed. This analysis was supplemented with an analysis of sample transaction data for one week in November in 2007 that reflected actual toll road usage. The transaction data included zip code and account type (i.e., commercial and non-commercial) information. The published literature on the demographics of toll road users showed correlations between toll road usage and higher incomes, as well as toll road usage and higher education levels. The findings regarding usage and gender are less pronounced, but a higher correlation among males is present on most tollways studied. Both California's SR-91 and the toll facilities in Central Texas found that females stated a higher preference for using the tollways, though males comprised a larger share in actual usage. Also in the case of California's SR-91, female respondents indicated child care pickup and shopping trip purposes as reasons for using SR-91. In the case of the Georgia 400 in Atlanta, the billing zip codes of toll road users indicated a concentration of users along the corridor.

A 2005 Nustats survey that was conducted prior to the completion of the CTTS, found that female, Hispanic, younger, and higher income, as well as higher educated respondents indicated that they would use the CTTS. Whereas the last two demographic attributes correspond with the literature findings, the analysis revealed higher percentages of Hispanic voters in the lower income categories and also higher percentages of younger respondents in the lower income categories. The 2008 survey that was conducted after the construction of the CTTS also found a correlation between higher income levels and toll road usage, as well as higher education levels and toll road usage. The 2008 survey also

revealed that - although a higher percentage of females indicated that they would use the toll roads (compared to males) in the 2005 survey – a higher percentage of male respondents actually used the CTTS.

The 2005 Nustats survey prior to the CTTS construction also captured information about the non-tolled roads respondents were using in Central Texas. This information was used to determine if any of the CTTS toll roads provide a feasible alternative to the non-tolled roads used by respondents, thereby serving as an indication of potential CTTS usage. An example is the high percentage of Hispanic respondents that were using I-35 and the high percentage of Hispanic respondents that indicated that they would use a toll road. From this information it could be inferred that SH130 would be a viable alternative for these respondents. However, the 2008 survey revealed that 183A - and not SH130 - attracts more minority users and lower income users. The 2008 survey also revealed that most respondents use toll roads because they are faster. On the other hand, a high percentage of non-toll road users indicated that the CTTS toll roads do not provide a feasible alternative to their current route for their commute (60%), non-work (25%), and business trips (29%).

Finally, the analyzed transaction data provided some very interesting findings regarding the billing zip codes of non-commercial and commercial account holders. This data provides information regarding the actual toll road usage of Austin commuters as opposed to inferences drawn from answers to a questionnaire. An analysis of the transaction data revealed that non-commercial two axle vehicles dominated the toll transactions in November 2007. This is partly attributable to the fact that the CTTS toll roads will be mainly commuter routes until SH 130 is completed. At that time SH 130 would provide a bypass around Austin and it is foreseen that more truck traffic (i.e., commercial transactions) will use the toll road. Already, a slightly higher level of commercial traffic was using SH-130. As could be expected, commercial transactions also reported a lower share of total transactions during weekends and peak hours compared to the non-commercial transactions.

Not surprisingly, the billing zip codes with the highest transaction concentrations for the non-commercial transactions were located north of Austin – specifically in the Pflugerville, Round Rock and Cedar Park areas - from where the CTTS toll roads provide convenient and fast access to downtown Austin. The billing zip codes of the commercial transactions, on the other hand, showed higher concentrations in areas south of the city, predominately around the airport.

The actual transaction data provided valuable insight into the billing address and account types of CTTS users, while the survey data provided interesting information regarding the characteristics of both the users and non-users of the CTTS. This data provides insight into the perceptions of both users and non-users of the CTTS and can be used to inform marketing strategies, as well as future enhancements to the system.

