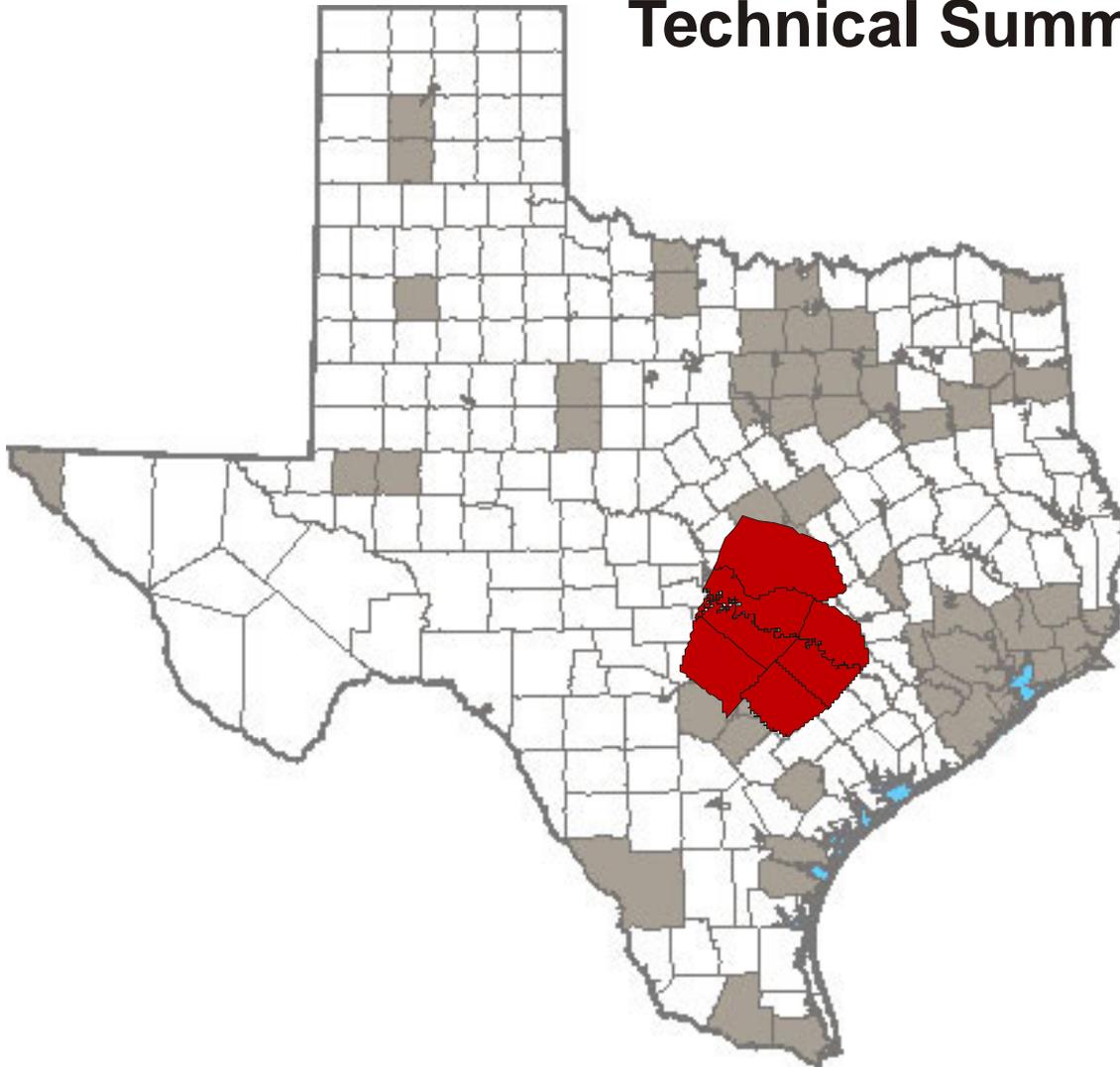


2006 Capital Area Metropolitan Planning Organization Household Travel Survey Technical Summary



Prepared by the
Texas Transportation Institute
April 2008

**2006 Capital Area Metropolitan Planning Organization
Household Travel Survey
Technical Summary**

Texas Department of Transportation Travel Survey Program

by

George B. Dresser, Ph.D.
Senior Research Scientist
Texas Transportation Institute

and

David Pearson, Ph.D., P.E.
Research Engineer
Texas Transportation Institute

Performed in cooperation with the
Texas Department of Transportation
and the
Capital Area Metropolitan Planning Organization
and the
Federal Highway Administration

April 2008

TEXAS TRANSPORTATION INSTITUTE
The Texas A&M University System
College Station, Texas 77843-3135

DISCLAIMER

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Federal Highway Administration (FHWA) or the Texas Department of Transportation (TxDOT). This report does not constitute a standard, specification, or regulation.

ACKNOWLEDGMENTS

This project was conducted in cooperation with the Texas Department of Transportation (TxDOT) and the Capital Area Metropolitan Planning Organization (CAMPO). The authors provide special thanks to Mr. Charlie Hall, the TxDOT project director, for his guidance on this report and for his continuing direction of the TxDOT's Travel Survey Program. The authors also acknowledge the contributions of Mr. Gary Lobaugh, of the Texas Transportation Institute, for preparation of the graphics and for editing the report.

TABLE OF CONTENTS

List of Figures	vii
List of Tables	viii
Introduction.....	1
Household Survey Results	5
Key Points Regarding Household Survey Data	5
Findings of the Survey	5
Household characteristics	6
Household Size	6
Household Life Cycle	8
Household Income	9
Household Vehicle Availability and Licensed Drivers	10
Household Employment	13
Ethnicity	16
Traveler characteristics	17
Household Trip Rates and Vehicle Occupancy	17
Travel by Age Cohort	21
Mode of Travel	22
Amount of Travel.....	23
Trip Distance.....	23
Trip Duration	25
Vehicle Miles of Travel	26
Time of Travel	27
Travel Purpose	28
Type of Place at Trip Destination	28
Where People Traveled.....	30
Terminology.....	41
Appendix A Comparison of the 1998 Austin Area Household Travel Survey with the 2006 CAMPO Household Travel Survey	43
Introduction.....	45
Household Characteristics	48
Household Size	49
Household Income	50
Household Vehicle Availability.....	51
Traveler Characteristics	51
Household Trip Rates	52
Travel by Age Cohort	54
Mode of Travel	55
Amount of Travel.....	56
Internal and External Person Trips	56
Trip Distance.....	57
Trip Duration	59
Vehicle Miles of Travel	60
Summary	61

LIST OF FIGURES

Figure 1.	CAMPO Household Survey Area.....	2
Figure 2.	Distribution of Households by Household Size.....	7
Figure 3.	Distribution of Households by Life Cycle.....	8
Figure 4.	Distribution of Households by Household Income Range.	9
Figure 5.	Distribution of Households by Number of Vehicle Available.	10
Figure 6.	Distribution of Households by Number of Licensed Drivers.....	11
Figure 7.	Distribution of Households by Licensed Drivers and Vehicle Availability.....	12
Figure 8.	Distribution of Households by Number of Persons Employed.	13
Figure 9.	Distributions of Persons by Employment Status.	14
Figure 10.	Distribution of Employed Persons by Employer Type.....	15
Figure 11.	Distribution of Persons by Ethnicity.....	16
Figure 12.	Household Trip Rates by Household Size.	17
Figure 13.	Household Trip Rates by Household Income Range.....	18
Figure 14.	Household Trip Rates by Number of Vehicles Available.	19
Figure 15.	Distribution of Person Trips by Mode of Travel.	22
Figure 16.	Distribution of Person Trips by Trip Distance in Miles.	23
Figure 17.	Distribution of Vehicle Trips by Trip Distance in Miles.....	24
Figure 18.	Distribution of Person Trips by Trip Duration in Minutes.....	25
Figure 19.	Distribution of Vehicle Trips by Trip Duration in Minutes.	26
Figure 20.	Distribution of Person Trip Start Times by Hour of the Day.	27
Figure 21.	Distribution of Person Trips by Trip Destination Purpose.	28
Figure 22.	Travis County and the Sub-Regions within Travis County.....	31
Figure 23.	Person Trip Interchanges between Area A and Areas B, C, D, and E.....	31
Figure 24.	Person Trip Interchanges between Area B and Areas A, C, D, and E.....	32
Figure 25.	Person Trip Interchanges between Area C and Areas A, B, D, and E.....	32
Figure 26.	Person Trip Interchanges between Area D and Areas A, B, C, and E.....	33
Figure 27.	Person Trip Interchanges between Area E and Areas A, B, C, and D.....	33
Figure 28.	Percent of Person Trips that Remain within Each Sub-Region.	34
Figure 29.	Five-County CAMPO Study Area.....	35
Figure 30.	Person Trip Interchanges between Bastrop County and Caldwell, Hays, Travis, and Williamson Counties.	36
Figure 31.	Person Trip Interchanges between Caldwell County and Bastrop, Hays, Travis, and Williamson Counties.	36
Figure 32.	Person Trip Interchanges between Hays County and Bastrop, Caldwell, Travis, and Williamson Counties.	37
Figure 33.	Person Trip Interchanges between Travis County and Bastrop, Caldwell, Hays, and Williamson Counties.	37
Figure 34.	Person Trip Interchanges between Williamson County and Bastrop, Caldwell, Hays, and Travis Counties.	38
Figure 35.	Percent of Person Trips that Remain within Each Sub-Region.....	38
Figure 36.	Three-County Household Survey Area.	46
Figure 37.	Five-County Household Survey Area.....	47
Figure 38.	Distribution of Households by Household Size.....	49
Figure 39.	Distribution of Households by Household Income Range.	50
Figure 40.	Distribution of Households by Number of Vehicle Available.	51

Figure 41. Household Trip Rates by Household Size.....	52
Figure 42. Distribution of Person Trips by Mode of Travel.....	55
Figure 43. Distribution of Person Trips by Trip Distance in Miles.....	57
Figure 44. Distribution of Vehicle Trips by Trip Distance in Miles.....	58
Figure 45. Distribution of Person Trips by Trip Duration in Minutes.....	59
Figure 46. Distribution of Vehicle Trips by Trip Duration in Minutes.....	60

LIST OF TABLES

Table 1.	Estimated Number of 2005-2006 Households, Number of Households Surveyed, and Percent of Surveyed Households, Stratified by Household Size and Income Range.	4
Table 2.	Person Trip Rates by Household Size and Household Income.....	20
Table 3.	Average Vehicle Occupancy by Household Size and Household Income.	20
Table 4.	Number of Persons, Percent of Persons, and Percent of Persons Making Zero Trips by Age Cohort.....	21
Table 5.	Number Person Trips and Distribution of Person Trips by Type of Place at Trip Destination.	29
Table 6.	Comparative Travel Survey Data for Selected Texas Urban Areas.	40
Table 7.	Estimated Population, Households, and Persons per Household.....	48
Table 8.	Person Trip Rates by Household Size and Household Income.....	53
Table 9.	Percent of Persons and Percent of Persons Making Zero Internal Trips.	54
Table 10.	The Number and Distribution of 1998 and 2006 Internal and External-Local Trips.	57

INTRODUCTION

In 2005-2006, the Transportation Planning and Programming Division (TPP) of the Texas Department of Transportation (TxDOT) funded a comprehensive set of travel surveys in Bastrop, Caldwell, Hays, Travis, and Williamson counties. The purpose of these travel surveys was to provide information on the characteristics of household travel into, out of, and within this five-county area. The Capital Area Metropolitan Planning Organization (CAMPO) planning area includes Hays, Travis, and Williamson counties. Bastrop and Caldwell counties were included in the travel survey area due to the large volume of travel between these two counties and the three counties in the CAMPO planning area. The surveys were designed to measure the amount of household travel and the characteristics of this travel for a typical Monday through Friday weekday during the school year.

The travel surveys were designed and conducted to measure: household travel within the five-county area that included a Global Positioning System (GPS) component. The travel surveys also included a commercial vehicle survey, an external station survey; a work place survey, and a peak and off-peak period travel time and delay survey by type of roadway.

This report summarizes the results of the household survey for the five-county area. A variety of household summary information is presented in this report. The summary information is subject to modification as the survey data are further evaluated and analyzed within the context of all the travel surveys conducted.

The household survey sample design is based on obtaining travel information from a pre-determined number of households within certain ranges of household income and household size. The desired number of surveyed households in any household size/income range is not proportional to the estimated number of households in the cell. Rather, the number of households to be surveyed in each cell was based on the total estimated number of households in the area and the expected number of trips the households will make during a typical school-year weekday.

The survey design is based on a desired level of accuracy of +/- 10 percent with a confidence level of 90 percent for the total person trips in the survey area. Figure 1 shows the survey area. The number of households in the five-county area in 2005-2006 was estimated from the 2000 census and the Texas State Data Center (TSDC) population projections for Bastrop, Caldwell, Hays, Travis, and Williamson counties. Table 1 shows the estimated number of households in the study area in 2005-2006, the number of households surveyed, and the distribution of the number of households surveyed stratified by household size and household income range.

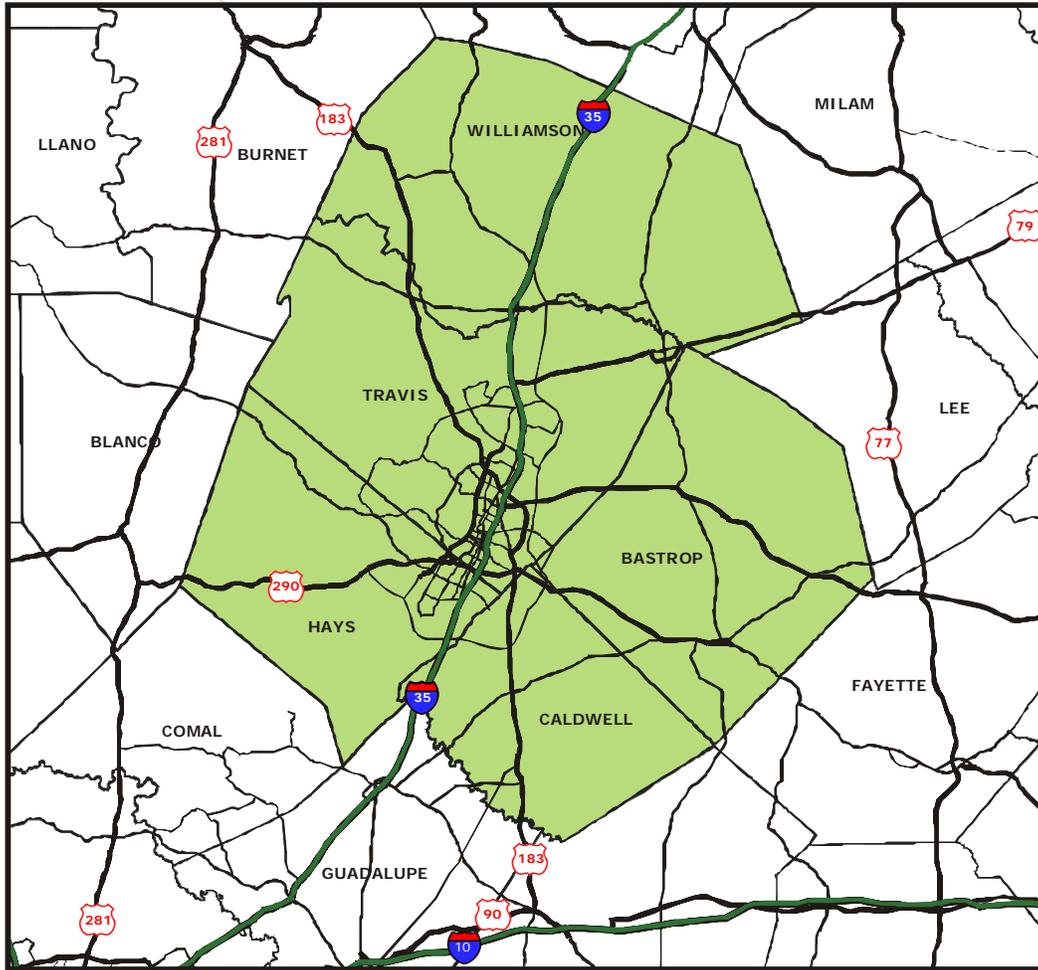


Figure 1. CAMPO Household Survey Area.

A total of 1,499 households were surveyed. The minimum number of households surveyed in any household size/income range cell was 14 and the maximum number surveyed was 111. The higher number of households surveyed in household sizes one and two is highly desirable due to the high number of households with one or two persons. Of the estimated 574,225 households in the five-county area, 26 percent are households with one person and 33 percent are households with two persons — 59 percent of the households are one or two person households.

Table 1. Estimated Number of 2005-2006 Households, Number of Households Surveyed, and Percent of Surveyed Households, Stratified by Household Size and Income Range.

Income Range	Household Size					
	1	2	3	4	5+	Total
Estimated 2005-2006 Number of Households						
\$0 to \$19,999	51,106	21,820	9,761	6,316	4,594	93,597
\$20,000 to \$34,999	40,770	28,137	12,059	9,188	6,317	96,471
\$35,000 to \$49,999	26,415	30,434	14,355	11,485	8,613	91,302
\$50,000 to \$74,999	20,098	44,790	24,117	21,821	16,653	127,479
\$75,000 +	12,633	61,442	33,879	33,879	23,543	165,376
Totals	151,022	186,623	94,171	82,689	59,720	574,225
Number of Households Surveyed						
\$0 to \$19,999	111	91	31	14	34	281
\$20,000 to \$34,999	65	115	56	42	34	312
\$35,000 to \$49,999	58	108	52	55	35	308
\$50,000 to \$74,999	26	99	46	41	39	251
\$75,000 +	19	104	89	86	49	347
Totals	279	517	274	238	191	1499
Percent of Households Surveyed						
\$0 to \$19,999	7.40	6.07	2.07	0.93	2.27	18.74
\$20,000 to \$34,999	4.34	7.67	3.74	2.80	2.27	20.82
\$35,000 to \$49,999	3.87	7.20	3.47	3.67	2.33	20.54
\$50,000 to \$74,999	1.73	6.60	3.07	2.74	2.60	16.74
\$75,000 +	1.27	6.94	5.94	5.74	3.27	23.16
Totals	18.61	34.48	18.29	15.88	12.74	100

Source: Five-County Household Travel Survey and Texas Transportation Institute (TTI) Analysis.

HOUSEHOLD SURVEY RESULTS

This survey represents a sample of household demographic and travel characteristics for a Monday through Friday weekday during the school year in the fall of 2005 and the spring of 2006. The survey data was collected from travel diaries completed on a specified travel day for all occupants of 1,499 households located in the five-county area, Figure 1.

Key Points Regarding Household Survey Data

- The survey data is for an average weekday in the fall of 2005 and the spring of 2006.
- The survey data were tabulated only for persons who lived in the surveyed households. Persons living in group quarters, such as nursing homes, correctional facilities, or dormitories, or in households without phone service were not surveyed.
- The survey data are for persons of all ages unless otherwise noted.
- The survey data do not include non-household-based travel such as commercial vehicles or tourists or persons staying in hotels.
- The estimates for population and number of households are based on the expanded survey data and may differ from population and household estimates developed by other agencies.
- The survey data is for trips that began and ended within the five-county area. Trips that began inside the five-county area and ended outside the planning area or vice versa are summarized in the external station survey report.

Findings of the Survey

For the five-county area:

- 97 percent of the households had a vehicle available.
- 98 percent of the households had a licensed driver.
- Trip rates per household increased with household size, with household income, and with vehicle availability.
- The average vehicle occupancy was 1.36 persons per vehicle.
- Over 91 percent of all person trips were made in a personal-use vehicle.
- Of the household population that traveled, 66 percent drove a vehicle, 25 percent rode as a passenger in a vehicle, 4 percent rode in a school bus, 4 percent either walked or rode a bicycle, and less than 1 percent used public transportation.
- Just over 11 percent of the total household population did not make an internal trip within the planning area on their survey day.
- On average, each person made 3.42 person trips per day and each household made 8.87 person trips per day.
- The average person trip length was 7.8 miles and the average person trip duration was 12.8 minutes.
- The average vehicle trip length was 8.4 miles and the average vehicle trip duration was 13.8 minutes.

- The peak hour for household travel was from 7:01 a.m. to 8:00 a.m. during which 12 percent of the trip starts occurred. The second highest hour for household trip starts was from 5:01 p.m. to 6:00 p.m. when almost 9 percent of the daily trip starts occurred.
- Weekday school year household travel internal to the study area accounted for an estimated 26.5 million vehicle miles of travel (VMT).