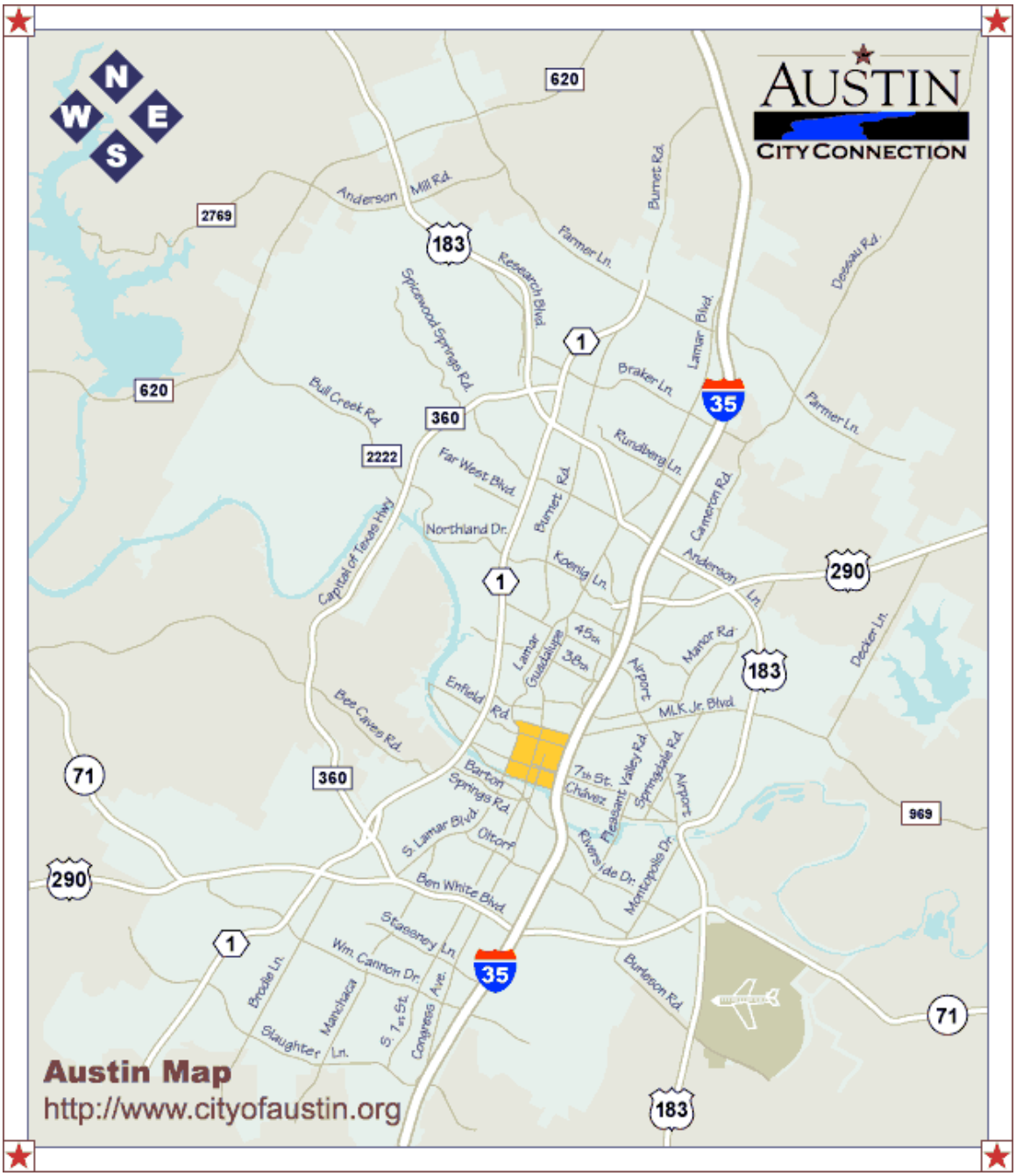
APPENDIX

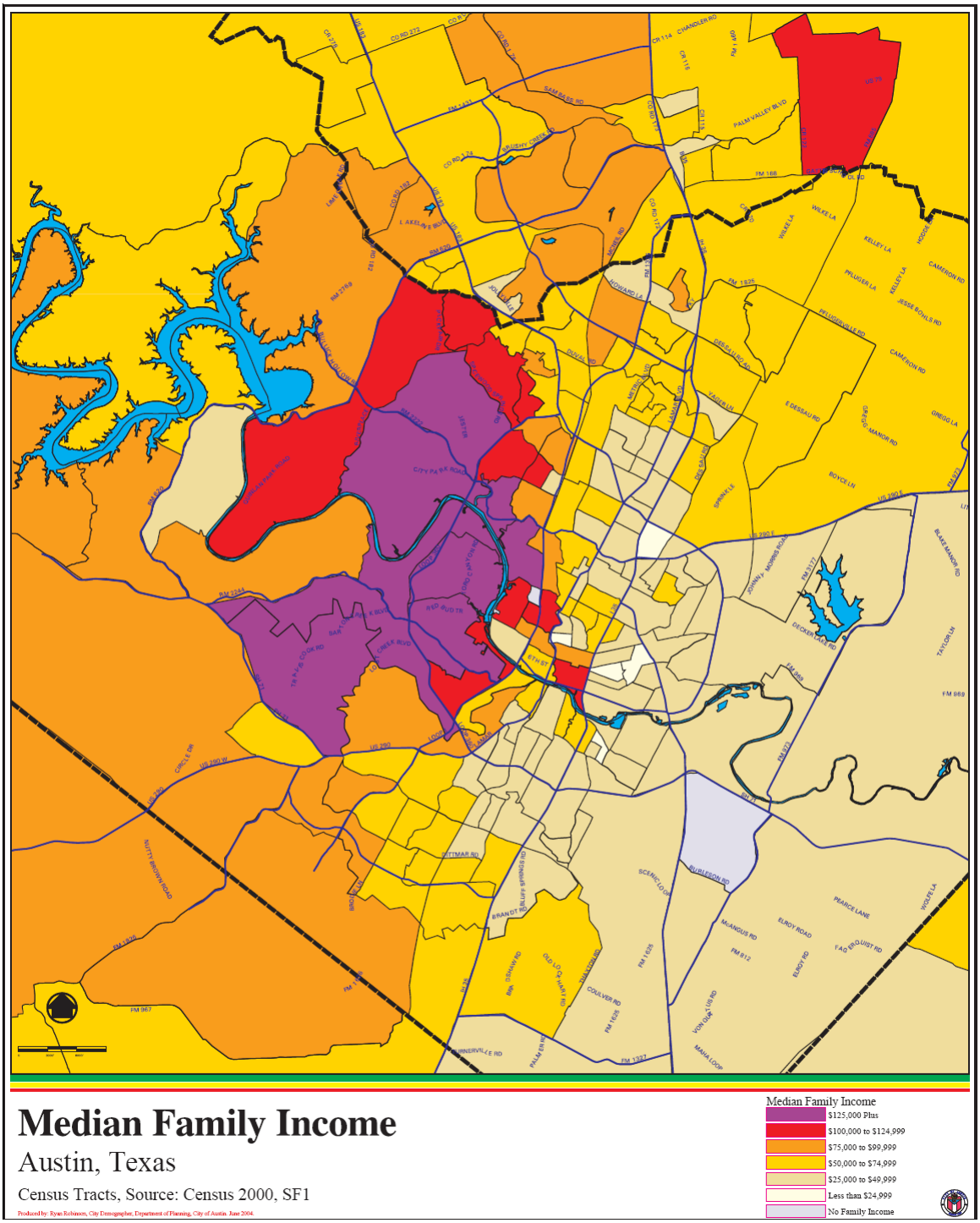
John Kilpatrick Toll Rates (Pike Pass / Cash)