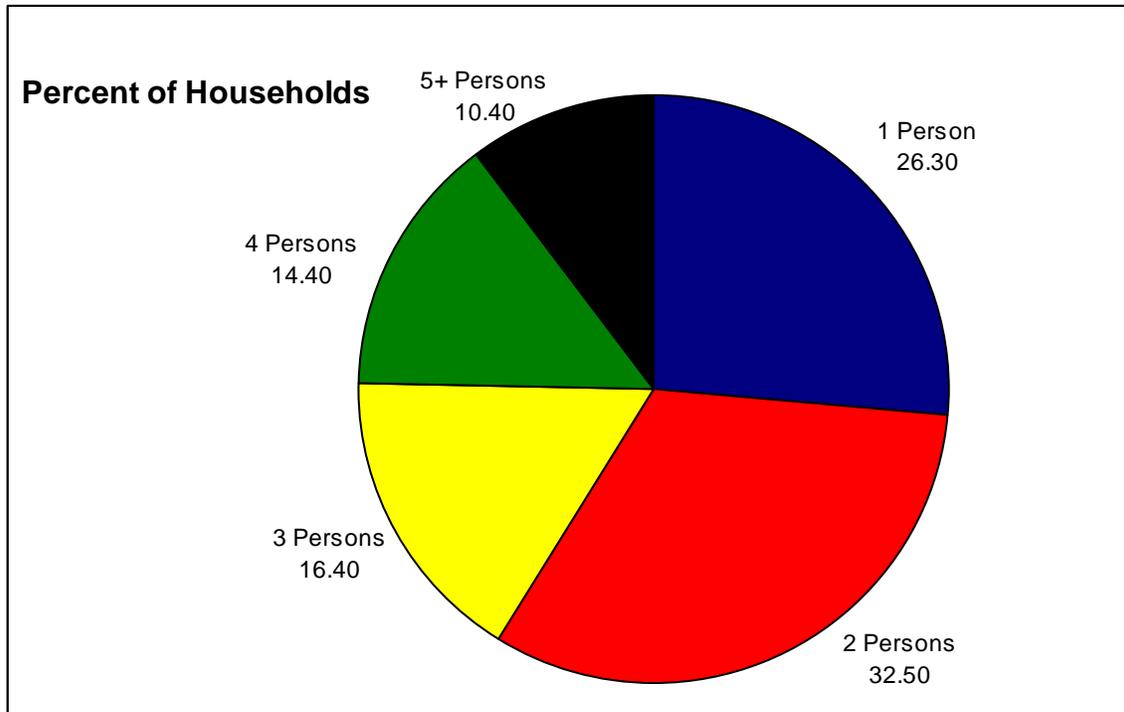
HOUSEHOLD CHARACTERISTICS

Characteristics of the household influence travel behavior. For example, household size, income, vehicles available, number of persons employed, and family life cycle affect the amount and the time-of-day that trips are made. For this survey, households include only those persons living in residences, and do not include persons living in group quarters. The figures in this section are for the expanded survey data.

Household Size

Figure 2 shows the distribution of households by household size for 2005. Household size and household income range are the two household variables used to stratify the household trip rates calculated from the household travel survey. When forecasting future travel, the forecast population must be estimated by household size and household income range. Average household size in the five-county study area in 2005 estimated from the survey was 2.59 persons per household down from 2.65 persons per household in 2000. This means that as the population grows, the number of households is increasing at a slightly faster rate than the population, since there are fewer persons per household. For the five-county travel model, three variables — household size, household income, and the number of persons employed in the household, were used to stratify trip rates for the home-based work (HBW) trip purpose. For the home-based non-work (HBNW) and the non-home based (NHB) trip purposes, two variables — household size and household income — were used to stratify trip rates.

A typical household makes a certain number of trips on most days to meet household needs, for example, to purchase food and other necessities, to earn an income, to attend school, to visit friends and family, to receive medical care, to attend events, etc. For this reason, the number of households is a better predictor of future travel than using the number of persons.

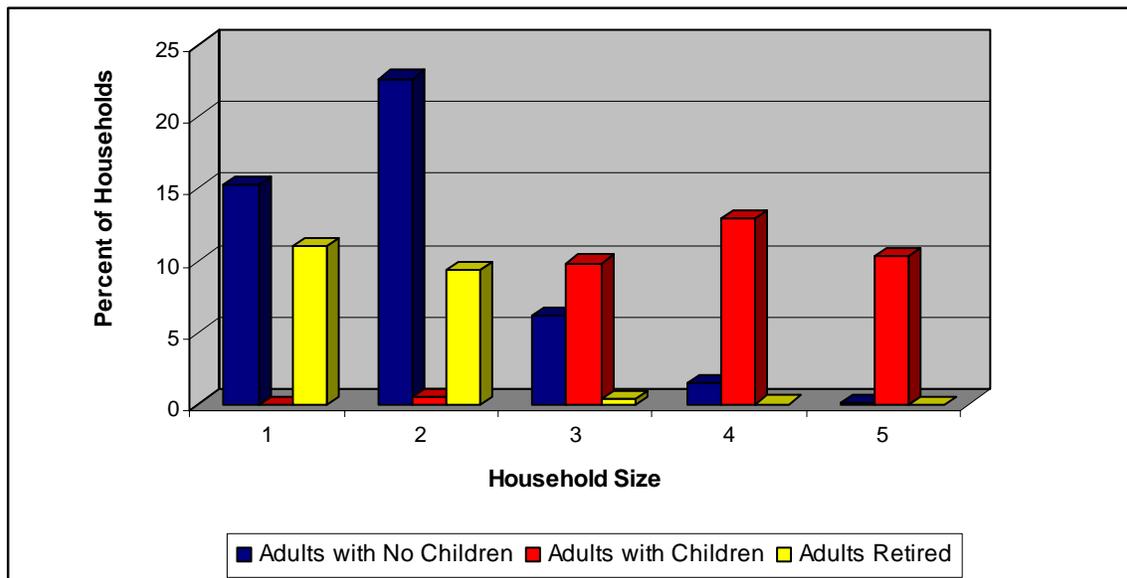


Source: Five-County Household Travel Survey.

Figure 2. Distribution of Households by Household Size.

Household Life Cycle

Household life cycle influences the amount and time of travel. For example, households with children tend to make more trips than households without children. Households with working adults tend to make more trips than households with retired adults. There were an estimated 574,225 households in the five-county travel area in 2005. Figure 3 shows the distribution of these 574,225 households by those with no children and not retired, those with children, and those with only retired persons. Over one-third of the households have children (34 percent), 46 percent of the households have no children, and 21 percent of the households have only retired persons.

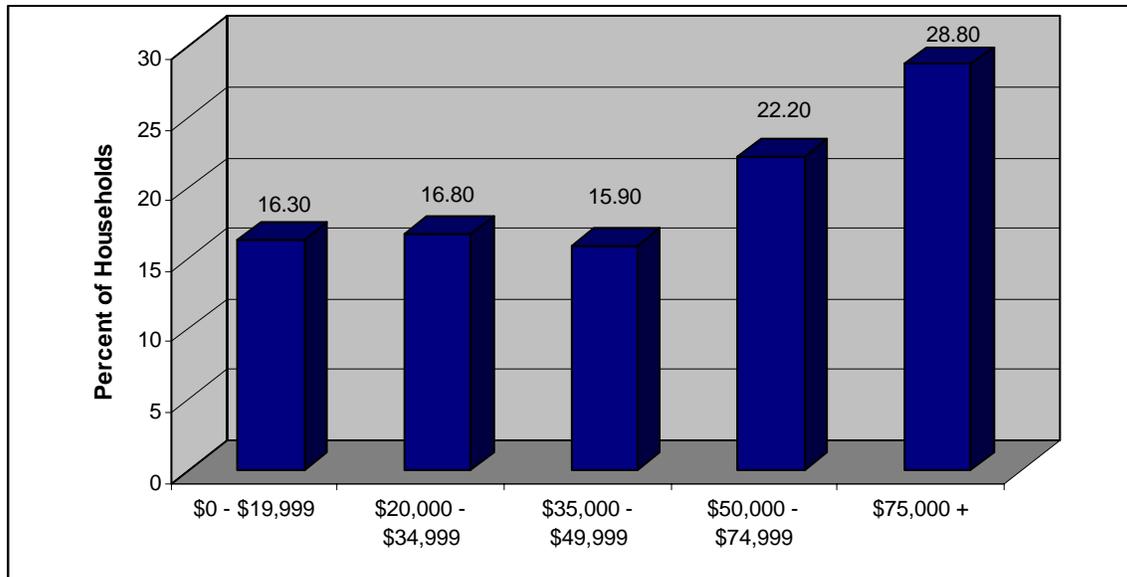


Source: Five-County Household Travel Survey and TTI Analysis. Note: The data represents households within the five-county travel survey area. The data does not include residents who did not report age. Adults are persons 18 years of age and older. Retired households have only retired persons. If one person in the household was retired and the other adult was employed, that household was not counted as a retired household.

Figure 3. Distribution of Households by Life Cycle.

Household Income

Household income and household size are the two primary variables used to estimate household trip rates. As household income increases, the amount of household travel tends to increase. Additionally, as income increases, vehicle ownership tends to increase and additional financial resources are available to the household to support increased travel. Figure 4 shows the distribution of the 574,225 expanded households in the survey by the combined annual household income range.

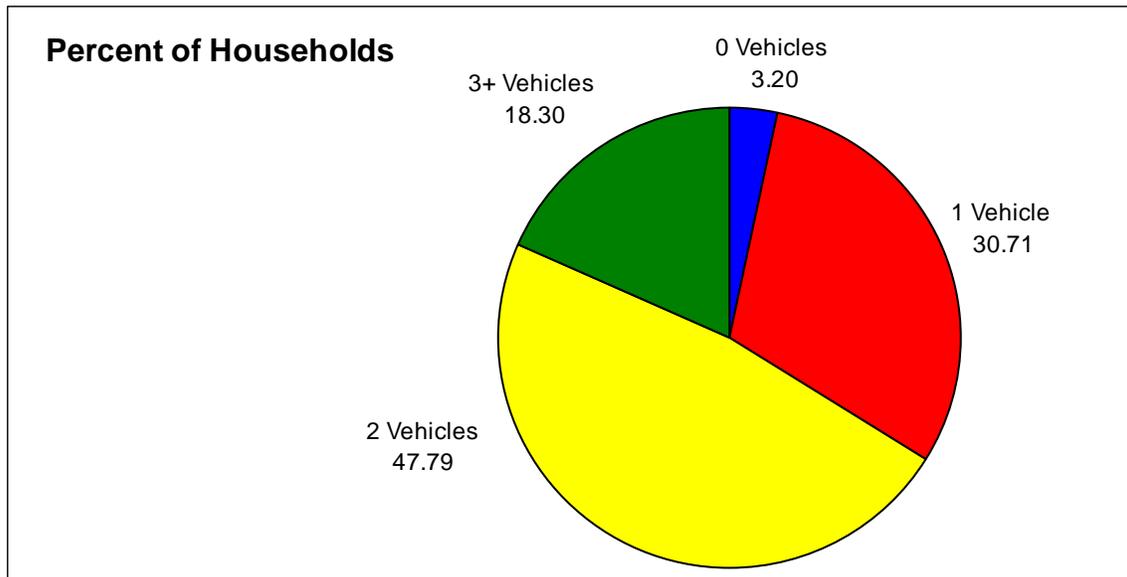


Source: Five-County Household Travel Survey and TTI Analysis.

Figure 4. Distribution of Households by Household Income Range.

Household Vehicle Availability and Licensed Drivers

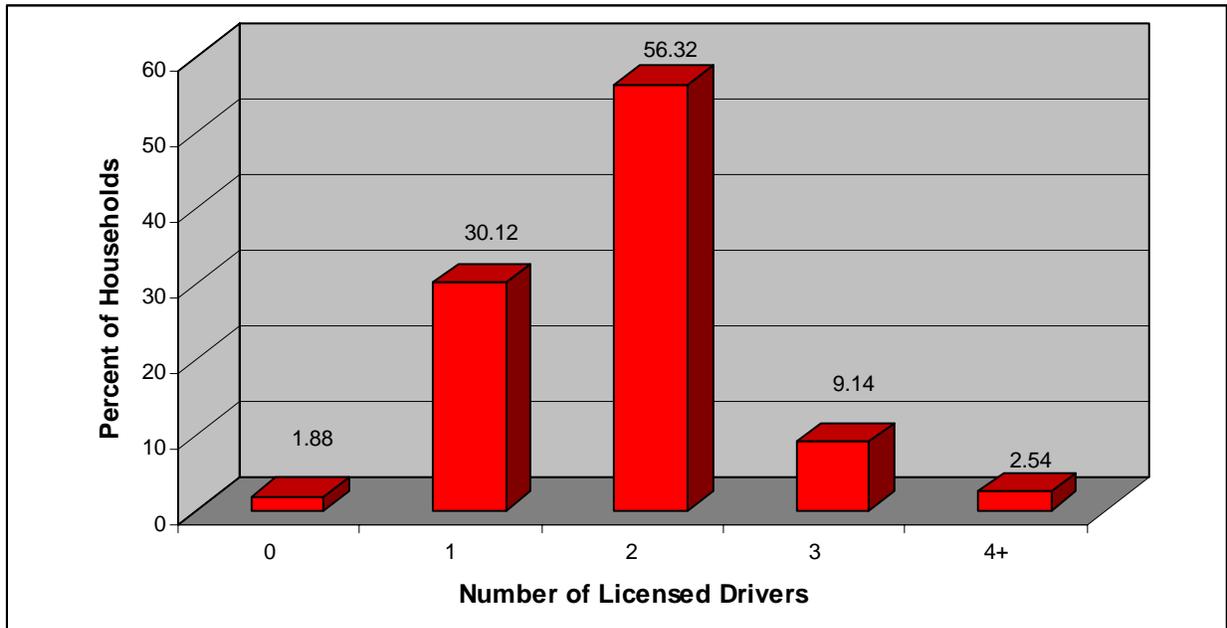
In general, as the number of vehicles available to the household increases, daily household travel increases. This household characteristic also impacts forecasting the demand for public transportation. As household vehicle availability increases, the household demand for public transportation tends to decrease. Figure 5 shows the distribution of the 574,225 expanded households in the survey by the number of vehicles available. Only 3 percent of the households did not have a vehicle available. The average number of vehicles available per household was 1.88.



Source: Five-County Household Travel Survey and TTI Analysis. Note: A household vehicle is any motorized vehicle available to a household for travel including motorcycles, trucks, vans, automobiles, sport utility vehicles, etc.

Figure 5. Distribution of Households by Number of Vehicle Available.

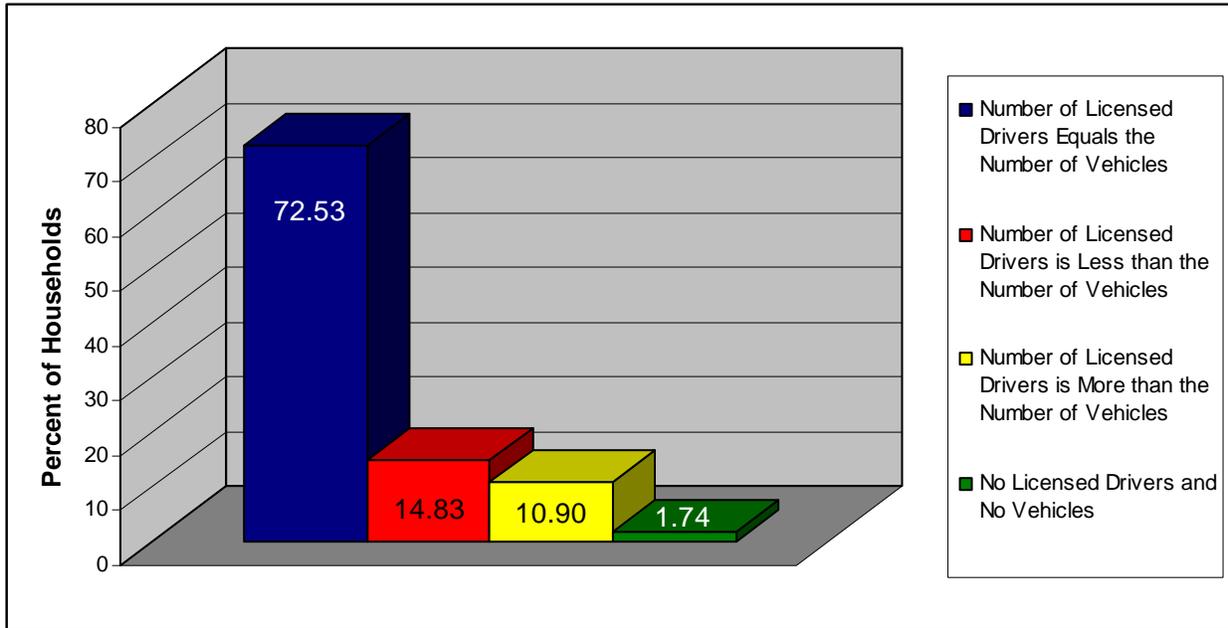
Figure 6 shows the distribution of the 574,225 expanded households by the number of licensed drivers per household. Less than 2 percent of the households did not have a licensed driver.



Source: Five-County Household Travel Survey and TTI Analysis.

Figure 6. Distribution of Households by Number of Licensed Drivers.

Figure 7 shows the distribution of the 574,225 expanded households by the number of licensed drivers and the number of vehicles available. For the majority of households, 73 percent, the number of licensed drivers and the number of vehicles available is equal. For 15 percent of the households, the number of licensed drivers is less than the number of vehicles available. Less than 2 percent of the households have neither a licensed drivers nor a vehicle available.

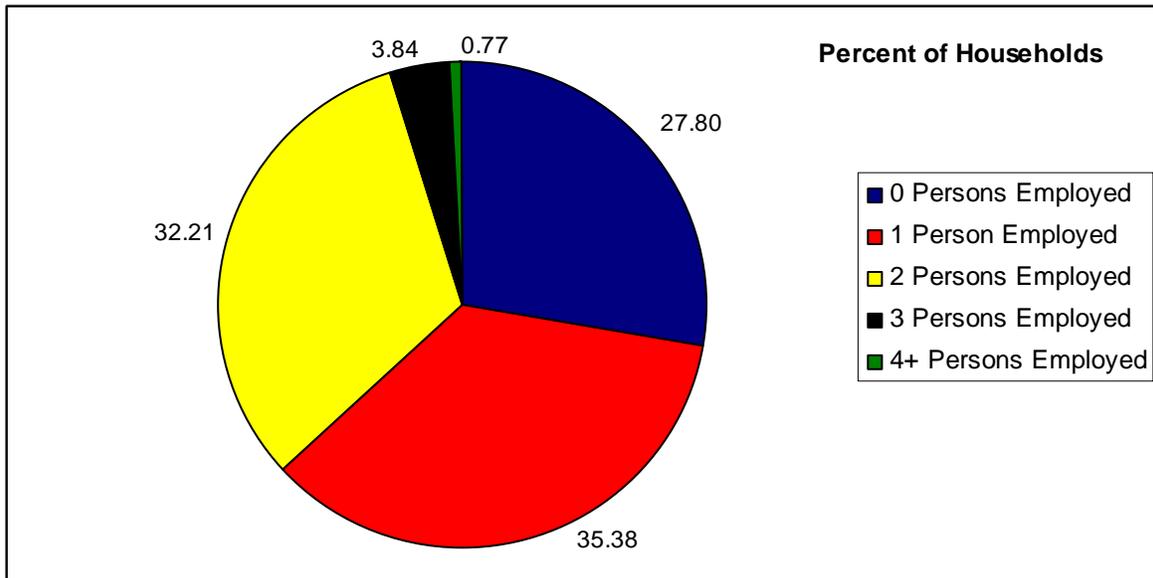


Source: Five-County Household Travel Survey and TTI Analysis.

Figure 7. Distribution of Households by Licensed Drivers and Vehicle Availability.

Household Employment

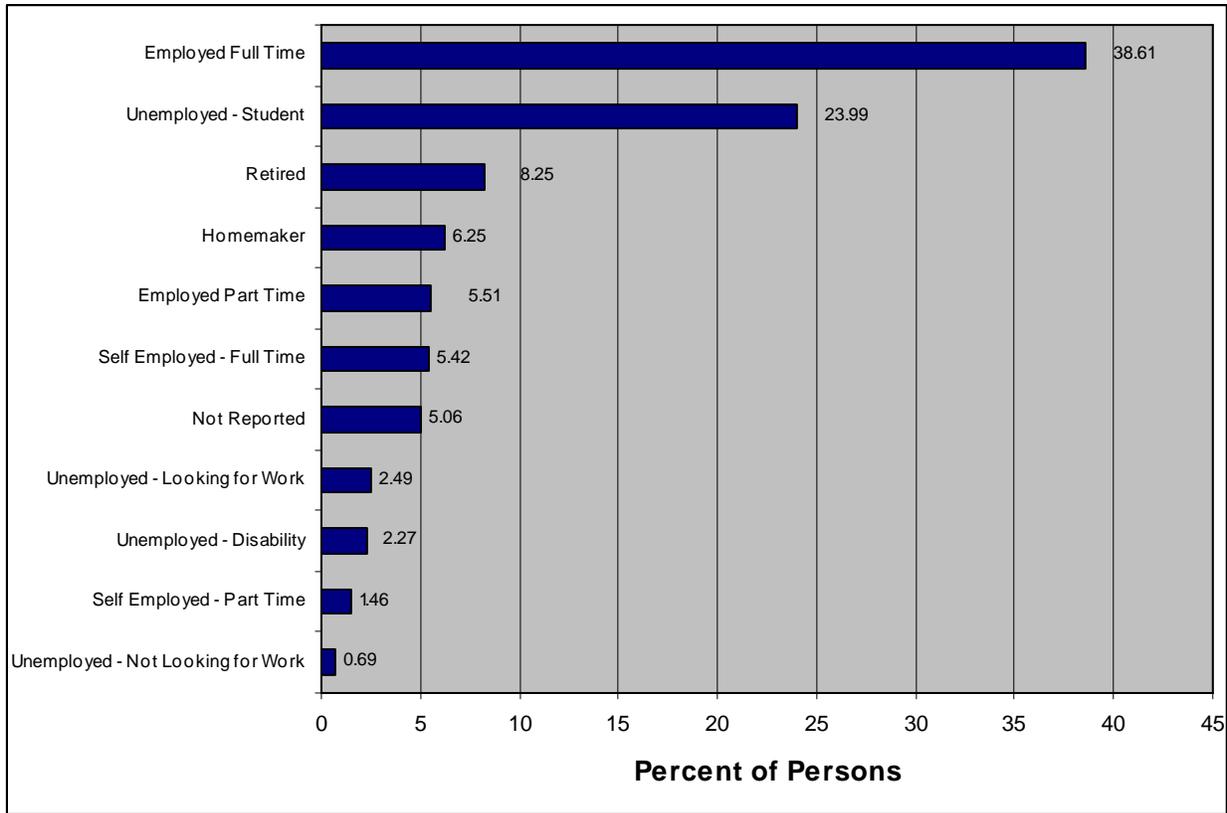
The 574,225 expanded households included 1,486,117 persons for an average of 2.59 persons per household. Figure 8 shows the distribution of the 574,225 expanded households by the number of persons employed.