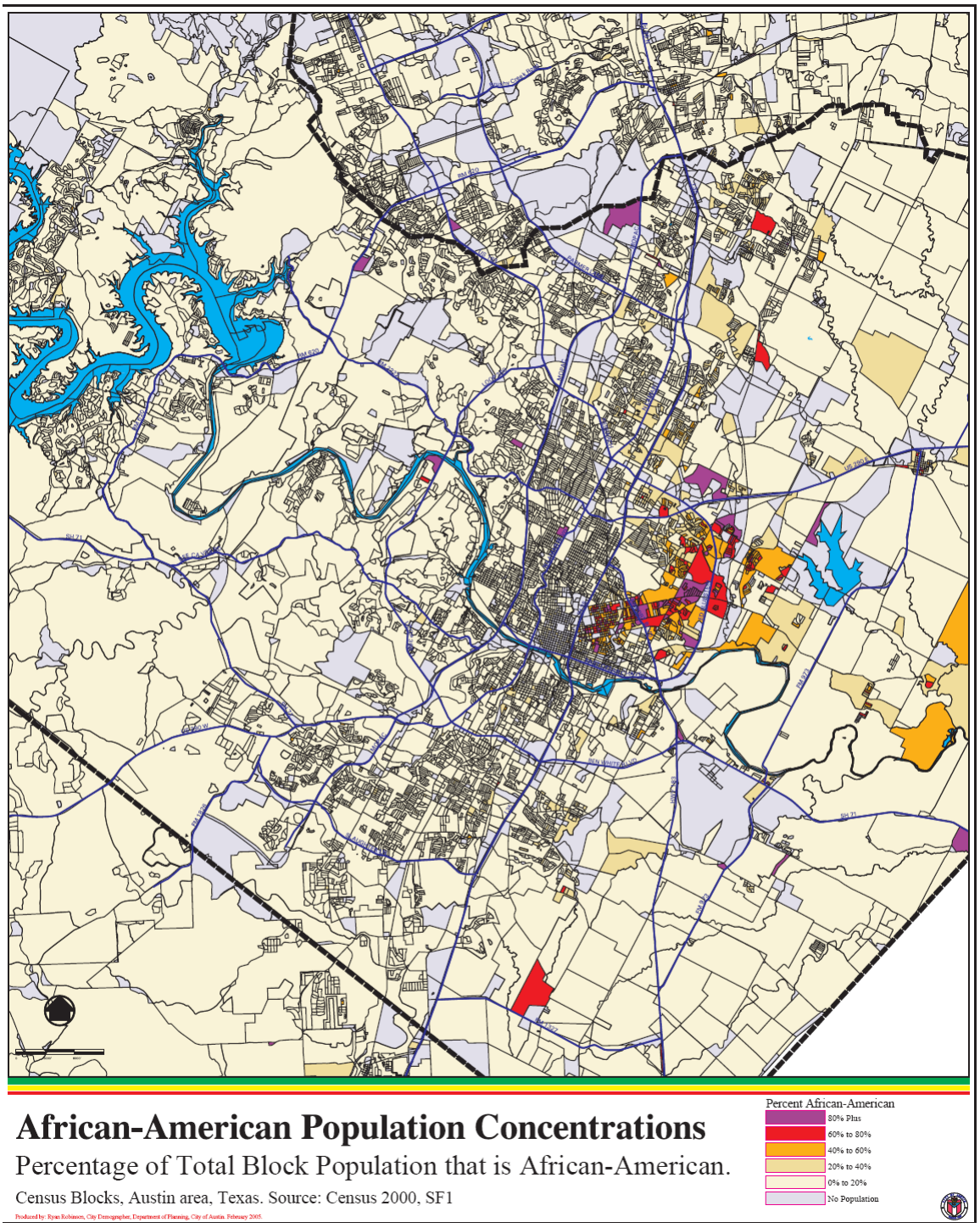
		2 axle		3 axle		4 axle		5 axle		6 axle	
ENTRY	**EXIT**	**PPS**	**Cash**	**PPS**	**Cash**	**PPS**	**Cash**	**PPS**	**Cash**	**PPS**	**Cash**
I-35	Eastern	$0.25	$0.30	$0.40	$0.50	$0.55	$0.75	$0.85	$1.30	$1.05	$1.60
	U.S. 77	$0.40	$0.50	$0.55	$0.75	$0.80	$1.00	$1.40	$1.60	$1.70	$1.95
	Western	$0.50	$1.00	$0.75	$1.45	$1.05	$2.00	$1.70	$3.40	$2.05	$4.10
	Pennsylvania	$0.60	$1.00	$0.85	$1.45	$1.20	$2.00	$2.00	$3.40	$2.40	$4.10
	May	$0.65	$1.00	$1.05	$1.45	$1.45	$2.00	$2.25	$3.40	$2.75	$4.10
	Portland	$0.80	$1.00	$1.20	$1.45	$1.60	$2.00	$2.80	$3.40	$3.40	$4.10
	Meridian	$0.90	$1.00	$1.25	$1.45	$1.75	$2.00	$3.10	$3.40	$3.75	$4.10
	MacArthur	$0.95	$1.00	$1.35	$1.45	$1.90	$2.00	$3.30	$3.40	$3.90	$4.10
	Rockwell	$1.05	$1.30	$1.75	$2.05	$2.45	$2.90	$3.35	$4.70	$4.45	$5.70
	NW Highway	$1.35	$1.50	$2.00	$2.20	$2.75	$3.00	$4.50	$5.00	$5.45	$6.05
	Wilshire	$1.50	$2.00	$2.10	$2.75	$2.85	$4.00	$5.05	$6.80	$6.20	$8.20
	S.H. 66	$1.65	$2.00	$2.15	$2.75	$3.00	$4.00	$5.60	$6.80	$6.80	$8.20
	NW 10th	$1.80	$2.00	$2.35	$2.75	$3.30	$4.00	$6.20	$6.80	$7.45	$8.20
	I-40	$1.90	$2.00	$2.45	$2.75	$3.45	$4.00	$6.45	$6.80	$7.80	$8.20
Eastern	U.S. 77	$0.25	$0.50	$0.40	$0.75	$0.55	$1.00	$0.75	$1.60	$0.90	$1.95
	Western	$0.25	$1.00	$0.40	$1.45	$0.55	$2.00	$0.85	$3.40	$0.90	$4.10
	Pennsylvania	$0.35	$1.00	$0.50	$1.45	$0.70	$2.00	$1.15	$3.40	$1.40	$4.10
	May	$0.50	$1.00	$0.70	$1.45	$0.95	$2.00	$1.70	$3.40	$2.05	$4.10
	Portland	$0.60	$1.00	$0.80	$1.45	$1.10	$2.00	$2.00	$3.40	$2.40	$4.10
	Meridian	$0.65	$1.00	$0.90	$1.45	$1.25	$2.00	$2.25	$3.40	$2.70	$4.10
	MacArthur	$0.75	$1.00	$1.00	$1.45	$1.40	$2.00	$2.50	$3.40	$3.05	$4.10
	Rockwell	$0.85	$1.30	$1.40	$2.05	$1.95	$2.90	$2.80	$4.70	$3.40	$5.70
	NW Highway	$1.05	$1.50	$1.65	$2.20	$2.25	$3.00	$3.65	$5.00	$4.40	$6.05
	Wilshire	$1.20	$2.00	$1.75	$2.75	$2.40	$4.00	$4.20	$6.80	$5.10	$8.20
	S.H. 66	$1.40	$2.00	$1.85	$2.75	$2.55	$4.00	$4.75	$6.80	$5.80	$8.20
	NW 10th	$1.60	$2.00	$2.05	$2.75	$2.85	$4.00	$5.35	$6.80	$6.45	$8.20
	I-40	$1.65	$2.00	$2.15	$2.75	$3.00	$4.00	$5.60	$6.80	$6.80	$8.20
US 77	Western	$0.25	$1.00	$0.40	$1.45	$0.55	$2.00	$0.75	$3.40	$0.90	$4.10
	Pennsylvania	$0.25	$1.00	$0.40	$1.45	$0.55	$2.00	$0.75	$3.40	$0.90	$4.10
	May	$0.35	$1.00	$0.50	$1.45	$0.70	$2.00	$1.15	$3.40	$1.40	$4.10
	Portland	$0.40	$1.00	$0.60	$1.45	$0.85	$2.00	$1.40	$3.40	$1.70	$4.10
	Meridian	$0.50	$1.00	$0.70	$1.45	$1.00	$2.00	$1.70	$3.40	$2.05	$4.10
	MacArthur	$0.60	$1.00	$0.80	$1.45	$1.15	$2.00	$2.00	$3.40	$2.40	$4.10
	Rockwell	$0.75	$1.30	$1.20	$2.05	$1.70	$2.90	$2.35	$4.70	$2.75	$5.70
	NW Highway	$0.90	$1.50	$1.45	$2.20	$2.00	$3.00	$3.05	$5.00	$3.75	$6.05
	Wilshire	$0.95	$2.00	$1.55	$2.75	$2.15	$4.00	$3.80	$6.80	$3.95	$8.20
	S.H. 66	$1.25	$2.00	$1.60	$2.75	$2.25	$4.00	$4.40	$6.80	$5.10	$8.20
	NW 10th	$1.40	$2.00	$1.85	$2.75	$2.55	$4.00	$4.75	$6.80	$5.75	$8.20
	I-40	$1.50	$2.00	$1.95	$2.75	$2.70	$4.00	$5.05	$6.80	$6.10	$8.20
Western	Pennsylvania	$0.25	$0.30	$0.40	$0.50	$0.55	$0.75	$0.75	$1.30	$0.90	$1.60
	May	$0.25	$0.30	$0.40	$0.50	$0.55	$0.75	$0.85	$1.30	$1.05	$1.60
	Portland	$0.25	$0.30	$0.45	$0.50	$0.60	$0.75	$1.15	$1.30	$1.20	$1.60