Source: Five-County Household Travel Survey and TTI Analysis.

Figure 8. Distribution of Households by Number of Persons Employed.

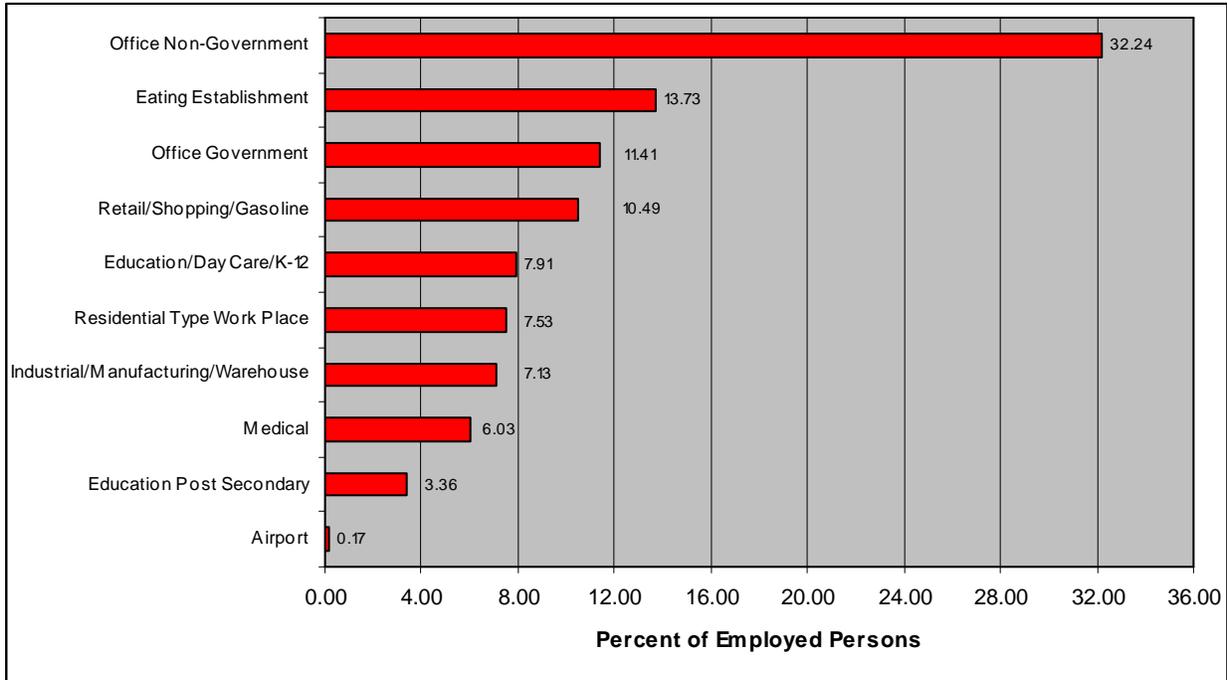
Figure 9 shows the distribution of all persons regardless of age by employment status. Almost 39 percent of the population is employed full time and almost 24 percent of the population is students. Less than 4 percent of those employed had more than one job.



Source: Five-County Household Travel Survey and TTI Analysis.

Figure 9. Distributions of Persons by Employment Status.

Figure 10 shows the distribution of the employed persons by the type of employer. The 574,225 households had 758,092 employed persons for an average of 1.32 employed persons per household. The office non-government employer type accounted for one of every three jobs. The eating establishment employer type provided jobs for almost 14 percent of those the employed.

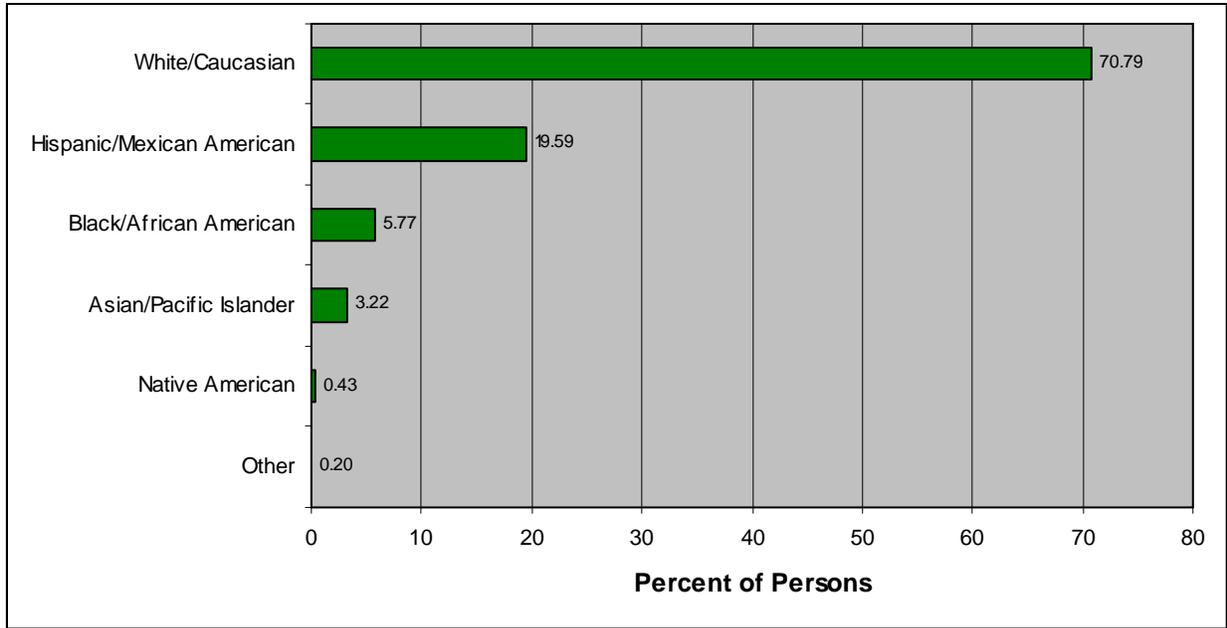


Source: Five-county Household Travel Survey and TTI Analysis.

Figure 10. Distribution of Employed Persons by Employer Type.

Ethnicity

Figure 11 shows the distribution of the 1,486,117 persons by ethnicity.



Source: Five-county Household Travel Survey and TTI Analysis.

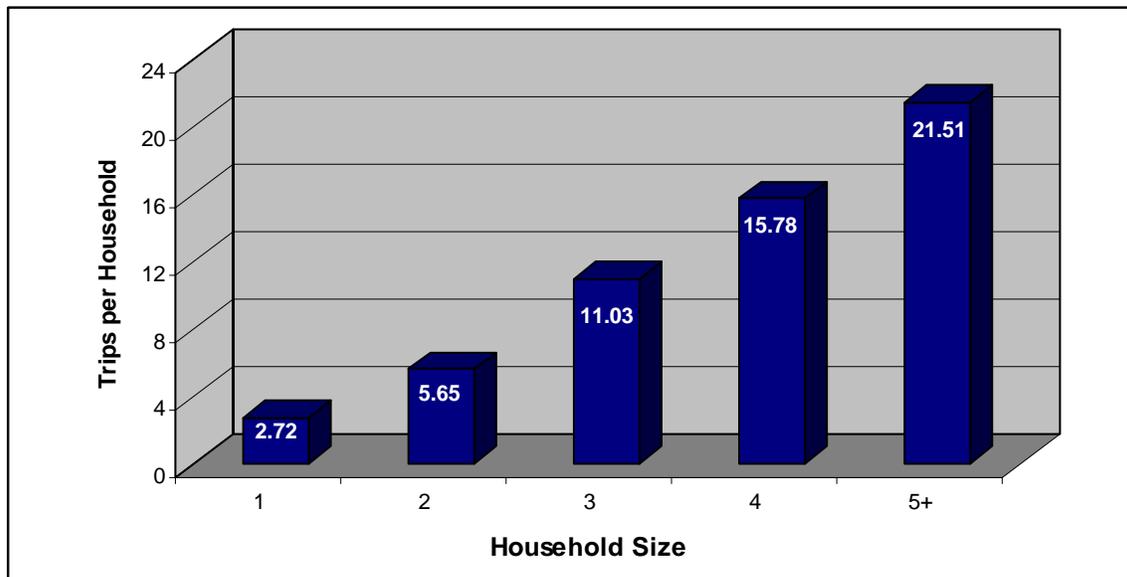
Figure 11. Distribution of Persons by Ethnicity.

TRAVELER CHARACTERISTICS

The previous section reported on a variety of household and person characteristics obtained from the household travel survey. In this section, these household and person characteristics are related to household travel characteristics. Household size, household income, household life cycle, household vehicle availability, household licensed drivers, and household employment all affect the amount of household travel.

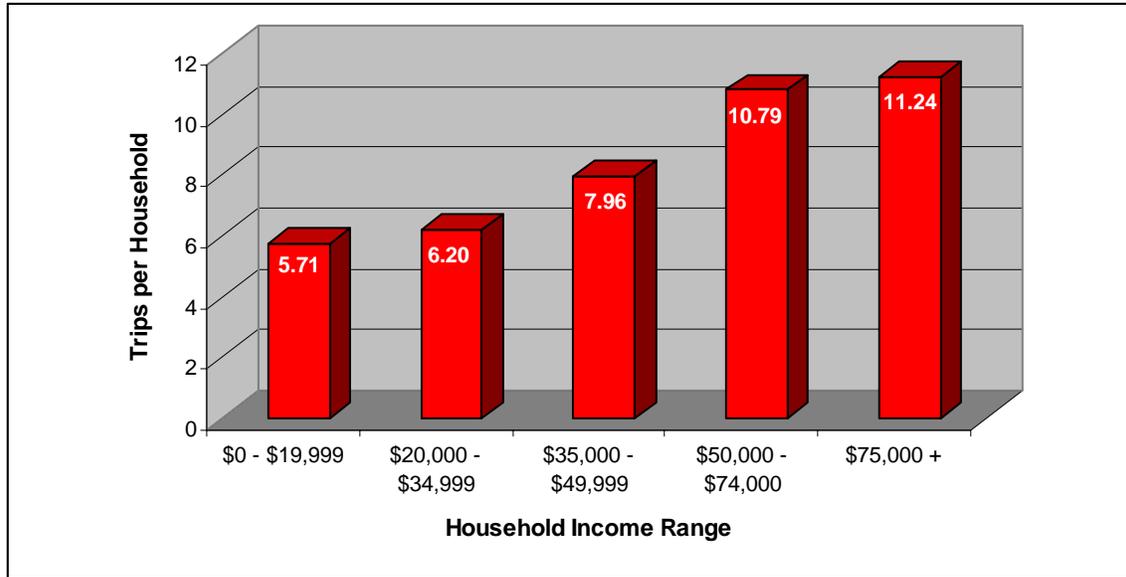
Household Trip Rates and Vehicle Occupancy

The household trip rates in this section are for person trips made in a vehicle either as the driver or as a passenger. Figure 12 shows household trip rates as a function of household size. As the household size increases, household trip rates increase and become large for large household sizes. For travel forecasting applications, households with five or more household members are grouped and an average trip rate is used for the group. Figure 13 shows the household trip rates as a function of the household income range. As expected, as household income increases, the household trip rate increases.



Source: Five-County Household Travel Survey and TTI Analysis.

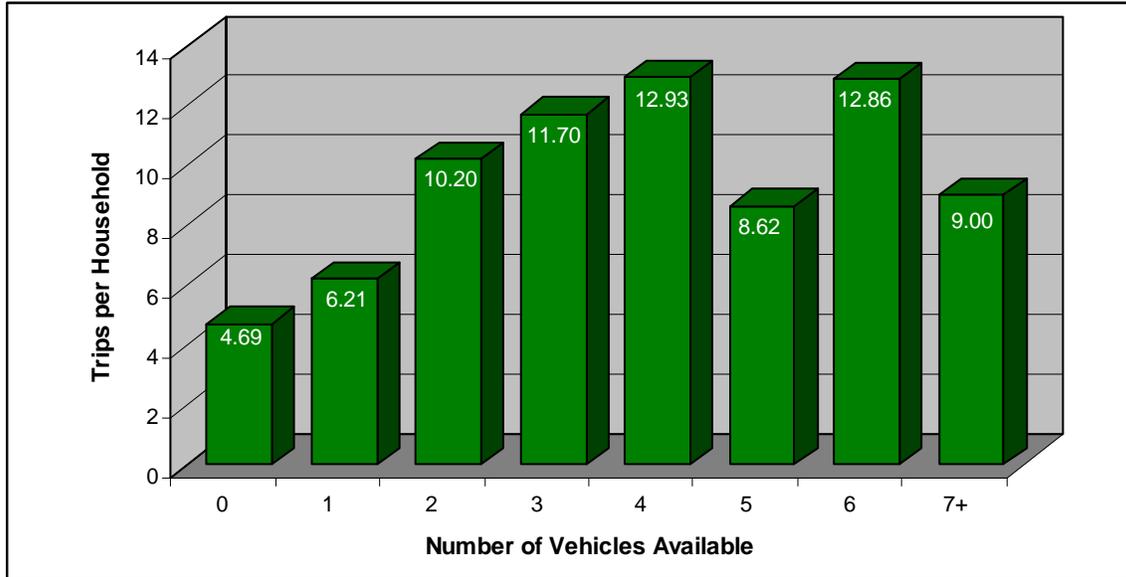
Figure 12. Household Trip Rates by Household Size.



Source: Five-County Household Travel Survey and TTI Analysis.

Figure 13. Household Trip Rates by Household Income Range.

Figure 14 shows the household trip rates as a function of the number of vehicles available to household members for travel. Again, as expected, as the number of vehicles available to the household increase, the household trip rate increases, but the rate increases very little after two vehicles. Notice that households with no vehicle available do make a meaningful number of trips. The apparent anomaly in trip rates for households with 5, 6, and 7 vehicles available is due to the very small sample sizes for these households.



Source: Five-County Household Travel Survey and TTI Analysis.

Figure 14. Household Trip Rates by Number of Vehicles Available.

Table 2 shows the person trip rates cross classified by household size and household income for all internal trip purposes combined, that is, trips that begin and end inside the five-county household travel survey area. These trip rates are for all trips by all modes including transit, bicycle, and walk trips. For travel forecasting applications, the cross-classified trip rates are disaggregated by trip purpose into HBW trips, HBNW trips, and NHB trips. (See the terminology section for the definitions of these terms.) As a part of the travel forecasting process, the person trips are divided among the modes during the mode split step. The average, internal to the five-county area, person trip rate for all households was 8.9 trips per household.

Table 2. Person Trip Rates by Household Size and Household Income.

Household Income Range	Household Size				
	1	2	3	4	5 +
\$0 - \$19,999	2.174	5.032	11.998	16.984	19.408
\$20,000 - \$34,999	2.571	4.822	9.371	13.551	19.072
\$35,000 - \$49,999	3.320	5.093	10.137	13.688	21.032
\$50,000 - \$74,999	2.999	6.907	11.845	15.098	23.441
\$75,000 +	3.664	5.609	11.151	17.317	21.369

Source: Five-County Household Travel Survey and TTI Analysis.

Table 3 shows the average vehicle occupancy for person trips made in private vehicles by household size and by household income range. The average vehicle occupancy for all households was 1.36 persons per vehicle.

Table 3. Average Vehicle Occupancy by Household Size and Household Income.

Household Income Range	Household Size				
	1	2	3	4	5 +
\$0 - \$19,999	1.082	1.605	1.513	1.411	1.302
\$20,000 - \$34,999	1.173	1.435	1.653	1.162	1.519
\$35,000 - \$49,999	1.052	1.376	1.573	1.355	1.343
\$35,000 - \$74,999	1.070	1.192	1.402	1.231	1.435
\$75,000 +	1.032	1.233	1.559	1.403	1.512

Source: Five-county Household Travel Survey and TTI Analysis.

Travel by Age Cohort

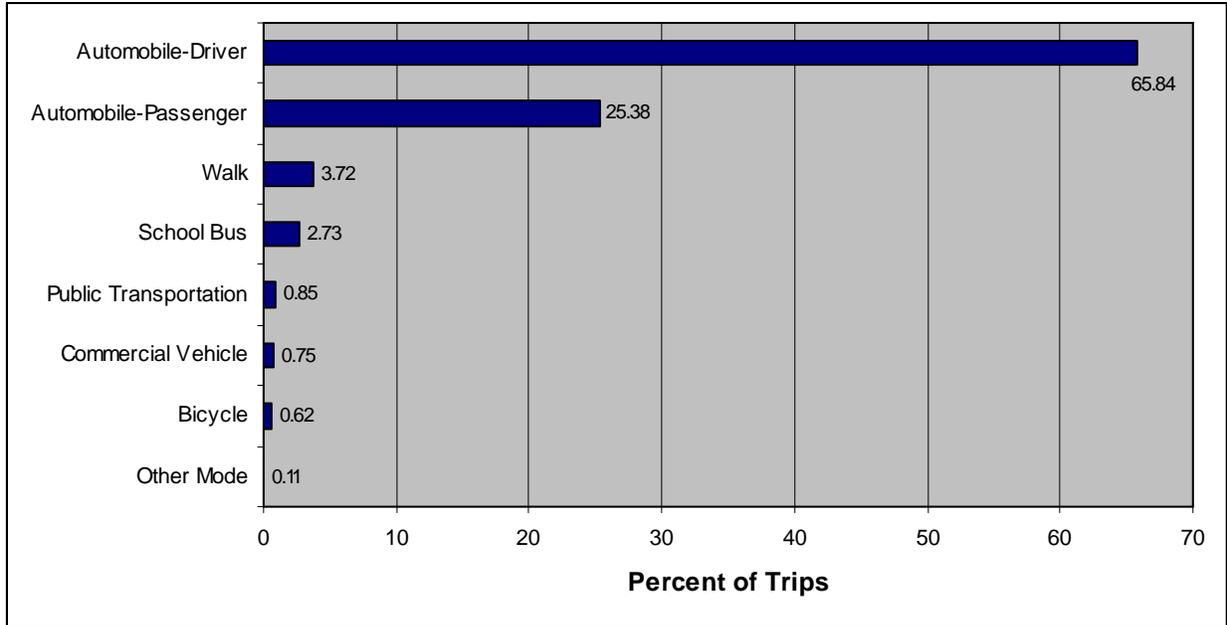
A total of 1,484,934 persons who reported their age were represented in the expanded household survey. Table 4 shows the number of persons and distribution of persons by age cohort that did not make any internal trips on their survey day. As expected, older persons are less likely to travel than are younger persons, but the older population is mobile and contribute significantly to the amount of household travel. The rather high percentage of persons making zero internal trips in the 20-24 age cohort probably is due to under reporting or not reporting of trips by this age cohort.

Table 4. Number of Persons, Percent of Persons, and Percent of Persons Making Zero Trips by Age Cohort.

Age Cohort	Number of Persons	Percent of Persons	Number of Person Making Trips	Number of Persons Making Zero Internal Trips	Percent of Persons Making Zero Internal Trips
0-15	324,472	21.86	293,928	30,545	9.41
16-19	93,056	6.27	87,896	5,160	5.55
20-24	124,916	8.41	102,663	22,253	17.81
25-29	132,280	8.91	114,526	17,754	13.42
30-34	136,093	9.16	120,366	15,727	11.56
35-39	125,831	8.47	114,904	10,927	8.68
40-44	114,194	7.69	104,434	9,760	8.55
45-49	111,265	7.49	101,490	9,775	8.79
50-54	93,475	6.29	80,582	12,893	13.79
55-59	73,553	4.95	62,323	11,230	15.27
60-64	48,877	3.29	42,371	6,506	13.31
65-69	37,569	2.53	32,401	5,168	13.76
70-74	25,636	1.73	20,860	4,776	18.63
75-79	19,249	1.30	15,373	3,876	20.14
80 +	24,468	1.65	17,579	6,889	28.15
Total	1,484,934	100	1,311,696	173,239	11.67

MODE OF TRAVEL

The modes of travel were household automobile-driver, household automobile-passenger, school bus, walk, public transportation, bicycle, carpool/vanpool, and commercial vehicle. Figure 15 shows the distribution of person trips by mode. Automobile travel accounted for 91 percent of the person trips. School bus trips accounted for 7 percent of the person trips and walk accounted for almost 4 percent of the person trips. The surveyed households made little use of public transportation, less than 1 percent of the person trips.



Source: Five-County Household Travel Survey and TTI Analysis.

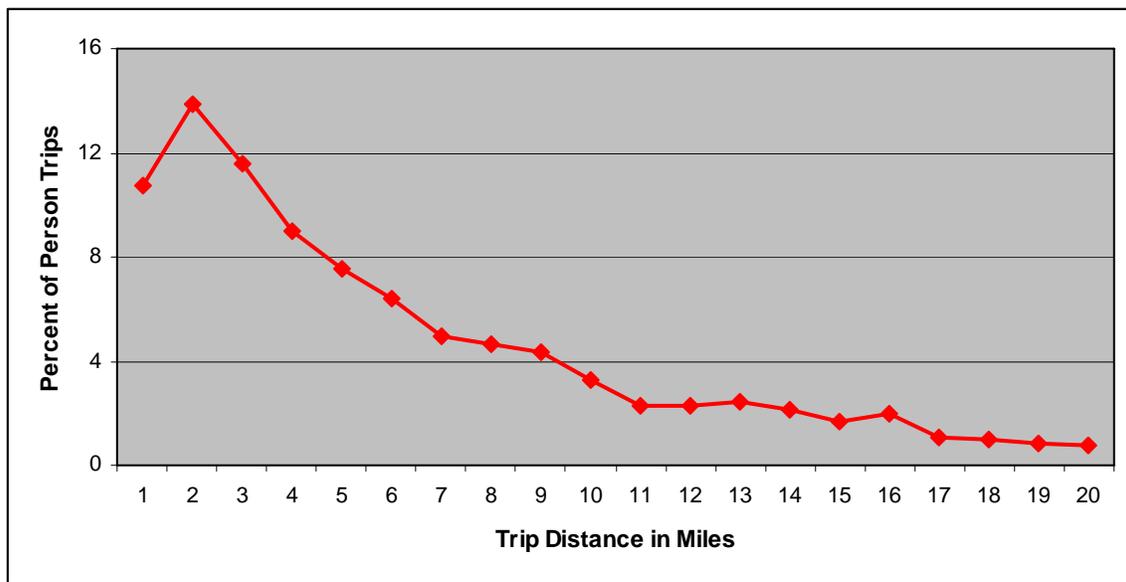
Figure 15. Distribution of Person Trips by Mode of Travel.