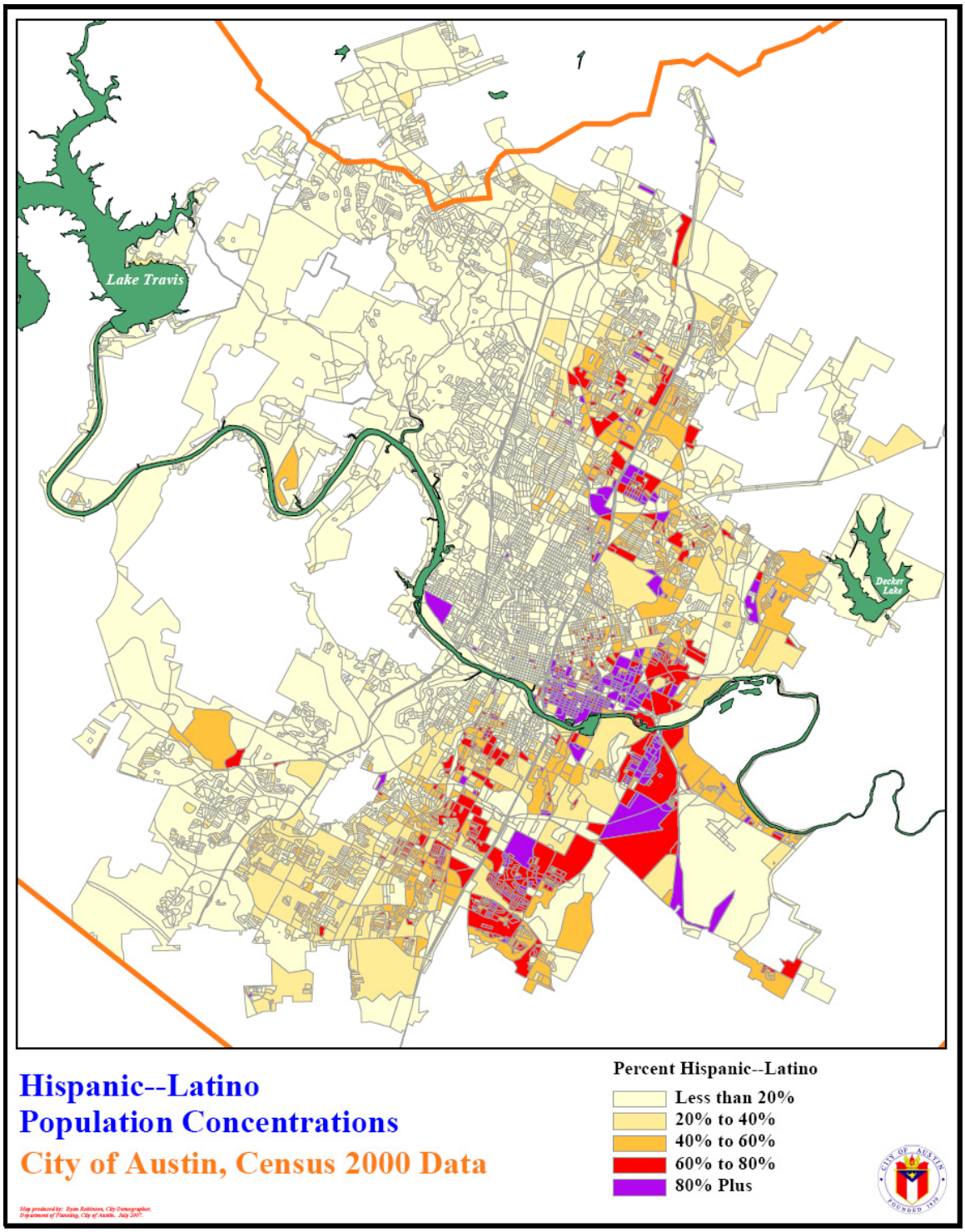
	Meridian	$0.25	$0.30	$0.45	$0.50	$0.60	$0.75	$1.25	$1.30	$1.20	$1.60
	MacArthur	$0.25	$0.30	$0.45	$0.50	$0.60	$0.75	$1.25	$1.30	$1.20	$1.60
	Rockwell	$0.50	$0.60	$0.85	$1.10	$1.15	$1.65	$2.00	$2.60	$2.40	$3.20
	NW Highway	$0.65	$0.80	$1.10	$1.25	$1.45	$1.75	$2.80	$2.90	$3.35	$3.55
	Wilshire	$0.90	$1.30	$1.30	$1.80	$1.75	$2.75	$3.40	$4.70	$3.80	$5.70
	S.H. 66	$1.15	$1.30	$1.50	$1.80	$2.10	$2.75	$3.95	$4.70	$4.75	$5.70
	NW 10th	$1.20	$1.30	$1.55	$1.80	$2.25	$2.75	$4.45	$4.70	$5.40	$5.70
	I-40	$1.25	$1.30	$1.60	$1.80	$2.30	$2.75	$4.50	$4.70	$5.45	$5.70
Pennsylvania	May	$0.25	$0.30	$0.40	$0.50	$0.55	$0.75	$0.75	$1.30	$0.90	$1.60
	Portland	$0.25	$0.30	$0.40	$0.50	$0.55	$0.75	$0.85	$1.30	$1.05	$1.60
	Meridian	$0.25	$0.30	$0.40	$0.50	$0.55	$0.75	$1.15	$1.30	$1.35	$1.60
	MacArthur	$0.25	$0.30	$0.40	$0.50	$0.55	$0.75	$1.25	$1.30	$1.50	$1.60
	Rockwell	$0.50	$0.60	$0.80	$1.10	$1.10	$1.65	$1.70	$2.60	$2.05	$3.20
	NW Highway	$0.65	$0.80	$1.05	$1.25	$1.40	$1.75	$2.50	$2.90	$3.05	$3.55
	Wilshire	$0.90	$1.30	$1.25	$1.80	$1.60	$2.75	$3.10	$4.70	$3.70	$5.70
	S.H. 66	$1.05	$1.30	$1.40	$1.80	$1.95	$2.75	$3.65	$4.70	$4.40	$5.70
	NW 10th	$1.20	$1.30	$1.60	$1.80	$2.25	$2.75	$4.20	$4.70	$5.10	$5.70
	I-40	$1.25	$1.30	$1.65	$1.80	$2.30	$2.75	$4.45	$4.70	$5.45	$5.70
Portland	Meridian	$0.25	$0.30	$0.40	$0.50	$0.55	$0.75	$0.75	$1.30	$0.90	$1.60
	MacArthur	$0.25	$0.30	$0.40	$0.50	$0.55	$0.75	$0.75	$1.30	$0.90	$1.60
	Rockwell	$0.50	$0.60	$0.80	$1.10	$1.10	$1.65	$1.50	$2.60	$1.80	$3.20
	NW Highway	$0.65	$0.80	$1.05	$1.25	$1.40	$1.75	$1.85	$2.90	$2.20	$3.55
	Wilshire	$0.80	$1.30	$1.10	$1.80	$1.45	$2.75	$2.50	$4.70	$2.80	$5.70