AMOUNT OF TRAVEL

Several measures are used to record the amount of travel — the number of person trips, the number of vehicle trips, the trip distances in miles, the trip durations or travel times in minutes, and the VMT.

Trip Distance

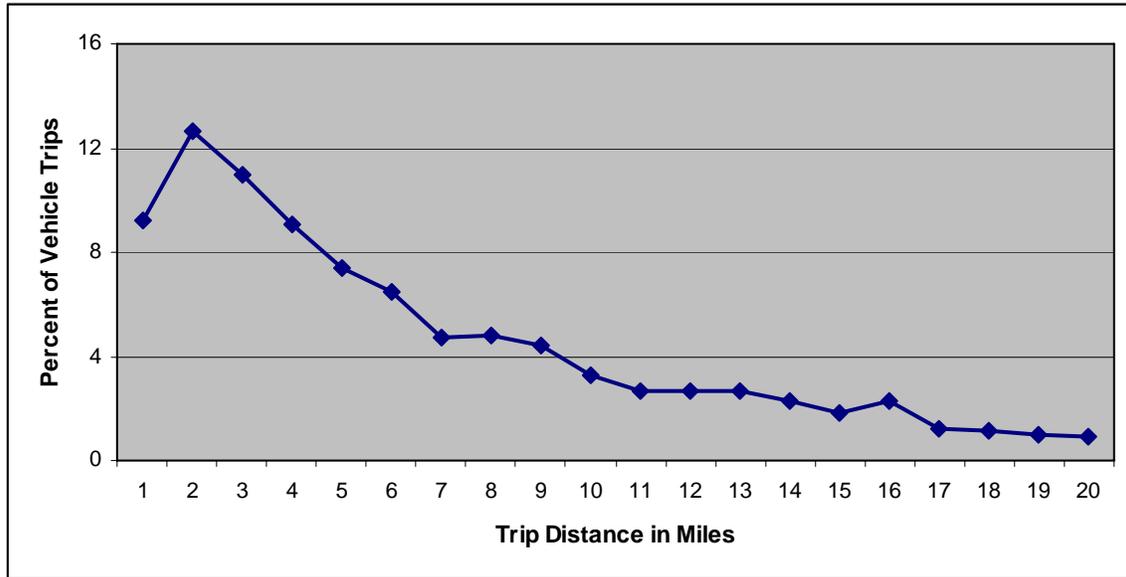
Figure 16 shows the distribution of person trips by the length of the trip in miles. The distribution is for internal person trips, trips beginning and ending inside the five-county study area. The average person trip length was 7.8 miles.



Source: Five-County Household Travel Survey and TTI Analysis.

Figure 16. Distribution of Person Trips by Trip Distance in Miles.

Figure 17 shows the distribution of vehicle trips by the length of the trip in miles. The average vehicle trip length was 8.4 miles. For travel demand modeling purposes, the travel modeler needs data about the distribution of vehicle trips in miles and the average vehicle trip length in miles for each internal trip purpose. Distributions similar to Figure 17 are prepared for each internal trip purpose.

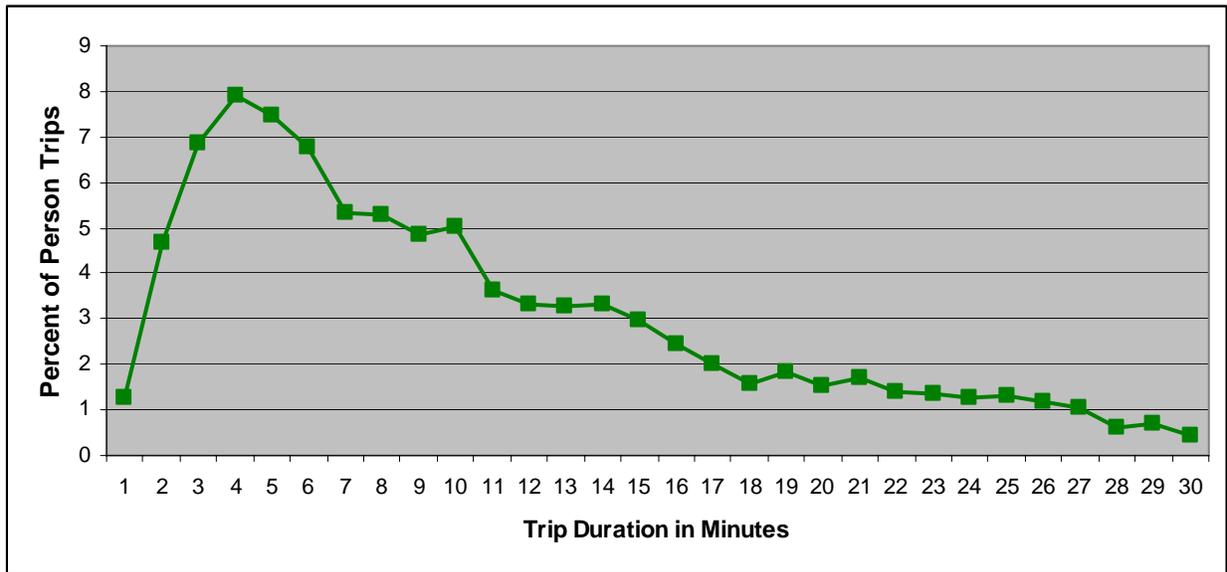


Source: Five-County Household Travel Survey and TTI Analysis.

Figure 17. Distribution of Vehicle Trips by Trip Distance in Miles.

Trip Duration

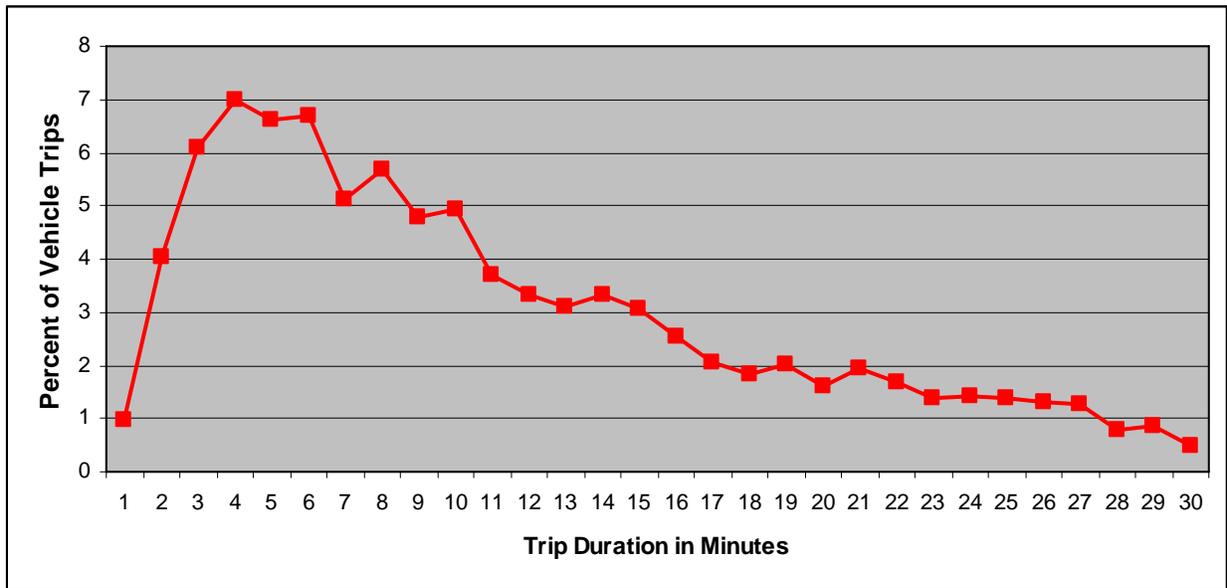
Figure 18 shows the distribution of person trips by the duration of the trip in minutes. The distribution is for internal person trips, trips beginning and ending inside the five-county study area. The average person trip length was 12.9 minutes.



Source: Five-County Household Travel Survey and TTI Analysis.

Figure 18. Distribution of Person Trips by Trip Duration in Minutes.

Figure 19 shows the distribution of vehicle trips by the duration of the trip in minutes. The average vehicle trip duration was 13.8 minutes.



Source: Five-County Household Travel Survey and TTI Analysis.

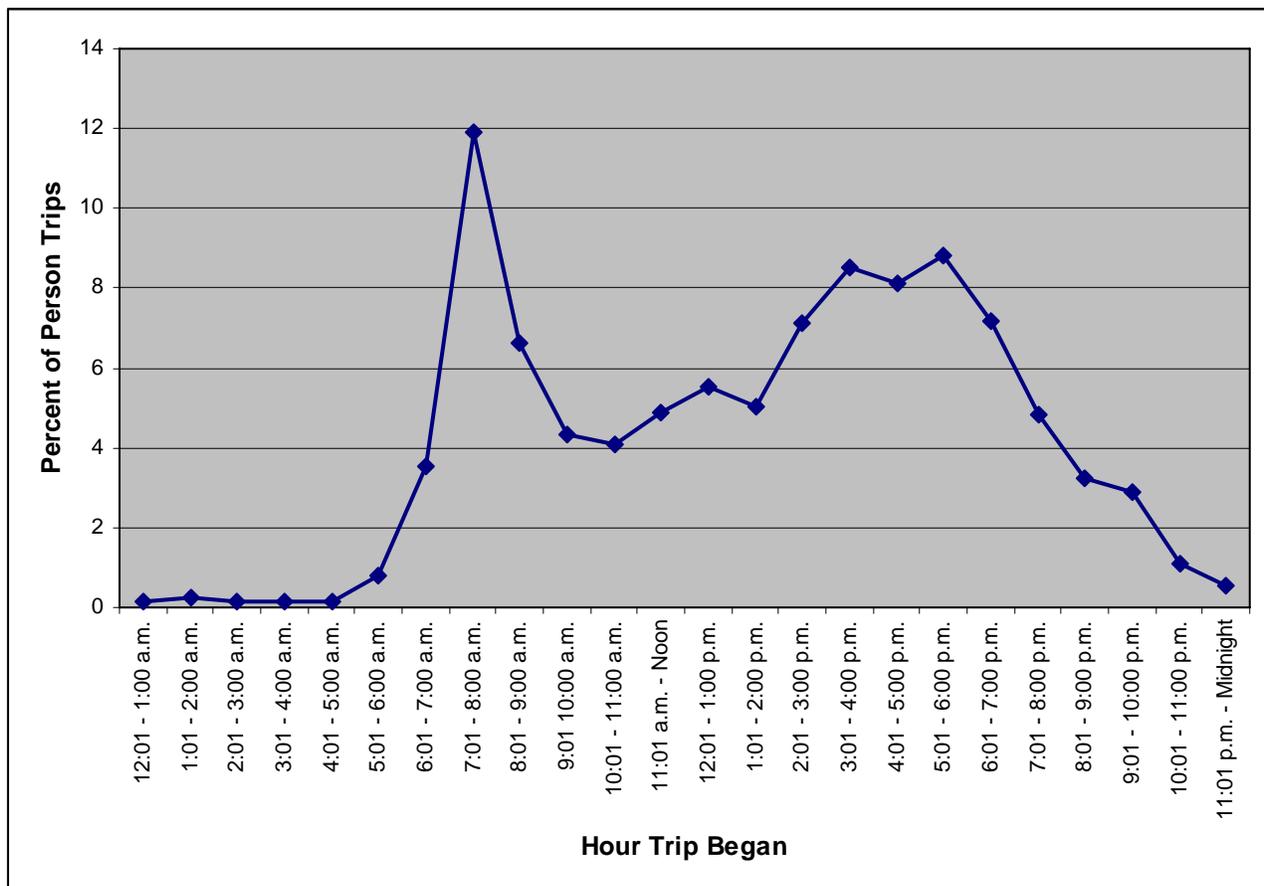
Figure 19. Distribution of Vehicle Trips by Trip Duration in Minutes.

Vehicle Miles of Travel

VMT is calculated as the product of the average vehicle trip length in miles and the number of vehicle trips. For household trips internal to the five-county study area, the estimated VMT is 26,463,000 miles per school-year weekday. This is not the total VMT for the study area, as the VMT associated with external-local, external-through, commercial vehicle, visitor travel, and intrazonal trips are not included in the estimate.

TIME OF TRAVEL

The time of travel is a function of the activity to be accomplished. The start times for trips to work and to school are dictated by the time that work and school begin. For other activities, such as trips to shop or for recreation, the trip start times are flexible. As travel during peak periods becomes more congested, some drivers choose to make trips earlier or later to avoid the most congested travel time. Figure 20 shows the distribution of trip start times for a 24-hour weekday during the school year. The morning peak period, 7:01 a.m. to 8:00 a.m., has the highest percentage of daily trip starts. During the morning peak period, trips from home to work and from home to school are the primary destinations. The second highest hour for trip starts is 5:01 p.m. to 6:01 p.m. During this hour, trips from work to home are the primary destinations. Trip starts from 3:01 p.m. to 4:00 p.m., which are trips from school to home, are almost the same percentage of daily trip starts as are trips from work to home.

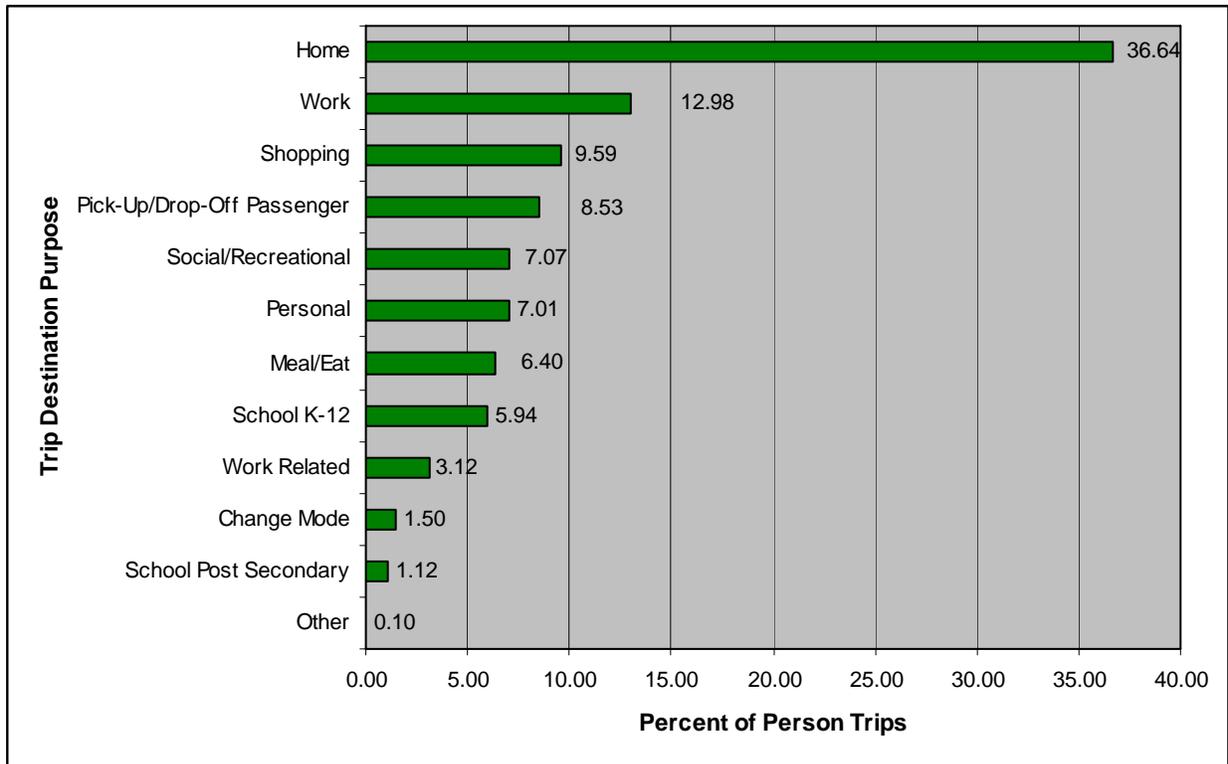


Source: Five-County Household Travel Survey and TTI Analysis.

Figure 20. Distribution of Person Trip Start Times by Hour of the Day.

TRAVEL PURPOSE

As a part of their travel diary, each household member was asked to identify from a list of choices what they did at each trip destination. The information about the trip destination was used to categorize the trip by trip purpose. In travel demand modeling, typically there are three internal trip purposes — HBW, HBNW, and NHB trips. Figure 21 shows the distribution of person trips by the trip destination purposes used in the survey. As would be expected, the most frequent trip destination was the return home trip.



Source: Five-County Household Travel Survey and TTI Analysis.

Figure 21. Distribution of Person Trips by Trip Destination Purpose.

Type of Place at Trip Destination

Closely related to the travel purpose and what the traveler did at the destination end of the trip is information on the type of place or business that was at the destination end of the trip. This information is used by the travel demand modeler to develop trip attraction rates for various types of land use. In travel demand modeling, attractions are typically grouped into three categories — basic, retail, and service. Table 5 shows the distribution of person trips by the types of places identified in the survey for the destination end of the trip.

Table 5. Number Person Trips and Distribution of Person Trips by Type of Place at Trip Destination.

Type of Place	Person Trips	Percent of Person Trips
Residential	415,070	8.15
Residential Type Work Place	40,141	0.79
Construction Site	27,033	0.53
Transportation Stop	79,796	1.57
Automotive Dealer/Repair	55,031	1.08
Bank/Financial Institution	85,740	1.68
Barber/Beauty/Nail Salon	33,828	0.66
Bookstore/Newsstand	18,794	0.37
Convenience/Drug Store	77,100	1.51
Government Offices	193,247	3.80
Offices Non-Government	481,476	9.46
Grocery	387,167	7.60
Health Club	75,639	1.49
Medical Facility/Hospital	214,916	4.22
Movie Theater/Cinema	21,597	0.42
Restaurant/Fast food, Bar and Grill	569,756	11.19
Educational – 12 th Grade or Lower	1,148,420	22.57
Educational – College, Trade, Etc.	94,383	1.85
Shopping Mall/Department Store	379,148	7.45
Gas Station	77,851	1.53
Airport	15,948	0.31
University of Texas	84,576	1.66
Other	514,952	10.11
Total	5,091,609	100

Source: Five-County Travel Survey and TTI Analysis.

WHERE PEOPLE TRAVELED

The geographic distribution of internal person trips within the study area is shown in Figures 22-35. Figures 22-28 show the geographic distribution of internal person trips within Travis County and sub-regions of the county. Figures 30-36 show the geographic distribution of internal trips within the five county study area.

Figure 22 shows the five-county area and the six sub-regions. Figure 23 shows the number of person trip interchanges between Area A and Areas B-E. Figure 24 shows the number of person trip interchanges between Area B and Area A and Areas C-E. Figure 25 shows the number of person trip interchanges between Area C and Areas A-B and Areas D-E. Figure 26 shows the number of person trip interchanges between Area D and Areas A-C and Area E. Figure 27 shows the number of person trip interchanges between Area E and Areas A-D. Figure 28 shows the percent of person trips that remain within each sub-area.

Following is a description of the Travis County Sub-Regions. Area A – Central Travis County is bounded by U.S.-183 on the north; U.S.-183 and SH-71 on the east; SH-71 and Loop-360 on the south; and Loop-360 on the west. Area B – Northeast Travis County is bounded by the county boundary on the north; the county boundary on the east; FM-969 on the south; and U.S.-183 and IH-35 on the west. Area C – Southeast Travis County is bounded by FM-969 on the north; the county boundary on the east; the county boundary on the south; and IH-35, SH-71, and U.S.-183 on the west. Area D – Southwest Travis County is bounded by SH-71, FM-2244, and Loop-360 on the north; IH-35 on the east; the county boundary on the south; and the county boundary on the west. Area E – Northwest Travis County is bounded by the county boundary on the north; IH-35, U.S.-183, and Loop-360 on the east; SH-71 and FM-2244 on the south; and the county boundary on the west.

Figure 29 shows the five-county CAMPO study area. Figure 30 shows the person trip interchanges between Bastrop County and Caldwell, Hays, Travis, and Williamson counties. Figure 31 shows the person trip interchanges between Caldwell County and Bastrop, Hays, Travis, and Williamson counties. Figure 32 shows the person trip interchanges between Hays County and Bastrop, Caldwell, Travis, and Williamson counties. Figure 33 shows the person trip interchanges between Travis County and Bastrop, Caldwell, Hays, and Williamson counties. Figure 34 shows the person trip interchanges between Williamson County and Bastrop, Caldwell, Hays, and Travis counties. Figure 35 shows the percent of person trips that remain within each sub-region.

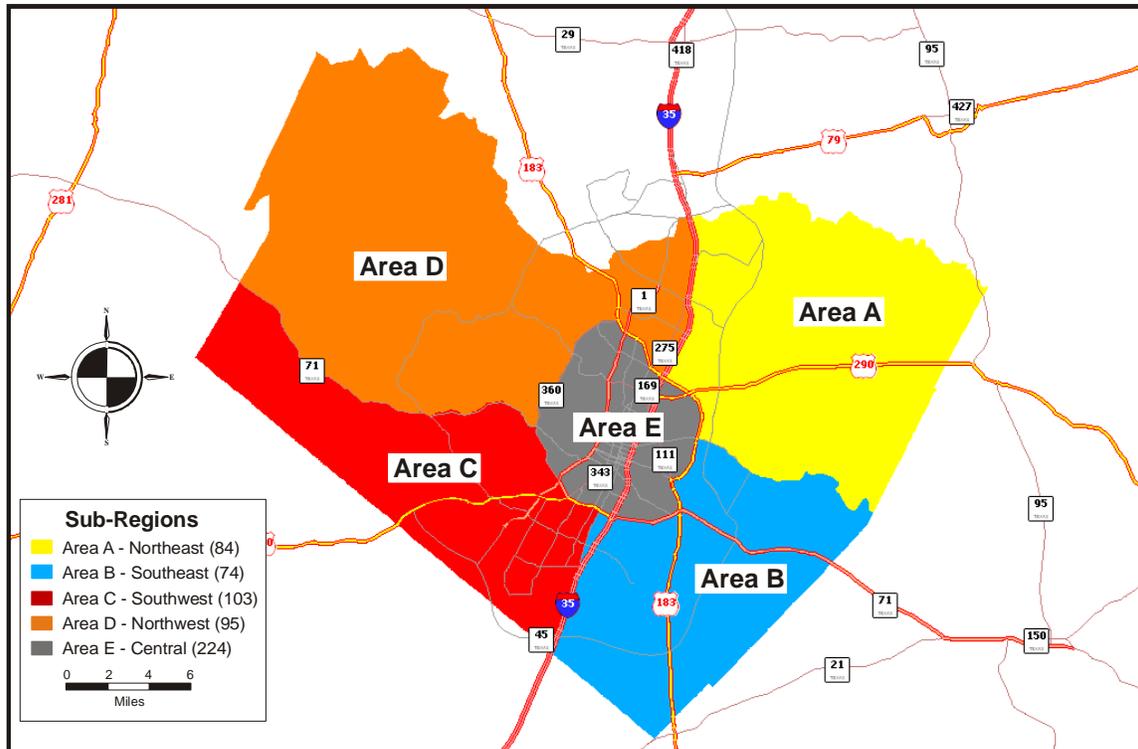


Figure 22. Travis County and the Sub-Regions within Travis County.

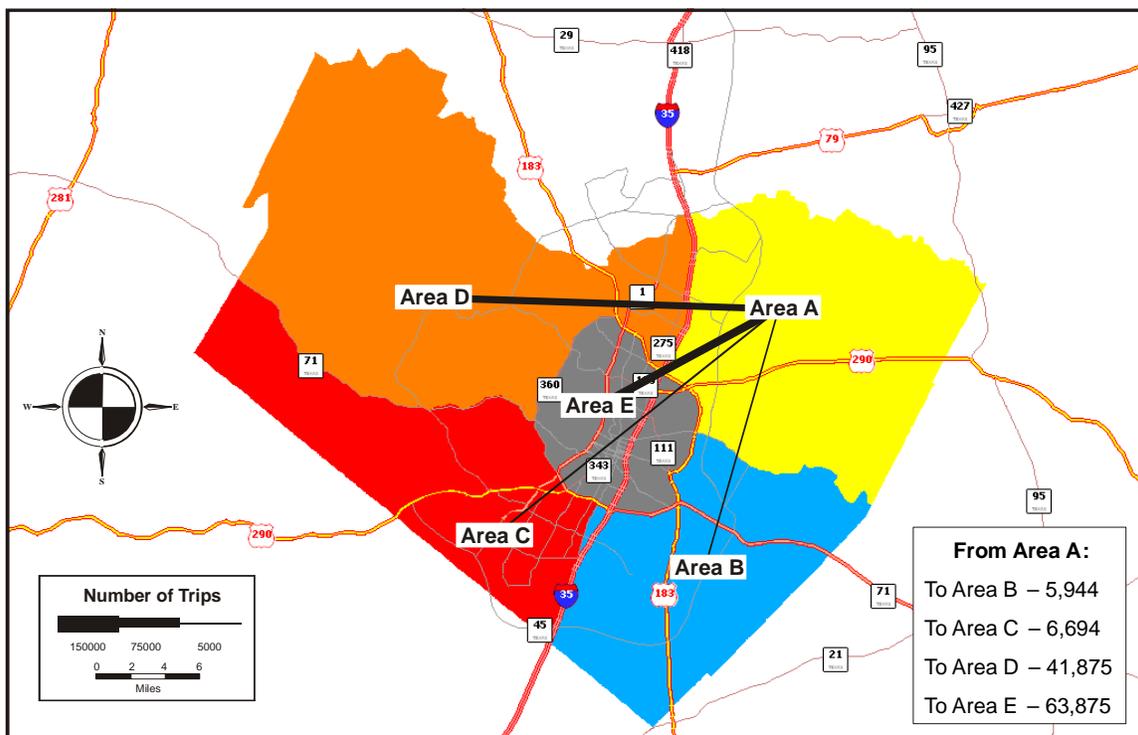


Figure 23. Person Trip Interchanges between Area A and Areas B, C, D, and E.

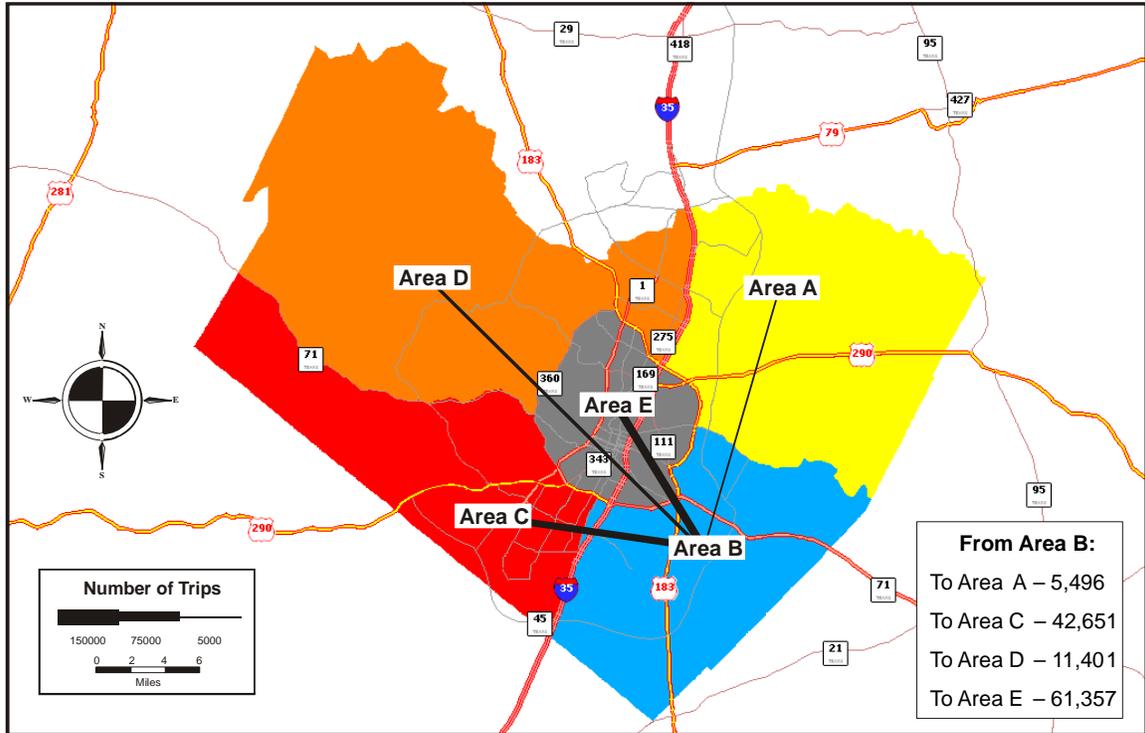


Figure 24. Person Trip Interchanges between Area B and Areas A, C, D, and E.

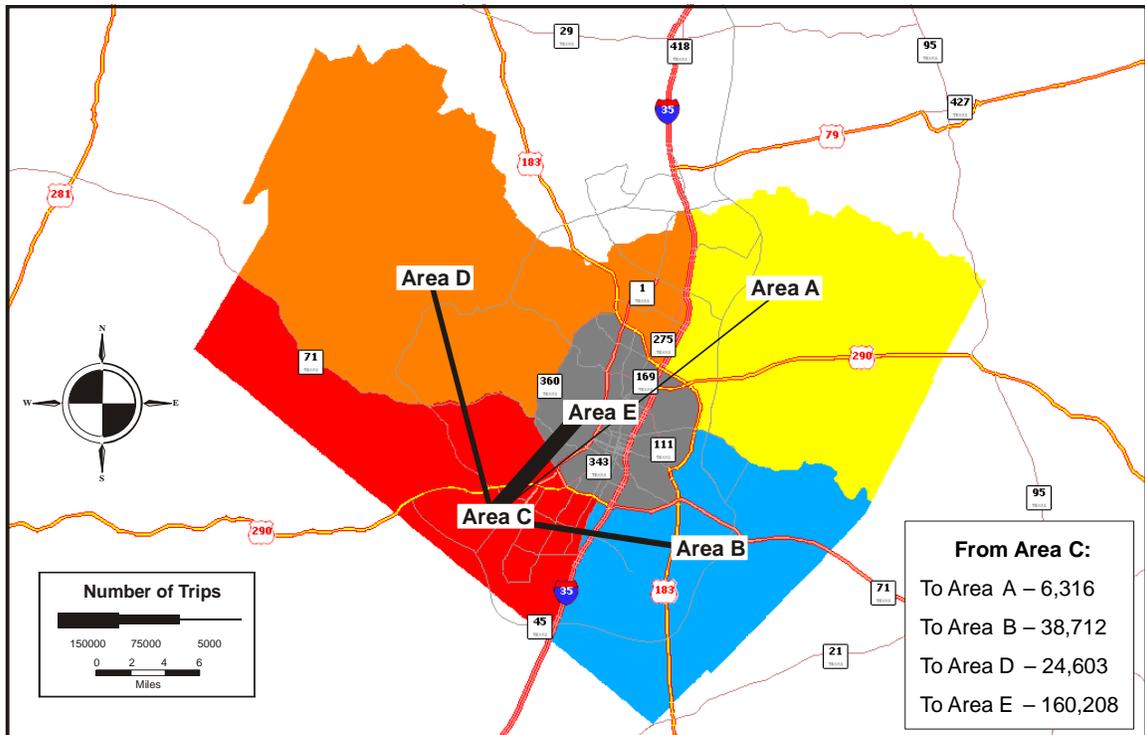


Figure 25. Person Trip Interchanges between Area C and Areas A, B, D, and E.

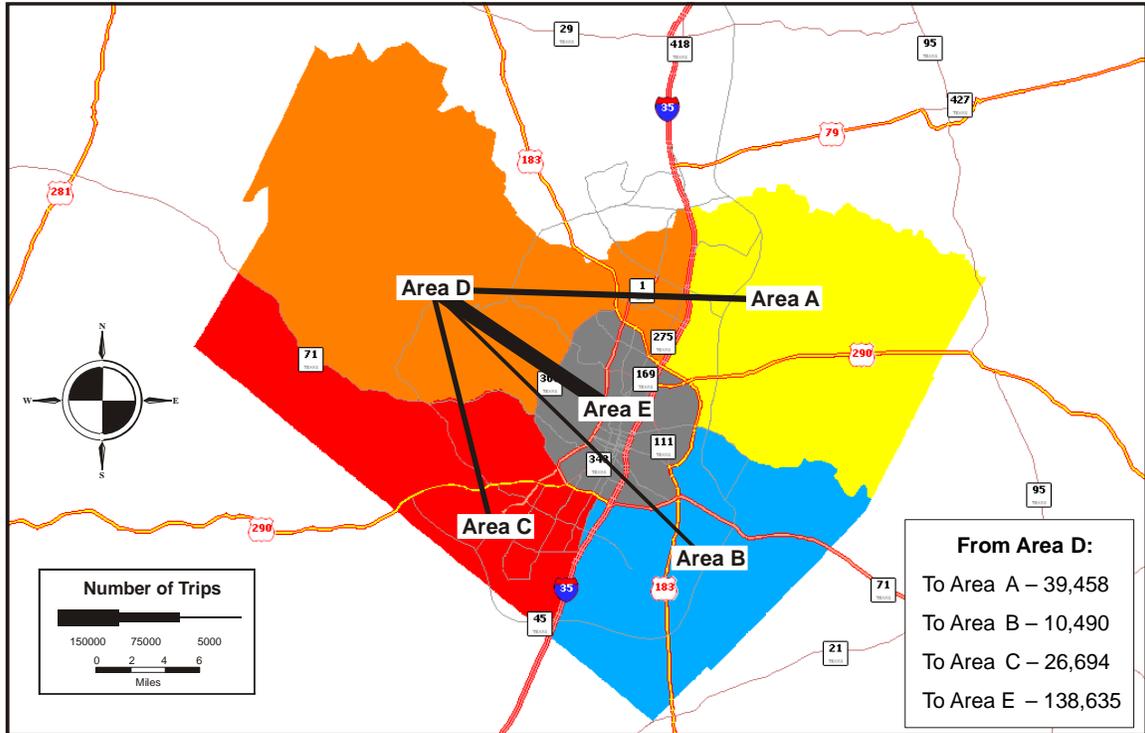


Figure 26. Person Trip Interchanges between Area D and Areas A, B, C, and E.

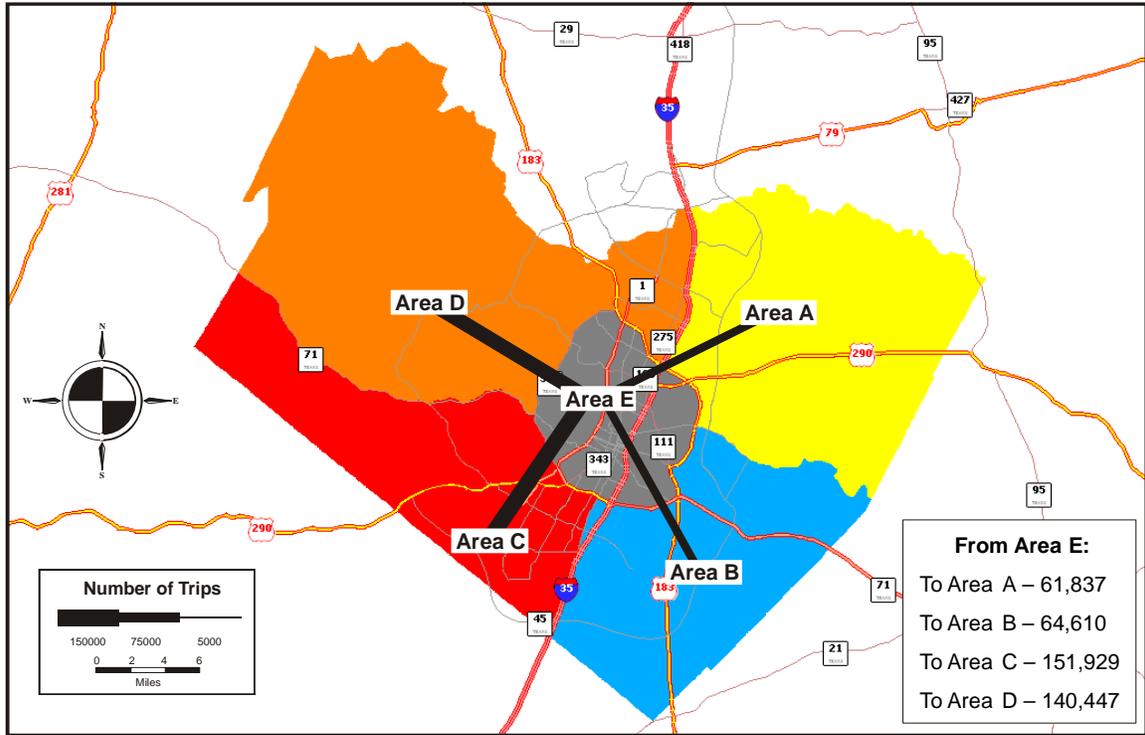


Figure 27. Person Trip Interchanges between Area E and Areas A, B, C, and D.

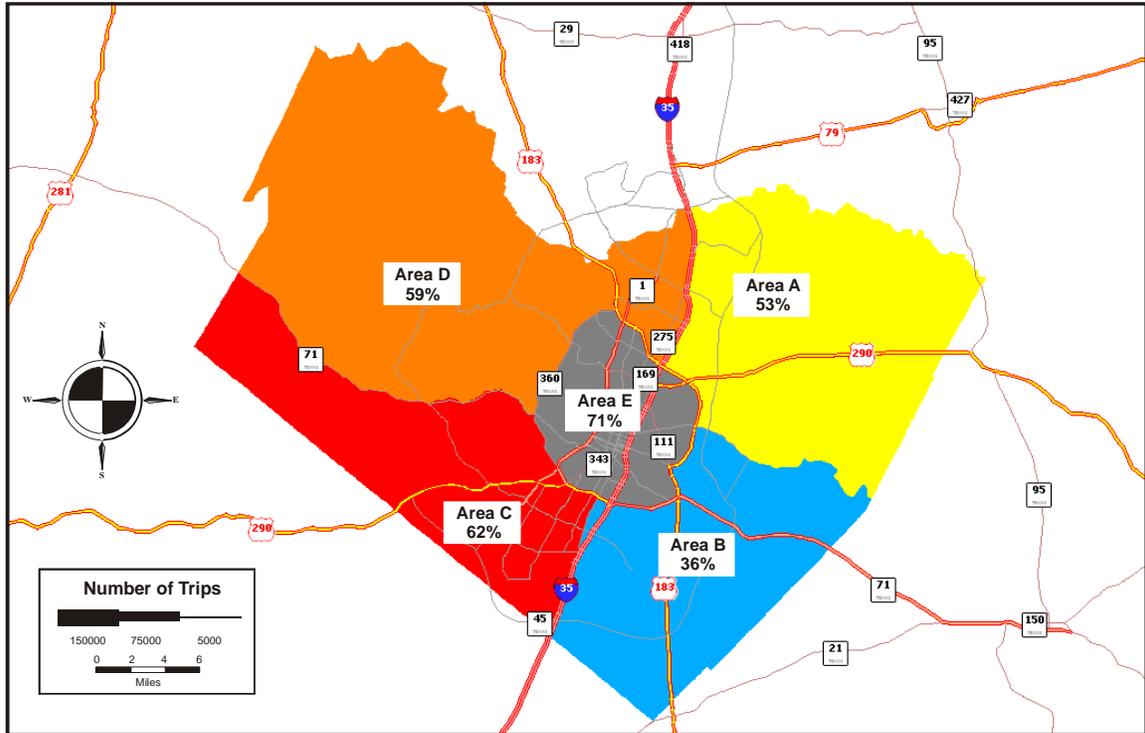


Figure 28. Percent of Person Trips that Remain within Each Sub-Region.

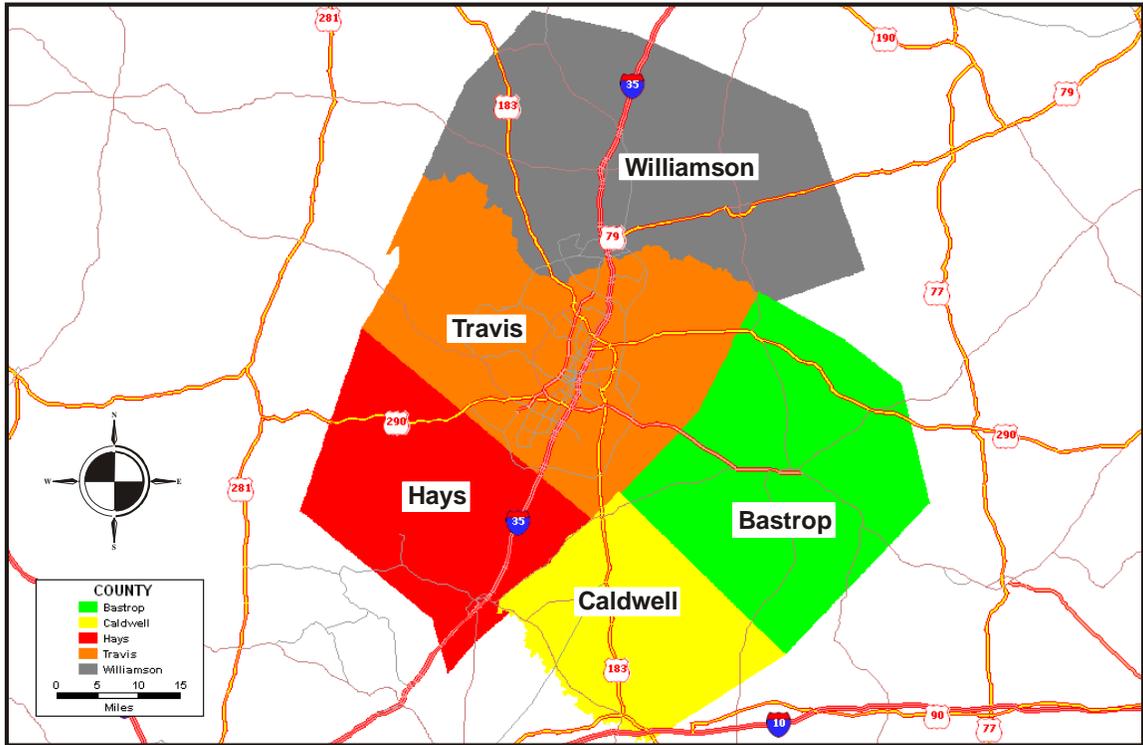


Figure 29. Five-County CAMPO Study Area.