	S.H. 66	$0.85	$1.30	$1.15	$1.80	$1.50	$2.75	$2.80	$4.70	$3.40	$5.70
	NW 10th	$1.00	$1.30	$1.30	$1.80	$1.80	$2.75	$3.40	$4.70	$4.10	$5.70
	I-40	$1.05	$1.30	$1.40	$1.80	$1.95	$2.75	$3.65	$4.70	$4.45	$5.70
MacArthur	Rockwell	$0.25	$0.30	$0.40	$0.60	$0.55	$0.90	$0.75	$1.30	$0.90	$1.60
	NW Highway	$0.40	$0.50	$0.65	$0.75	$0.85	$1.00	$1.50	$1.60	$1.85	$1.95
	Wilshire	$0.70	$1.00	$0.85	$1.30	$1.25	$2.00	$2.30	$3.40	$2.60	$4.10
	S.H. 66	$0.85	$1.00	$1.10	$1.30	$1.50	$2.00	$2.75	$3.40	$3.40	$4.10
	NW 10th	$0.90	$1.00	$1.20	$1.30	$1.70	$2.00	$3.25	$3.40	$3.90	$4.10
	I-40	$0.95	$1.00	$1.25	$1.30	$1.75	$2.00	$3.30	$3.40	$3.90	$4.10
Rockwell	NW Highway	$0.40	$0.50	$0.50	$0.75	$0.70	$1.00	$1.40	$1.60	$1.70	$1.95
	Wilshire	$0.65	$1.00	$0.75	$1.30	$1.10	$2.00	$2.15	$3.40	$2.30	$4.10
	S.H. 66	$0.75	$1.00	$0.95	$1.30	$1.35	$2.00	$2.55	$3.40	$3.05	$4.10
	NW 10th	$0.90	$1.00	$1.20	$1.30	$1.65	$2.00	$3.10	$3.40	$3.75	$4.10
	I-40	$0.95	$1.00	$1.25	$1.30	$1.75	$2.00	$3.25	$3.40	$3.90	$4.10
Council	NW Highway	$0.25	$0.50	$0.40	$0.75	$0.55	$1.00	$0.65	$1.60	$0.80	$1.95
	Wilshire	$0.45	$1.00	$0.55	$1.30	$0.75	$2.00	$1.20	$3.40	$1.45	$4.10
	S.H. 66	$0.65	$1.00	$0.65	$1.30	$0.90	$2.00	$1.70	$3.40	$2.05	$4.10
	NW 10th	$0.70	$1.00	$0.85	$1.30	$1.20	$2.00	$2.25	$3.40	$2.75	$4.10
	I-40	$0.75	$1.00	$1.00	$1.30	$1.35	$2.00	$2.50	$3.40	$3.05	$4.10
NW Highway	Wilshire	$0.25	$1.00	$0.35	$1.30	$0.50	$2.00	$1.00	$3.40	$1.00	$4.10
	S.H. 66	$0.35	$1.00	$0.45	$1.30	$0.60	$2.00	$1.15	$3.40	$1.40	$4.10
	NW 10th	$0.50	$1.00	$0.65	$1.30	$0.90	$2.00	$1.70	$3.40	$2.05	$4.10
	I-40	$0.55	$1.00	$0.75	$1.30	$1.05	$2.00	$1.95	$3.40	$2.40	$4.10
Wilshire	S.H. 66	$0.25	$0.50	$0.30	$0.85	$0.40	$1.25	$0.75	$2.20	$0.90	$2.70