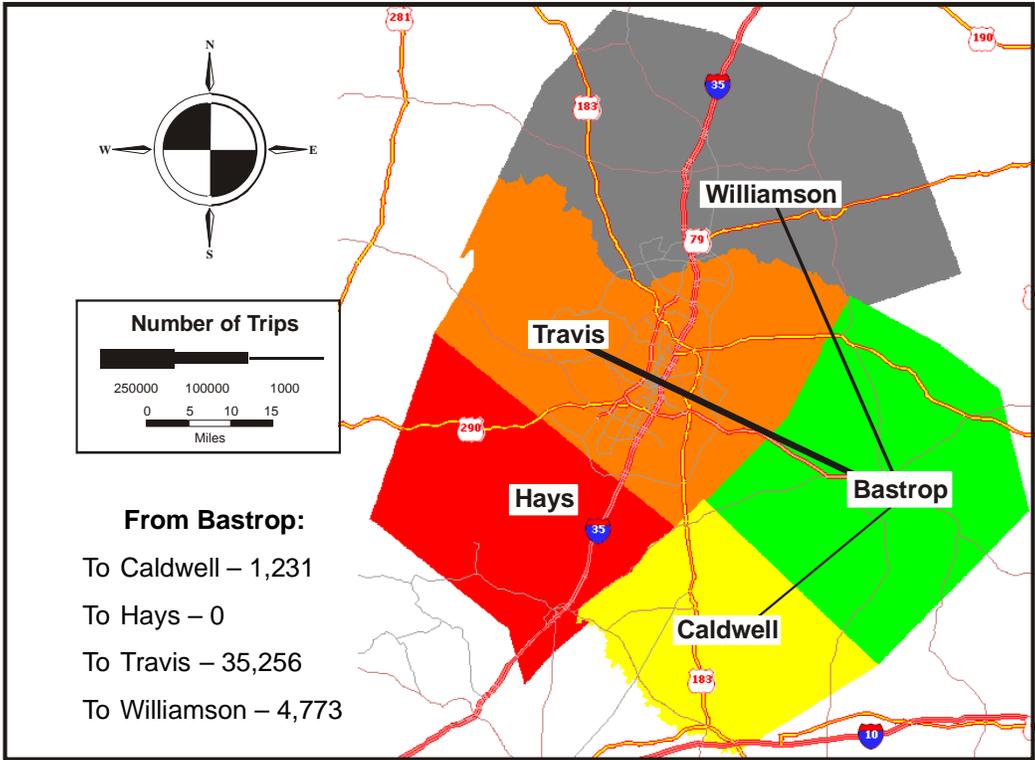


Figure 30. Person Trip Interchanges between Bastrop County and Caldwell, Hays, Travis, and Williamson Counties.

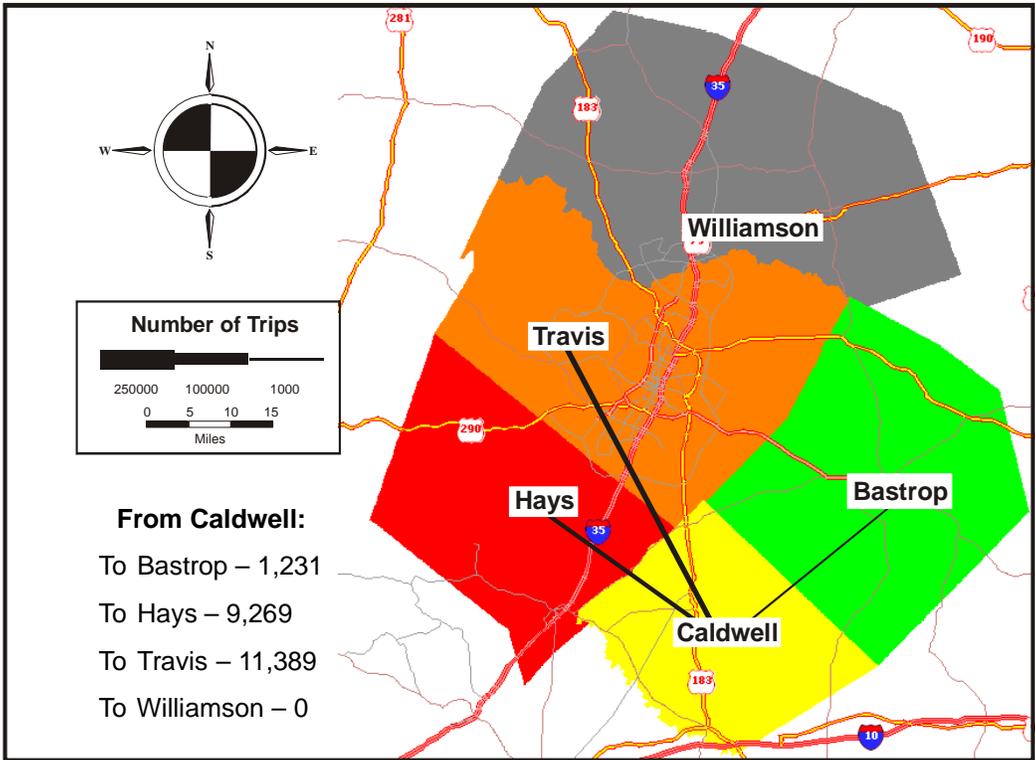


Figure 31. Person Trip Interchanges between Caldwell County and Bastrop, Hays, Travis, and Williamson Counties.

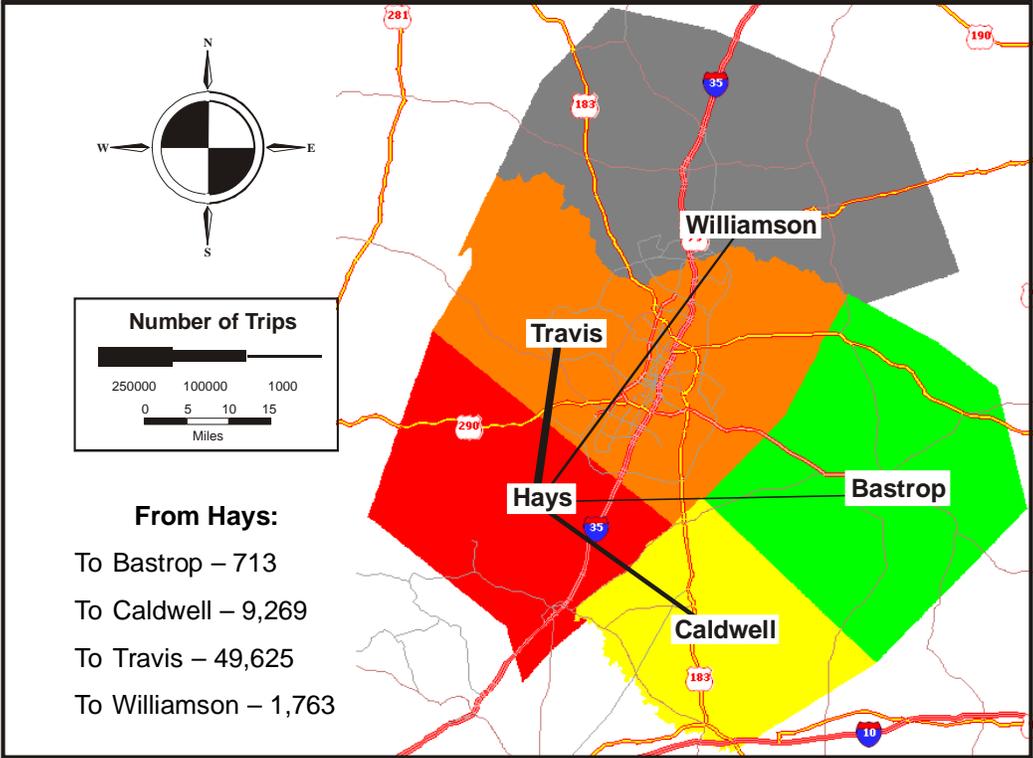


Figure 32. Person Trip Interchanges between Hays County and Bastrop, Caldwell, Travis, and Williamson Counties.

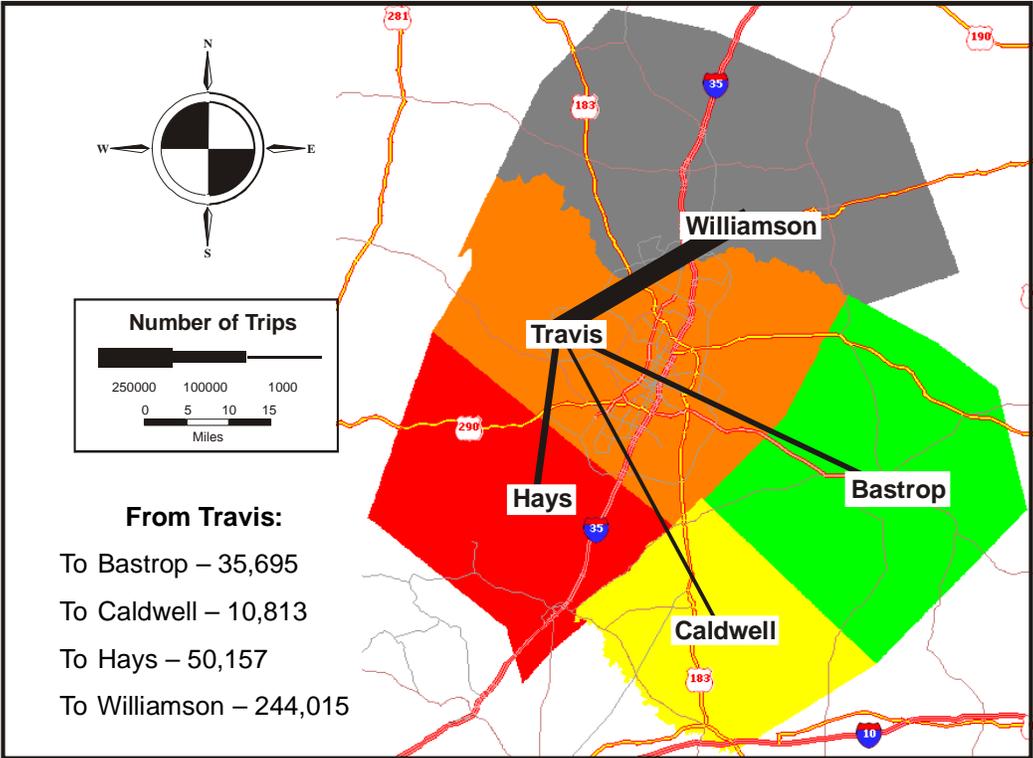


Figure 33. Person Trip Interchanges between Travis County and Bastrop, Caldwell, Hays, and Williamson Counties.

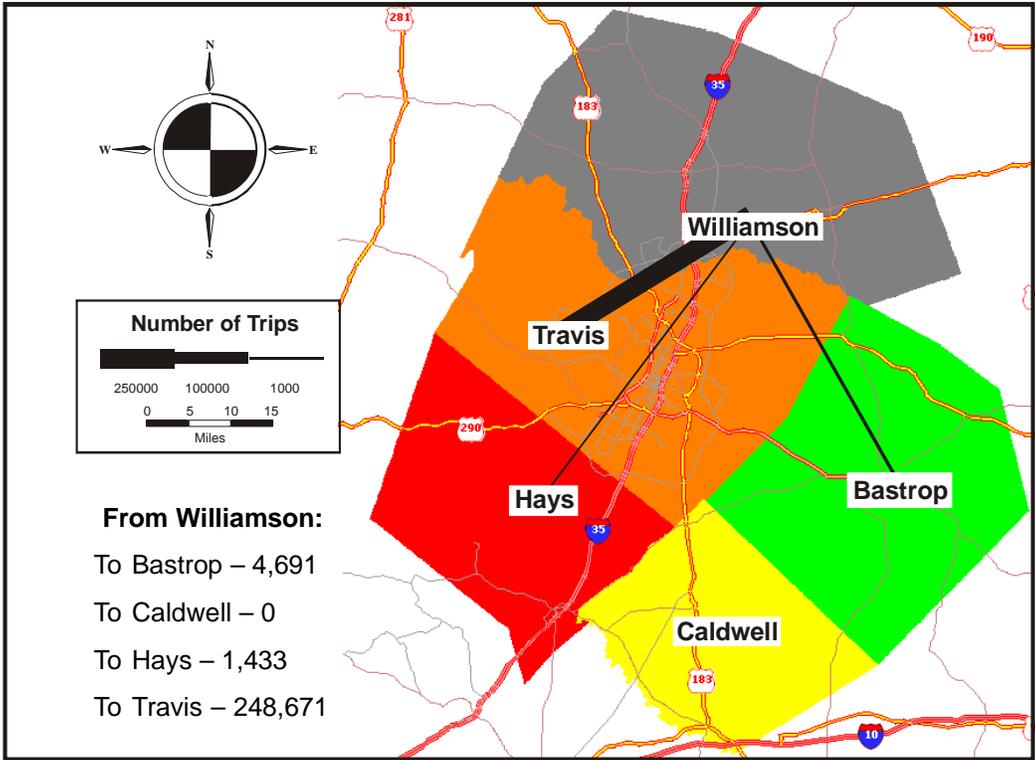


Figure 34. Person Trip Interchanges between Williamson County and Bastrop, Caldwell, Hays, and Travis Counties.

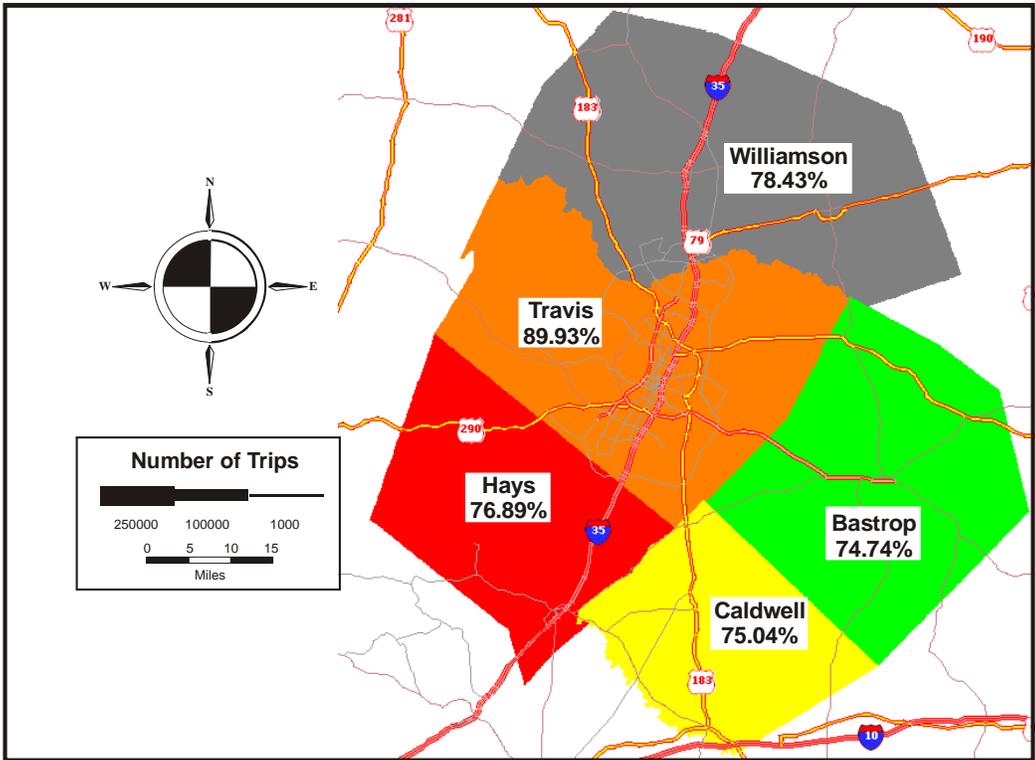


Figure 35. Percent of Person Trips that Remain within Each Sub-Region.

SUMMARY DATA

Table 6 provides household survey summary data for the five-county study area and for travel surveys conducted in the, City of Brownsville, City of Harlingen, and Hidalgo County, Texas. Data, more detailed than that provided in this report, has been provided to TxDOT's TPP Division for their use in updating the five-county study area travel demand model.

Table 6. Comparative Travel Survey Data for Selected Texas Urban Areas.

Urban Area	Brownsville	Harlingen - San Benito	Hidalgo County	Bastrop, Caldwell, Hays, Travis, and Williamson Counties
Demographics				
Household Population	203,290	168,752	658,115	1,486,117
Licensed Drivers	113,156	101,081	378,979	1,060,436
Number of Households	55,015	53,090	181,473	574,225
Average Household Size	3.70	3.18	3.63	2.59
Number of Motor Vehicles	105,849	98,163	338,810	1,065,898
Motor Vehicles per Household	1.92	1.85	1.87	1.86
Number of Daily Trips by Mode				
Total Person Trips	553,822	434,659	2,273,841	5,093,023
Automobile-Driver Trips	306,352	246,010	1,296,718	3,353,404
Motor Vehicle Passenger Trips	170,949	159,191	791,678	1,292,793
School Bus Trips	40,489	16,977	106,426	138,951
Walk Trips	21,296	10,576	58,328	189,256
Public Transit Trips	3,826	97	3,156	43,475
Bicycle Trips	1,298	589	4,209	31,470
Commercial Vehicle Trips	462	692	11,425	37,962
Other Modes/Taxi	150	527	1,901	5,712
Number of Daily Trips by Destination/Purpose				
Trips to Home	220,692	157,146	847,808	1,866,466
Trips to Work	55,775	39,102	210,803	661,624
Trips Work Related	9,854	6,838	70,349	158,955
Trips to Shop	52,419	41,299	210,919	489,085
Trips to Pick-Up/Drop Off Passenger	55,835	55,115	283,180	434,359
Trips for Personal Business	32,226	30,750	142,555	356,953
Trips for Social/Recreation	35,571	39,613	174,919	359,071
Trips for School K-12	52,908	36,842	181,741	302,415
Trips for School Post Secondary	9,902	3,292	31,211	56,962
Trips for Meal/Eat	23,972	20,732	107,369	325,699
Trips to Change Mode	4,306	3,350	10,938	76,436
Other Trips	362	580	2,050	4,986
Daily Trip Rates				
Person Trips per Person	2.72	2.58	3.45	3.42
Person Trips per Household	10.07	8.19	12.53	8.87
Trip Lengths and Durations				
Average Person Trip Length in Miles	4.2	3.5	4.9	7.8
Average Vehicle Trip Length in Miles	4.4	3.6	5.3	8.4
Average Person Trip Duration in Minutes	7.0	6.0	7.5	12.8
Average Vehicle Trip Duration in Minutes	7.3	6.3	8.0	13.8
Vehicle Miles of Travel (VMT)				
Household Internal VMT	1,346,000	895,000	6,856,000	26,463,000

Source: Selected Travel Surveys and TTI Analysis.

TERMINOLOGY

Within the context of the household travel survey, a number of terms are used. These terms are defined in this section.

Person Trip – A person trip is the movement of an individual from one location to another location. In the household survey, trips were recorded for all persons in a surveyed household.

Automobile Driver Trip – An automobile driver trip is the movement of a vehicle from one location to another location. These trips are recorded for the person driving the vehicle. These are also referred to as vehicle trips.

Trip Purpose – The trip purpose is stated in terms of the purpose at the location the trip began and the purpose at the location the trip ended. For example, a trip that began at home and ended at work would be referred to as a home-based work (HBW) trip. There were 11 trip purposes used in the household survey.

Trip Activity – The trip activity is stated in terms of the activity at the location the trip began and/or the location the trip ended. There were 22 activities used in household survey. The activities were recorded in the survey and post processed to identify the trip purpose associated with each trip activity.

Vehicle Availability – Vehicle availability is the number of vehicles available to members of a household for making trips.

Vehicle Occupancy – Vehicle occupancy is the number of occupants in a vehicle during a vehicle trip including the driver of the vehicle.

Mode of Travel – Mode of travel is the physical means used by the household member to make a trip. The modes are walk, vehicle driver, vehicle passenger, carpool driver, carpool passenger, vanpool driver, vanpool passenger, commercial vehicle driver, commercial vehicle passenger, public transportation, school bus, taxi/paid limousine, bicycle, motorcycle/moped, and other.

Home-Based Work (HBW) Trip – An HBW trip is a trip that has one end of the trip at home and the other end of the trip at work. An HBW trip is non-directional in terms of the trip activity/trip purpose, i.e., a trip from home to work or from work to home is defined as an HBW trip.

Home-Based Non-Work (HBNW) Trip – An HBNW is a trip with one end of the trip at home and the other of the trip at a location other than the work location. An HBNW trip is non-directional in terms of the trip activity/trip purpose.

Non-Home-Based (NHB) Trip – An NHB trip is a trip with neither end of the trip at home.

Trip Productions – Trip productions are the number of trips produced by members of a household. Trip productions are calculated by trip purpose and mode of travel. Production rates are the number of trip productions divided by the number of households that produced those trips.

Trip Attractions – Trip attractions are the number of trips attracted to a particular category of land use. Trip attractions are calculated by trip purpose and mode of travel for different land use categories.

APPENDIX A
COMPARISON OF THE 1998 AUSTIN AREA HOUSEHOLD TRAVEL
SURVEY WITH THE 2006 CAMPO HOUSEHOLD TRAVEL SURVEY

INTRODUCTION

The 1998 Austin household travel survey included all of Hays, Travis, and Williamson counties (Figure 36). The 2006 household travel survey included these three counties plus Bastrop and Caldwell counties (Figure 37).

There are several reasons why two additional counties were included in the 2006 household travel survey. The most important of these reasons is to support development of a more accurate travel demand model that can be used to forecast future travel demand in all five counties. Since the 1998 household survey, travel among the five counties has increased. A significant number of household members commute each weekday from Bastrop and Caldwell counties to Hays, Travis, and Williamson counties for work, for shopping, for recreation, and for access to variety of services.

By expanding the geographic area included in the household travel survey, these commute trips are treated within the travel demand model as internal (HBW, HBNW, and NHB) trips rather than external-local trips. The cross-classification trip production models used for forecasting internal trips are judged to be significantly more accurate than the growth factor models used for forecasting external-local trips.