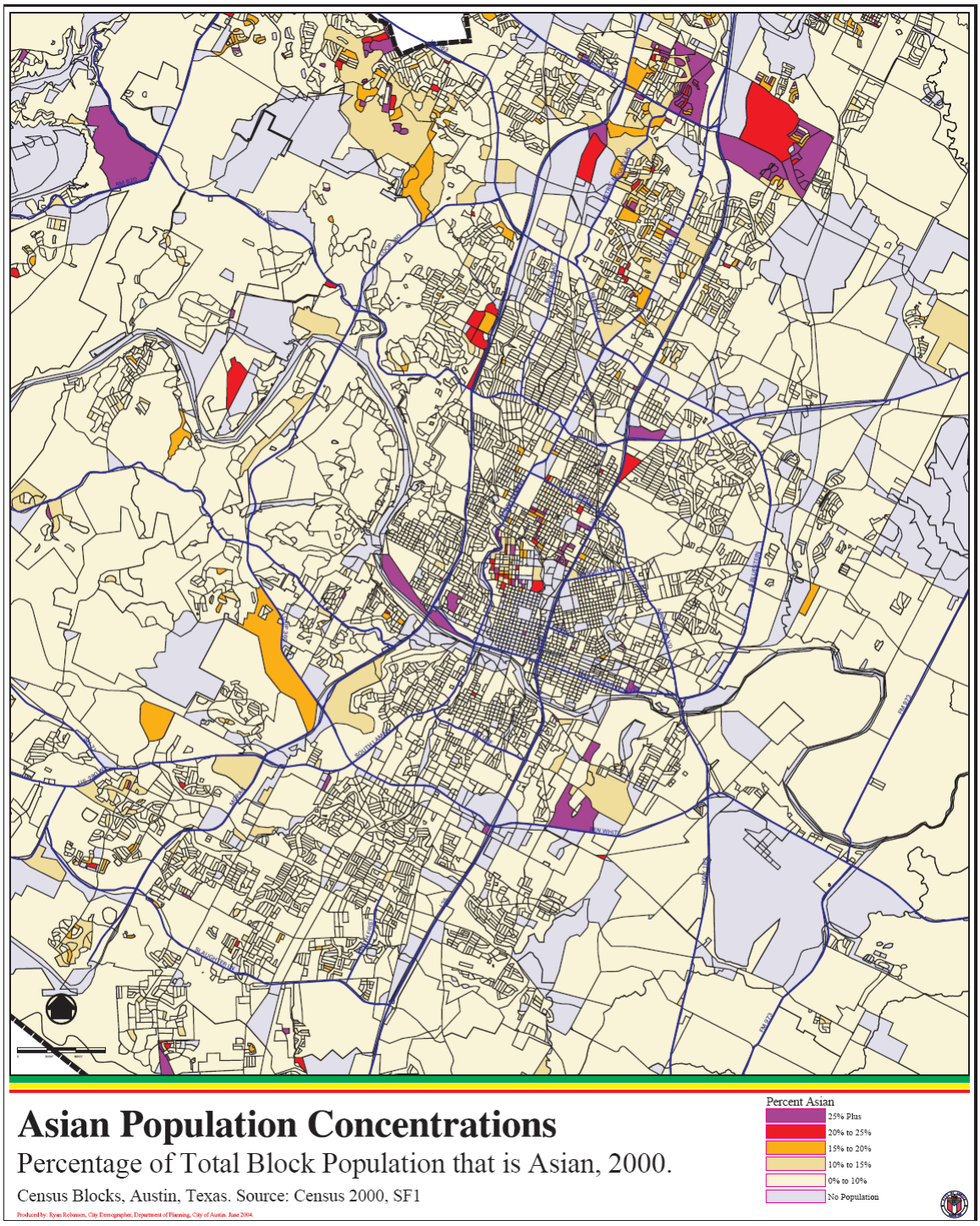
	NW 10th	$0.40	$0.50	$0.50	$0.85	$0.70	$1.25	$1.30	$2.20	$1.60	$2.70
	I-40	$0.45	$0.50	$0.65	$0.85	$0.85	$1.25	$1.60	$2.20	$1.95	$2.70
S.H. 66	NW 10th	$0.25	$0.30	$0.45	$0.50	$0.55	$0.75	$0.60	$1.30	$0.70	$1.60
	I-40	$0.25	$0.30	$0.45	$0.50	$0.55	$0.75	$0.85	$1.30	$1.05	$1.60


AUSTIN
CITY CONNECTION
N
W
E
S
620
2769
183
Anderson Mill Rd.
Research Blvd.
Spicewood Springs Rd.
Farmer Ln.
Burnet Rd.
Lamar Blvd.
Decker Rd.
1
Braker Ln.
35
Bull Creek Rd.
360
2222
Far West Blvd.
Rundberg Ln.
Cameron Rd.
Northland Dr.
Capital of Texas Hwy
Koenig Ln.
Anderson Ln.
290
45th
38th
Lamar
Guadalupe
Airport
Manor Rd.
Decker Ln.
Enfield Rd.
Bee Caves Rd.
M.L.K. Jr. Blvd.
71
Barton Springs Rd.
7th St.
Chávez
Pleasant Valley Rd.
Springdale Rd.
969
S. Lamar Blvd.
Oltorf
Riverside Dr.
Montopolis Dr.
Ben White Blvd.
Stassney Ln.
Wm. Cannon Dr.
Burleson Rd.
Brodie Ln.
Manchaca
S. 1st St.
Congress Ave.
Slaughter Ln.
Austin Map
http://www.cityofaustin.org


Median Family Income
Austin, Texas
Census Tracts, Source: Census 2000, SF1
Produced by: Ryan Robinson, City Demographer, Department of Planning, City of Austin. June 2004.
Median Family Income
$125,000 Plus
$100,000 to $124,999
$75,000 to $99,999
$50,000 to $74,999
$25,000 to $49,999
Less than $24,999
No Family Income


African-American Population Concentrations
Percentage of Total Block Population that is African-American.
Census Blocks, Austin area, Texas. Source: Census 2000, SF1
Produced by: Ryan Robinson, City Demographer, Department of Planning, City of Austin. February 2005.
Percent African-American
80% Plus
60% to 80%
40% to 60%
20% to 40%
0% to 20%
No Population


Lake Travis
Decker Lake
Hispanic--Latino
Population Concentrations
City of Austin, Census 2000 Data
Percent Hispanic--Latino
Less than 20%
20% to 40%
40% to 60%
60% to 80%
80% Plus


Asian Population Concentrations
Percentage of Total Block Population that is Asian, 2000.
Census Blocks, Austin, Texas. Source: Census 2000, SF1
Produced by: Ryan Robinson, City Demographer, Department of Planning, City of Austin. June 2004.
Percent Asian
25% Plus
20% to 25%
15% to 20%
10% to 15%
0% to 10%
No Population

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