Although the CAMPO transportation planning area has not changed since 1998, the inclusion of Bastrop and Caldwell counties in the travel demand model will support more accurate travel demand forecasts for the three-county CAMPO planning area. Additionally, the five-county travel demand model can be used by TxDOT staff for planning transportation system improvements in Bastrop and Caldwell counties.

The household travel survey comparisons provided in this appendix are not strictly comparable since the 1998 survey was for three counties and the 2006 survey was for five counties. However, the comparisons will provide CAMPO with better planning data.

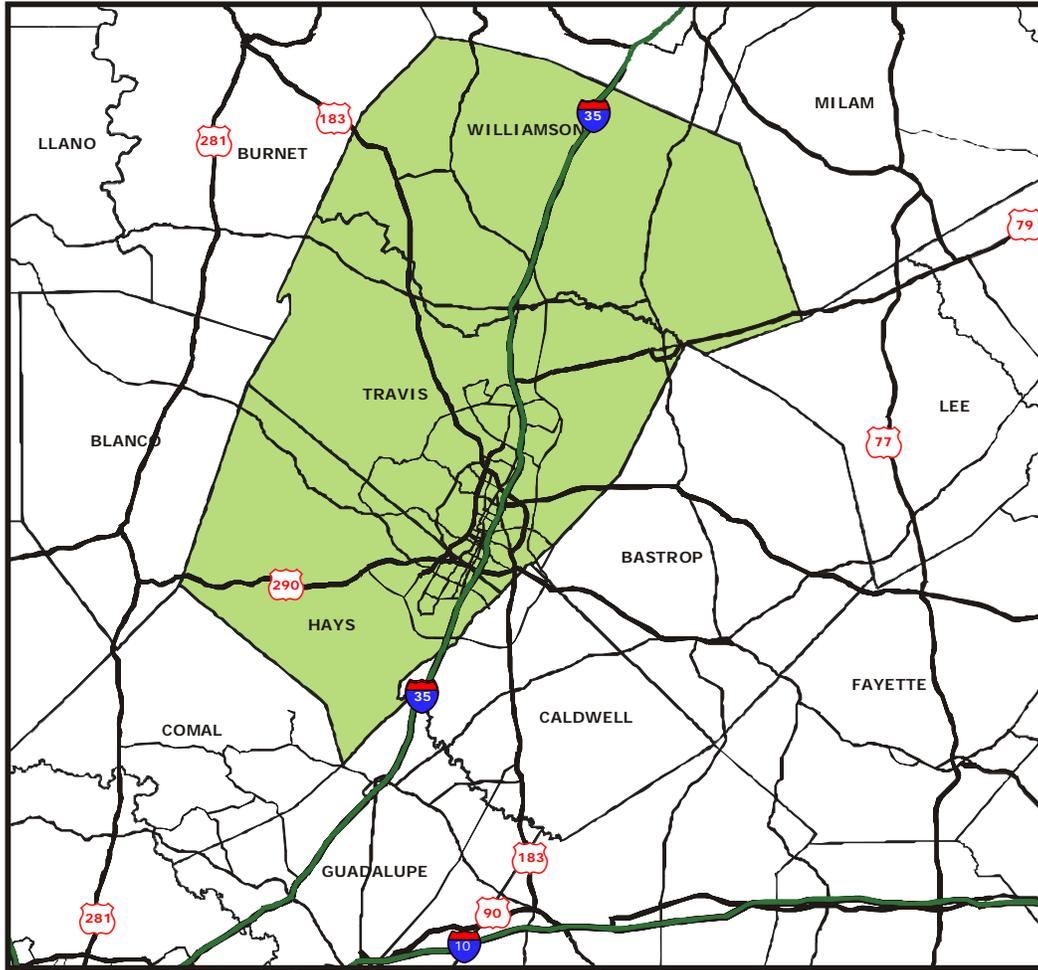


Figure 36. Three-County Household Survey Area.

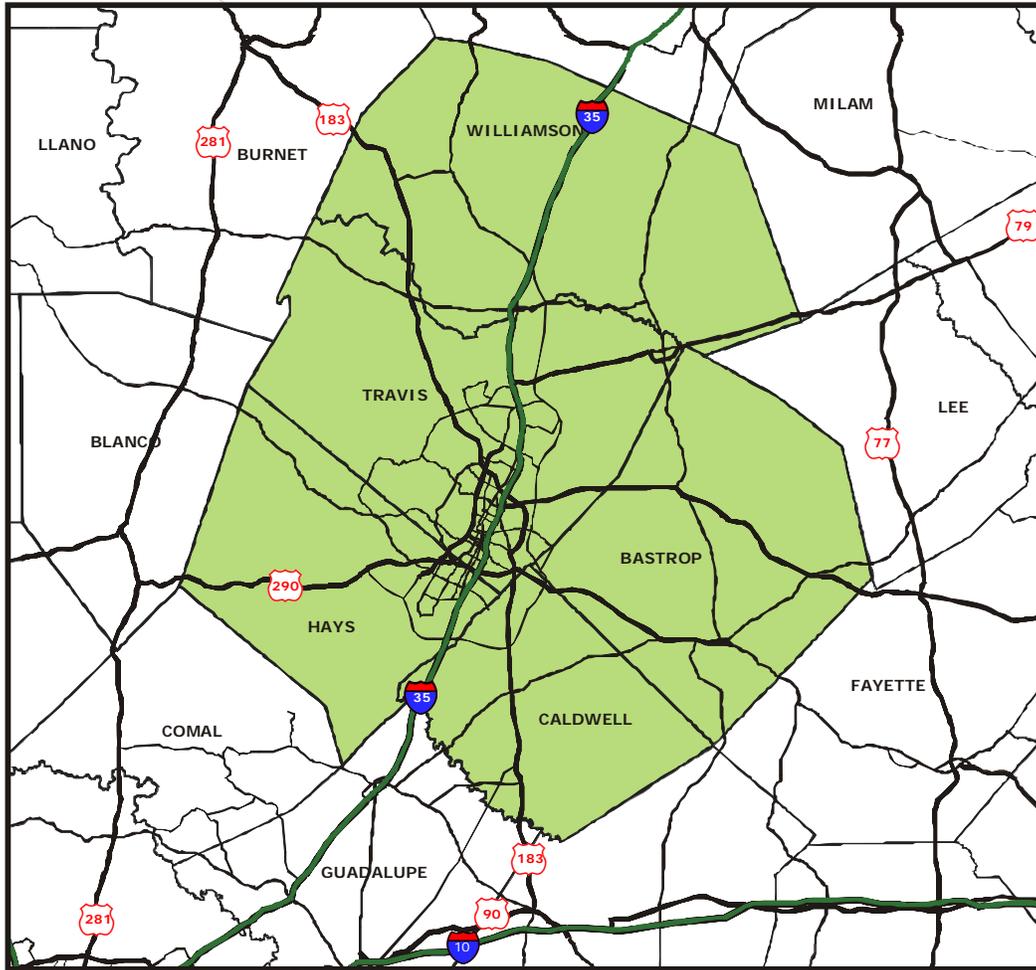


Figure 37. Five-County Household Survey Area.

HOUSEHOLD CHARACTERISTICS

Characteristics of the household influence travel behavior. In this section, selected household characteristics from the 1998 household survey are compared to the 2006 household survey.

Table 7 shows the estimated population, households, and persons per household for 1990, 2000, and 2006. The slight decline in the average number of persons per household from 2000 to 2006 is significant as it shows that the number of households is growing at a faster rate than the population. Travel demand is more closely correlated with the number of households than with the total population. The travel demand model uses household size and household income as the independent variables in the trip production models. Consequently, the travel demand forecasts are very sensitive to the independent forecast of these two household characteristics.

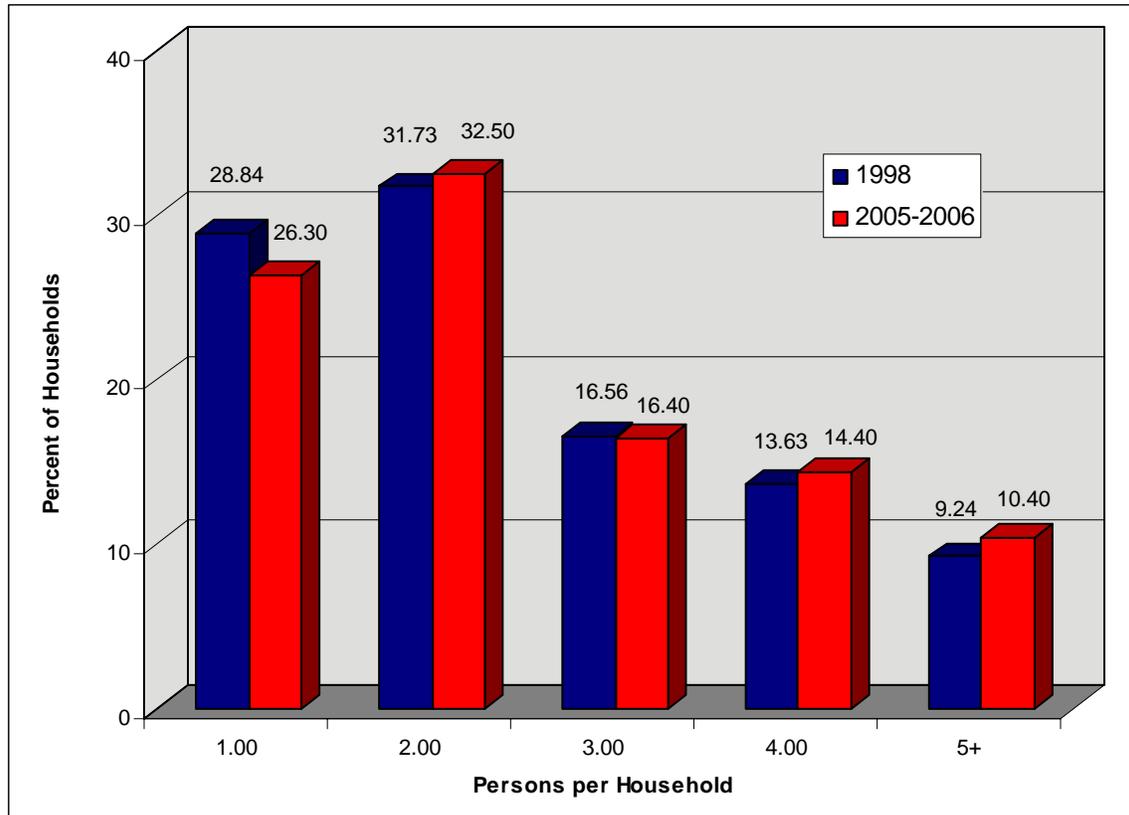
Table 7. Estimated Population, Households, and Persons per Household.

Geographic Area	Year	Population	Number of Households	Persons per Household
Three-County Area	1990	781,572	303,921	2.57
Five-County Area	1990	842,512	325,995	2.58
Three County Area	2000	1,159,836	440,942	2.63
Five- County Area	2000	1,251,716	471,855	2.65
Three-County Area	2005-2006	1,353,699	533,324	2.54
Five-County Area	2005-2006	1,484,993	574,225	2.59

Source: U.S. Census Bureau for 1990 and 2000, Texas State Data Center, and TTI Analysis for 2006. Note that the 2005-2006 population and household estimates in Table 7 have been revised based on more recent data from the Texas State Data Center

Household Size

Figure 38 shows the distribution of households by household size estimated from the 1998 household travel survey and the 2006 household travel survey. The percentage of households with four and five plus persons per household increased and the percentage of one-person households decreased from 1998 to 2006. In 1998 the average persons per household was 2.45 compared to the 2006 average persons per household of 2.59.

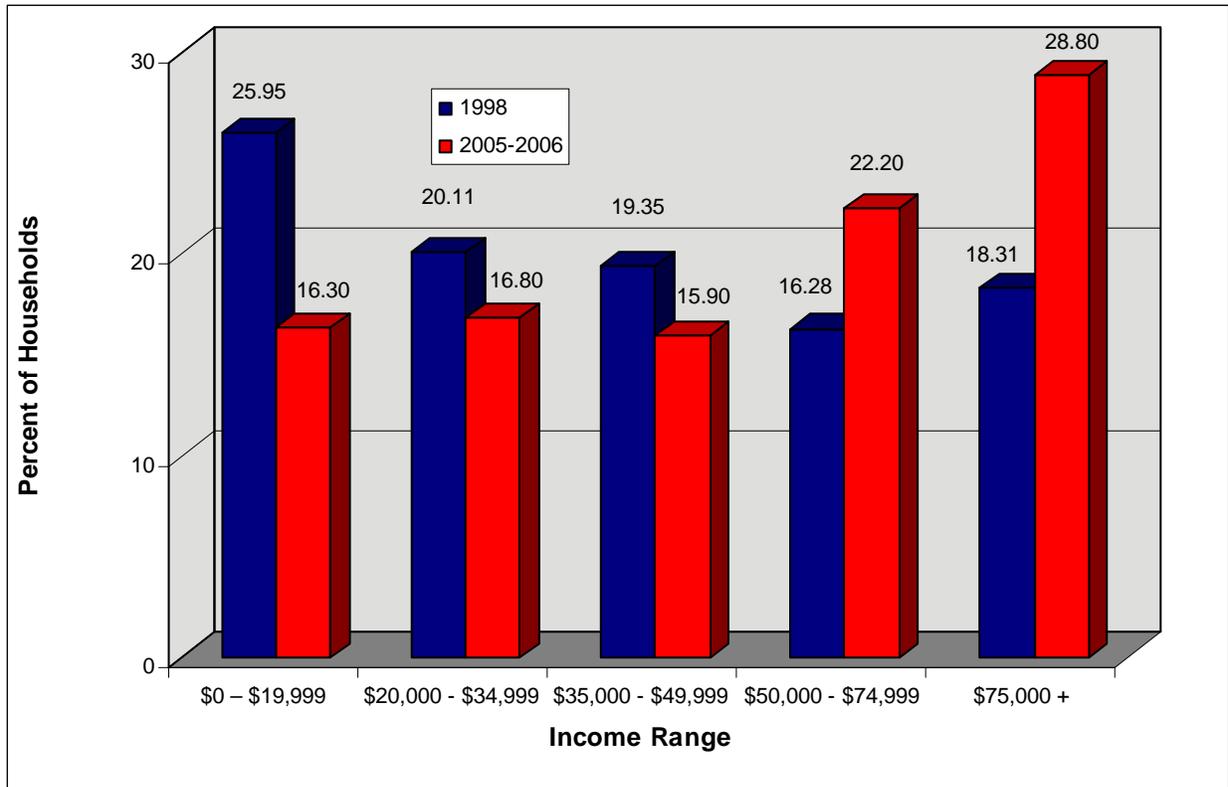


Source: 1998 Austin Household Travel Survey and the 2006 CAMPO Household Travel Survey.

Figure 38. Distribution of Households by Household Size.

Household Income

Figure 39 shows the distribution of households by household income range estimated from the 1998 household travel survey and the 2006 household travel survey. The surveys asked for the combined household income for a previous calendar year, 1997 for the 1998 survey and 2004 for the 2006 survey. Accounting for inflation between 1997 and 2004, household income appears to be increasing.

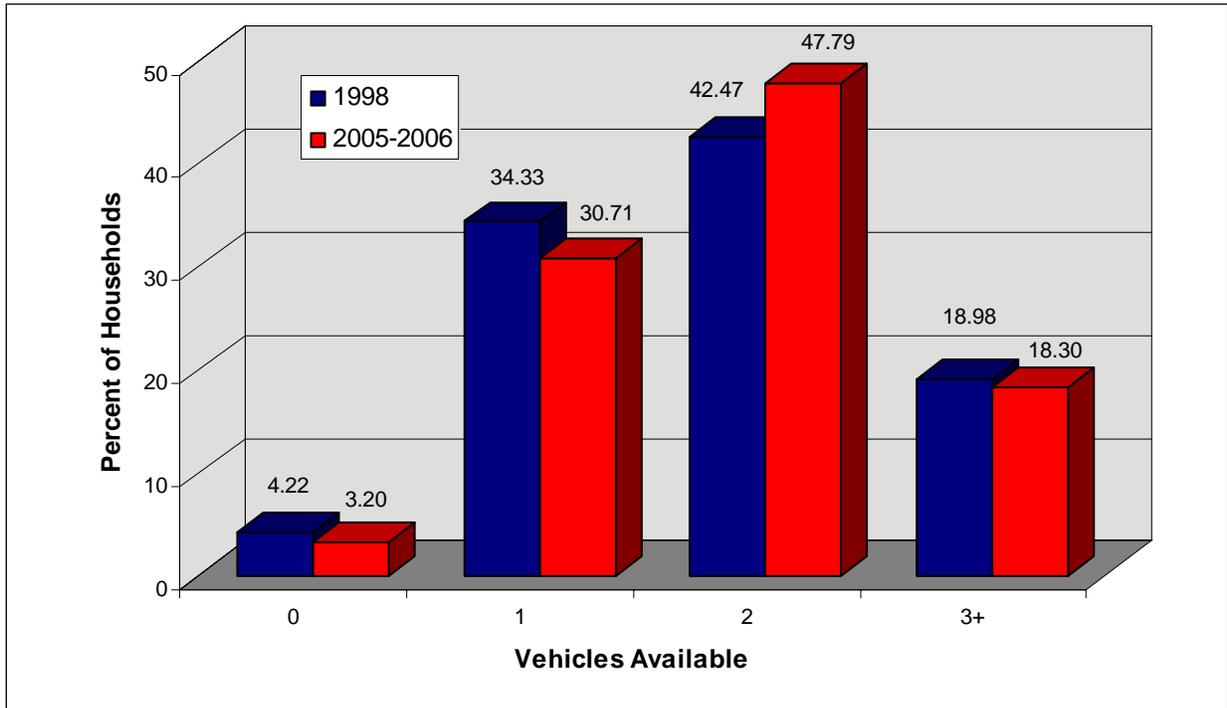


Source: 1998 Austin Household Travel Survey and the 2006 CAMPO Household Travel Survey.

Figure 39. Distribution of Households by Household Income Range.

Household Vehicle Availability

Figure 40 shows the distribution of households by the number of vehicles available. On average, more vehicles were available to households in 2006 than in 1998, indicative of rising household incomes.



Source: 1998 Austin Household Travel Survey and the 2006 CAMPO Household Travel Survey.

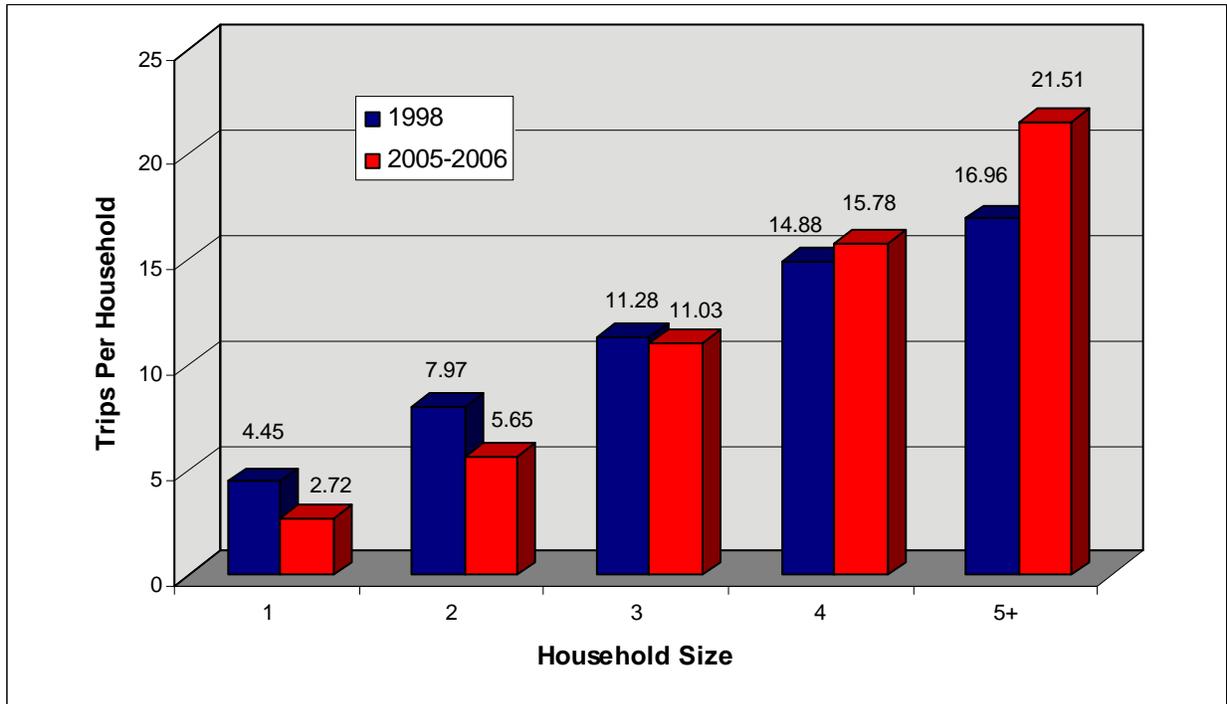
Figure 40. Distribution of Households by Number of Vehicle Available.

TRAVELER CHARACTERISTICS

Traveler characteristics are related to the household and personal characteristics of the traveler. The most important traveler characteristics estimated from the household travel survey are trip rates by trip purpose. In this section, trip rates for all trip purposes combined are related to the household characteristics of size and income. For the travel demand model trip rates are estimated for each trip purpose separately (HBW, HBNW, and NHB). HBNW trips may be further divided into HBNW educational, HBNW retail and HBNW other, etc.

Household Trip Rates

Figure 41 shows the internal person trip rates by household size estimated from the 1998 and 2006 household travel surveys. The average internal person trip rate for all trip purposes combined was 9.27 trips per day per household in 1998 and 8.87 trips per day per household in 2006 suggesting a possible 4 percent decline in the average household trip rate.



Source: 1998 Austin Household Travel Survey and the 2006 CAMPO Household Travel Survey.

Figure 41. Household Trip Rates by Household Size.

Table 8 shows the person trip rates cross classified by household size and household income for all internal trip purposes combined. The household income ranges used for the 1998 survey are different than the household incomes ranges used for the 2006 survey. For travel forecasting applications, the cross-classified trip rates are disaggregated by trip purpose.

Table 8. Person Trip Rates by Household Size and Household Income.

Household Income Range	Household Size				
	1	2	3	4	5 +
\$0 - \$9,999 (1998)	4.159	6.682	8.166	12.920	16.081
\$10,000 - \$19,999 (1998)	4.073	7.525	9.050	11.199	11.905
\$0 - \$19,999 (2005-2006)	2.174	5.032	11.998	16.984	19.408
\$20,000 - \$34,999 (1998)	4.435	7.147	11.530	12.026	16.881
\$20,000 - \$34,999 (2005-2006)	2.571	4.822	9.371	13.551	19.072
\$35,000 - \$49,999 (1998)	5.073	8.212	10.674	14.674	18.082
\$35,000 - \$49,999 (2005-2006)	3.320	5.093	10.137	13.688	21.032
\$50,000 + (1998)	5.313	8.706	12.226	16.153	17.222
\$50,000 - \$74,999 (2005-2006)	2.999	6.907	11.845	15.098	23.441
\$75,000 + (2005-2006)	3.664	5.609	11.151	17.317	21.369

Source: 1998 Austin Household Travel Survey and the 2006 CAMPO Household Travel Survey.

Travel by Age Cohort

A total of 897,471 persons were represented in the 1998 household travel survey and a total of 1,484,934 persons were represented in the 2006 household travel survey. Table 9 shows the distribution of these persons by age cohort and the percent of persons making zero trips on their survey day by age cohort. The distributions of persons by age cohort and the percent of persons making zero trips by age cohort are remarkably similar for the two surveys. There appears to be some under reporting of trips by persons in the 25-29 and 30-34 age cohorts in both surveys and some under reporting of trips in the 20-24 age cohort category in the 2006 survey.

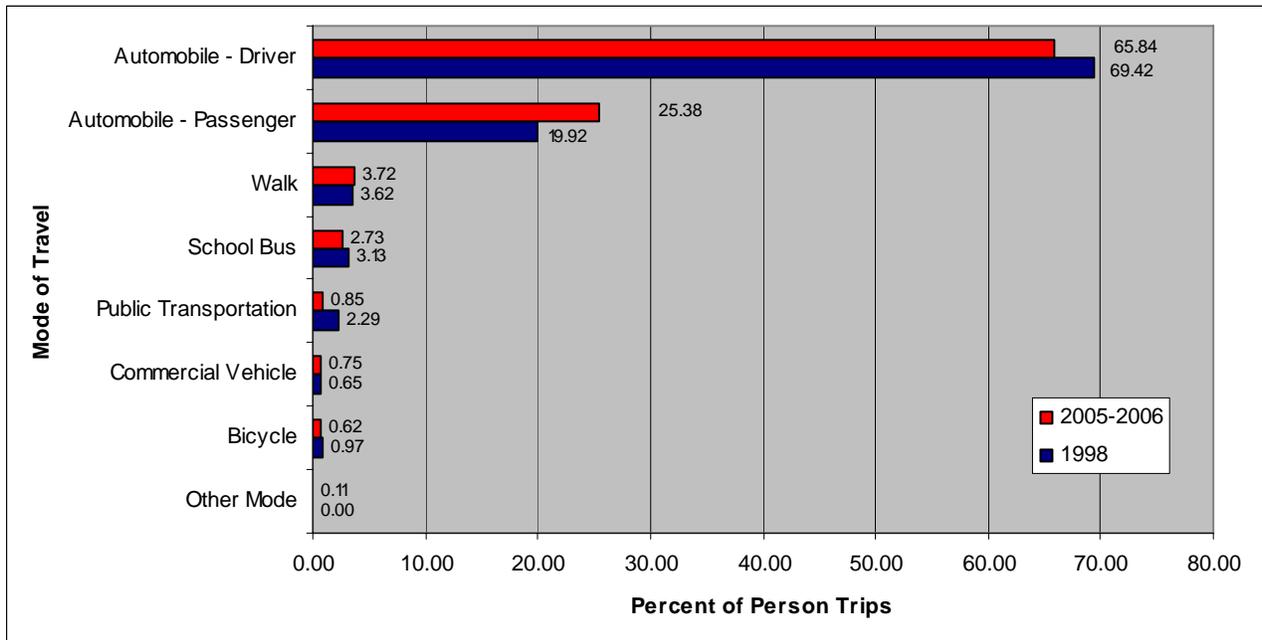
Table 9. Percent of Persons and Percent of Persons Making Zero Internal Trips.

Age Cohort	1998 Percent of Persons	2005-2006 Percent of Persons	1998 Percent of Persons Making Zero Internal Trips	2005-2006 Percent of Persons Making Zero Internal Trips
0-15	18.23	21.86	4.94	9.41
16-19	5.63	6.27	7.55	5.55
20-24	9.73	8.41	7.02	17.81
25-29	8.12	8.91	14.21	13.42
30-34	8.25	9.16	12.26	11.56
35-39	10.01	8.47	9.52	8.68
40-44	9.67	7.69	7.77	8.55
45-49	8.27	7.49	7.99	8.79
50-54	5.84	6.29	13.44	13.79
55-59	3.74	4.95	12.57	15.27
60-64	3.19	3.29	11.00	13.31
65-69	3.04	2.53	15.34	13.76
70-74	2.74	1.73	15.54	18.63
75-79	1.55	1.30	23.61	20.14
80 +	1.99	1.65	38.46	28.15
Total	100	100	10.17	11.67

Source: 1998 Austin Household Travel Survey and the 2006 CAMPO Household Travel Survey.

MODE OF TRAVEL

Figure 42 shows the distribution of person trips by mode. Automobile travel accounted for 89 percent of person trips in 1998 and 91 percent of person trips in 2006. The use of public transportation appears to have declined from 2.3 percent of person trips in 1998 to 0.9 percent of person trips on 2006. However, since Bastrop and Caldwell counties, with limited public transportation compared to Travis County, were added to the household travel survey, this apparent decline is misleading.



Source: 1998 Austin Household Travel Survey and the 2006 CAMPO Household Travel Survey.

Figure 42. Distribution of Person Trips by Mode of Travel.

AMOUNT OF TRAVEL

Several measures are used to record the amount of travel, the number of person trips, the number of vehicle trips, the trip distances in miles, the trip durations in minutes and the VMT.

Internal and External Person Trips

Internal trips are produced and attracted to traffic analysis zones within the study area boundaries. External-local trips are produced outside the study and are attracted to traffic analysis zones inside the study area or vice versa. For example, persons commuting from Williamson County into Bell County for work are making external-local trips.

External-through trips pass through the study area without making any stops. For example, many trips being made on IH-35 and SH-71 pass through the study area without making any stops within the study area.

Travel demand models are better able to forecast internal trips than external-local and external-through trips. For internal trips, the travel demand modeler has knowledge of the household characteristics and trip production rates of the trip makers and knowledge of the workplace characteristics and their associated trip attraction characteristics. The modeler does not have this knowledge about travelers making external-local and external-through trips.

One reason that Bastrop and Caldwell counties were included in the 2006 household travel survey was to minimize the proportion of the total trips that are external-local trips, thereby improving the ability of the travel demand model to forecast future travel. Between the 1998 household survey and the 2006 household survey the number of household members commuting among Bastrop and Caldwell Counties and Hays, Travis, and Williamson counties increased significantly. Table 10 shows the distribution of internal and external person trips from the 1998 and 2006 household surveys.

The external-local trips shown in Table 10 are external-local trips made by households within the study area. External-local trips and external-through trips made by travelers not residing within the study area are estimated from the external station survey and are not included in Table 10. By including Bastrop and Caldwell counties in the expanded study area, the number of external-local trips made by households within the study area was held to less than 2 percent.

Table 10. The Number and Distribution of 1998 and 2006 Internal and External-Local Trips.

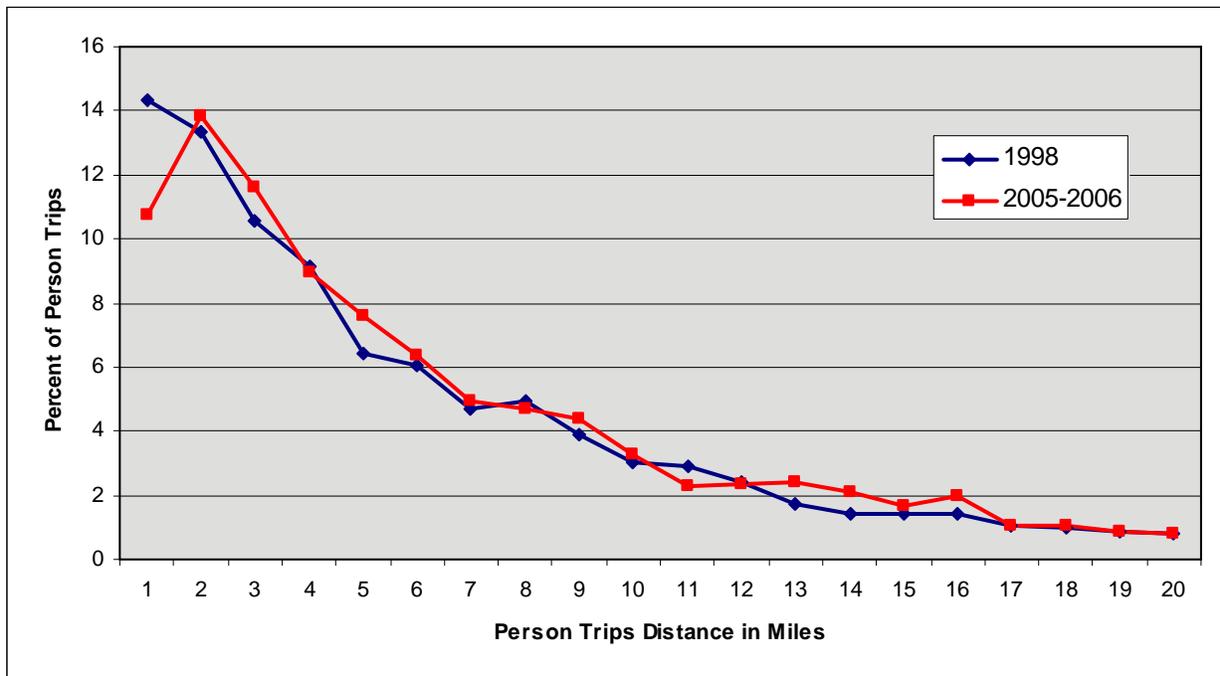
Trip Purpose	1998 Person Trips	2005-2006 Person Trips	Distribution of 1998 Person Trips	Distribution of 2005-2006 Person Trips
Internal Trips	3,708,208	5,093,023	98.35%	98.04%
External-Local Trips	62,246	101,691	1.65%	1.96%
Total Trips	3,770,454	5,194,714	100.00%	100.00%

Source: 1998 Austin Household Travel Survey and the 2006 CAMPO Household Travel Survey.

Note: The external-local trips shown are for households within the respective study areas. External-local trips made by households outside the study area are estimated from the external station surveys.

Trip Distance

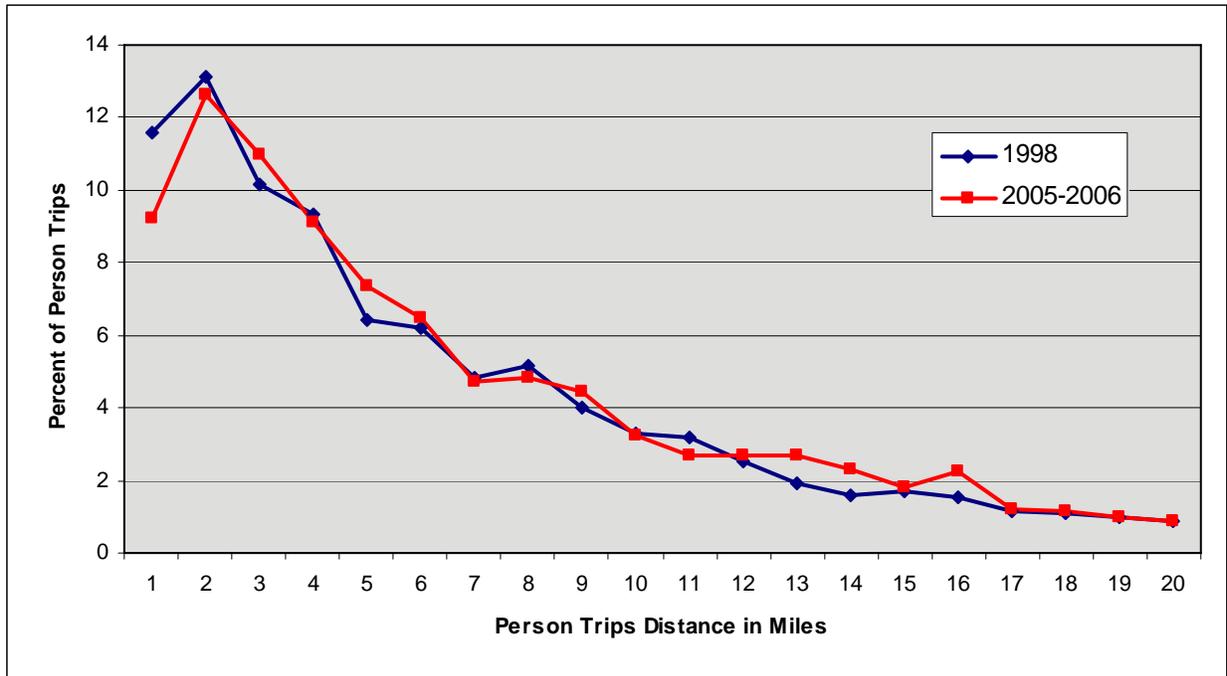
Figure 43 shows the distribution of internal person trips by the length of the trip in miles for the 1998 and 2006 household travel surveys. The average person trip length was 8.1 miles for the 1998 household travel survey and 7.8 miles for the 2006 household travel survey.



Source: 1998 Austin Household Travel Survey and the 2006 CAMPO Household Travel Survey.

Figure 43. Distribution of Person Trips by Trip Distance in Miles.

Figure 44 shows the distribution of internal vehicle trips by the length of the trip in miles for the 1998 and 2006 household travel surveys. The average vehicle trip length was 8.6 miles for the 1998 household travel survey and 8.4 miles for the 2006 household travel survey.

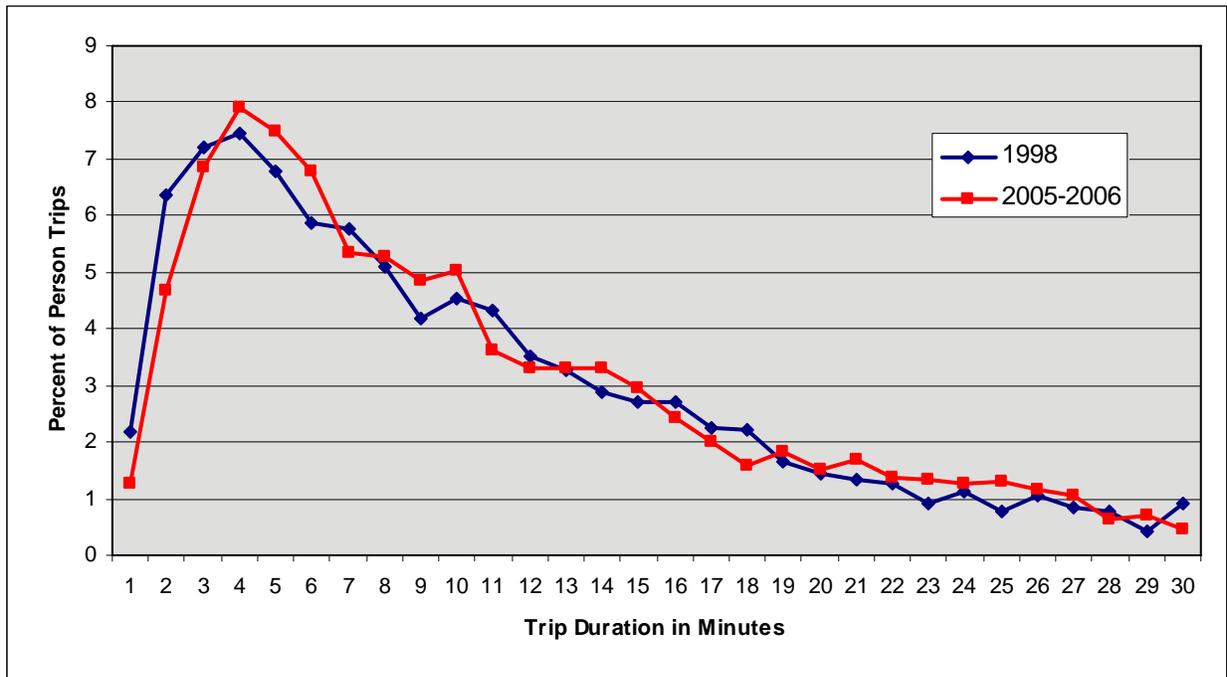


Source: 1998 Austin Household Travel Survey and the 2006 CAMPO Household Travel Survey.

Figure 44. Distribution of Vehicle Trips by Trip Distance in Miles.

Trip Duration

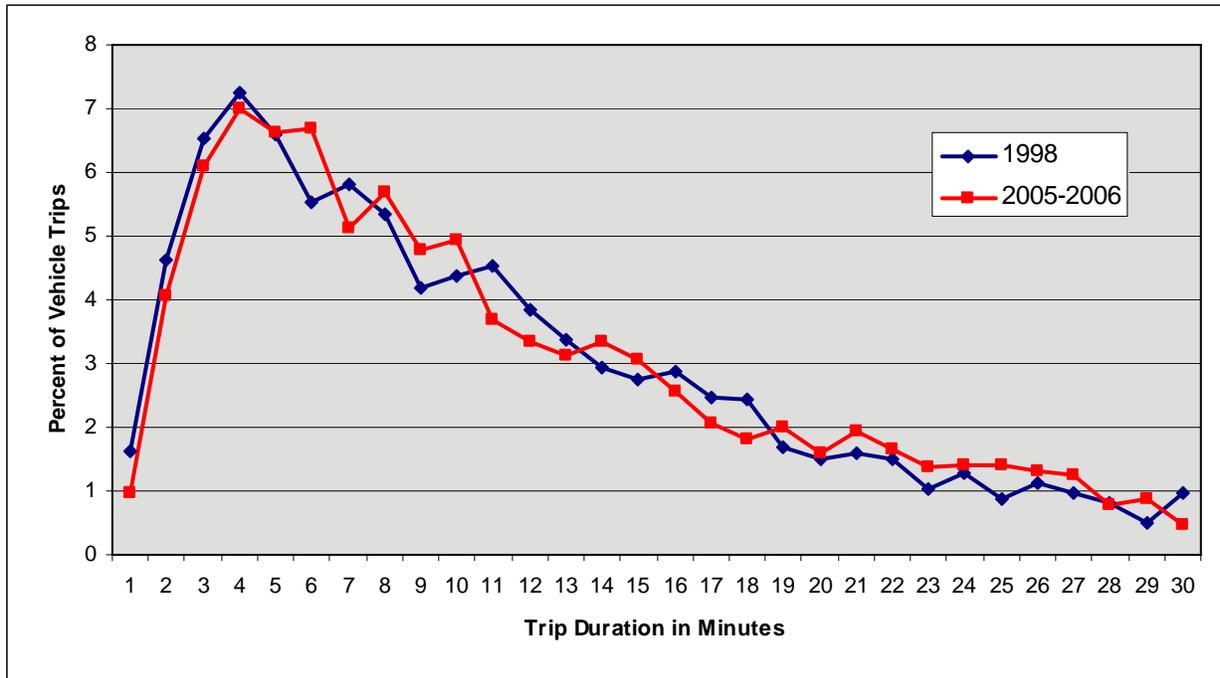
Figure 45 shows the distribution of internal person trips by the duration of the trip in minutes for the 1998 and 2006 household travel surveys. The average person trip duration was 13.2 minutes for the 1998 household travel survey and 12.9 minutes for the 2006 household travel survey.



Source: 1998 Austin Household Travel Survey and the 2006 CAMPO Household Travel Survey.

Figure 45. Distribution of Person Trips by Trip Duration in Minutes.

Figure 46 shows the distribution of internal vehicle trips by the duration of the trip in minutes for the 1998 and 2006 household travel surveys. The average vehicle trip duration was 13.9 minutes for the 1998 household travel survey and 13.8 minutes for the 2006 household travel survey.



Source: 1998 Austin Household Travel Survey and the 2006 CAMPO Household Travel Survey.

Figure 46. Distribution of Vehicle Trips by Trip Duration in Minutes.

Vehicle Miles of Travel

The VMT was 19,834,000 for vehicle trips internal to the three-county study area in the 1998 household travel survey and 26,463,000 for vehicle trips internal to the five-county study area in the 2006 household travel survey. This is not the total VMT for the study area, as the VMT associated with external-local, external-through, commercial vehicle, visitor travel, and intrazonal trips are not included in the estimate.

SUMMARY

The 1998 and 2006 trip rates cross classified by household size and household income are similar. This result was expected. The travel demand model assumes that household trip rates by trip purpose do not change during the 20-year forecast. What does change over time is the number of households, the household size, the household income, and the geographic location of the households.

Travel demand forecasts are very dependent on the accuracy of the household demographic and household location forecasts. In reality, there are some changes in trip rates over time even accounting for changes in household size and household income, thus the need to periodically update household travel surveys.