2006 Killeen-Temple
External Survey
Technical Summary

Texas Department of Transportation

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TECHNICAL SUMMARY

Texas Department of Transportation Travel Survey Program

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Acknowledgements

INTRODUCTION

In 2006, the Transportation Planning and Programming (TPP) Division of the Texas Department of Transportation (TxDOT) funded an external station travel survey in the Killeen-Temple Urban Transportation Study area (KTUTS). This survey measured and identified travel patterns into, within, and out of the Killeen/Temple/Belton metropolitan area, which is located in portions of Bell, Coryell, and Lampasas counties. This report presents a Technical Summary of the 2006 KTUTS External Station Survey and documents the data collected and the analysis results for the study area.

EXTERNAL STATION SURVEY

An external station survey collects data through personal interviews to measure and identify travel patterns of vehicles and/or pedestrians entering and exiting a particular study area. Surveys are conducted during daylight hours for one day at each designated location. Additionally, 24-hour vehicle classification counts are performed on the same day as the survey at each survey location. These counts provide a basis for expanding the survey data to represent the average weekday movements into and out of the study area. Data are also collected on the movements of the vehicle during the survey day prior to the point at which the vehicle is surveyed. This data provides a basis for estimating the amount of travel occurring in the study area prior to the time of the survey.

KTUTS STUDY AREA

The study area, as shown in Figure 1, is in Bell, Coryell, and Lampasas counties, is located in central Texas. The two primary population centers of the study area are Killeen and Temple, which according to the 2000 census had a combined population of approximately 141,400 persons. The area is also home to the Fort Hood Military Reservation. The boundary established for this external survey was determined by KTUTS.
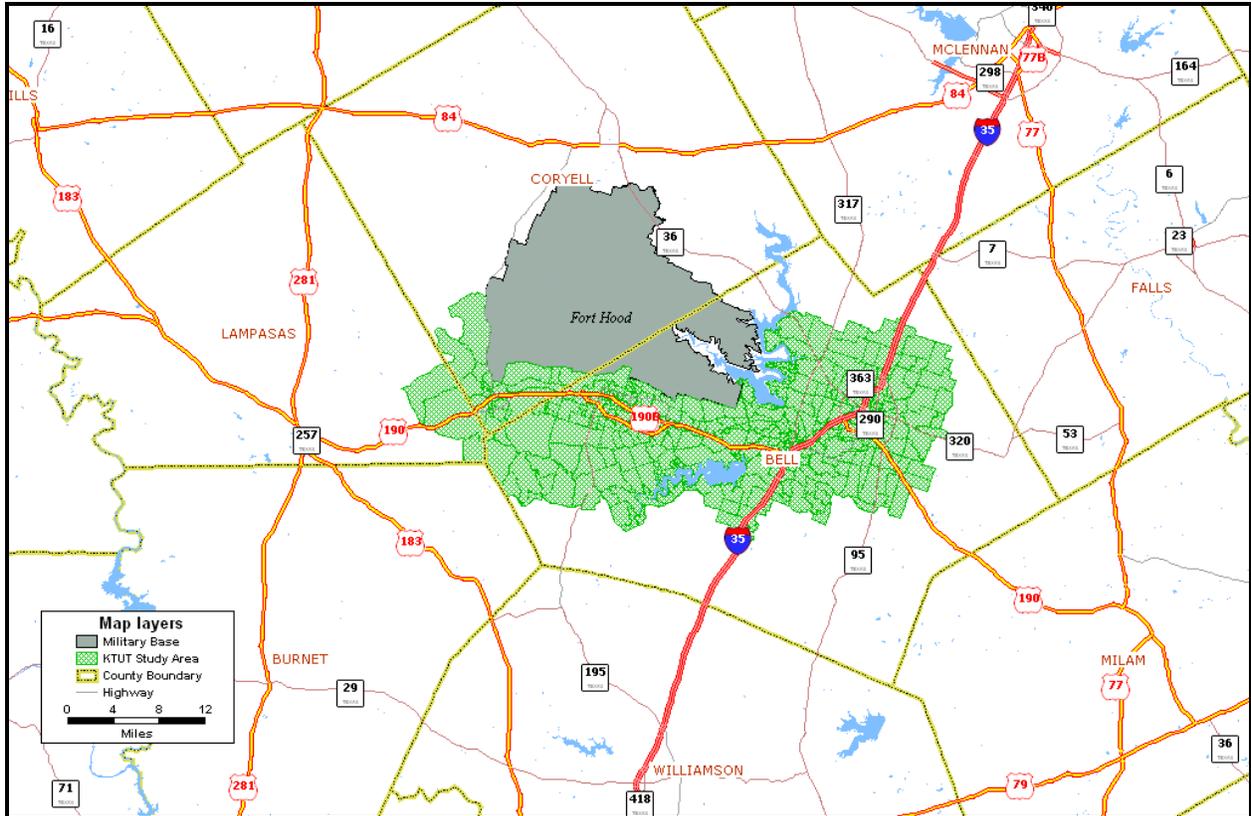
Figure 1. KTUTS Study Area.

EXTERNAL STATIONS

There are 28 locations on the border of the KTUTS study area identified as external stations. These locations are transportation facilities that cross the study area boundary and represent where travelers may enter and exit the study area. Of these 28 locations, 14 were selected for travel surveys. One of the 14 survey locations bordered the Waco study area, and as a result, this location was surveyed in both directions. Figure 2 shows the location of the external stations in the KTUTS area, and Table 1 identifies the external surveys, their general location, whether or not surveys were conducted, and the 24-hour traffic count at the location. Additionally, Table 1 groups the external station locations by direction. The location group aggregated data will be utilized to present external local and through trip information later in the summary.
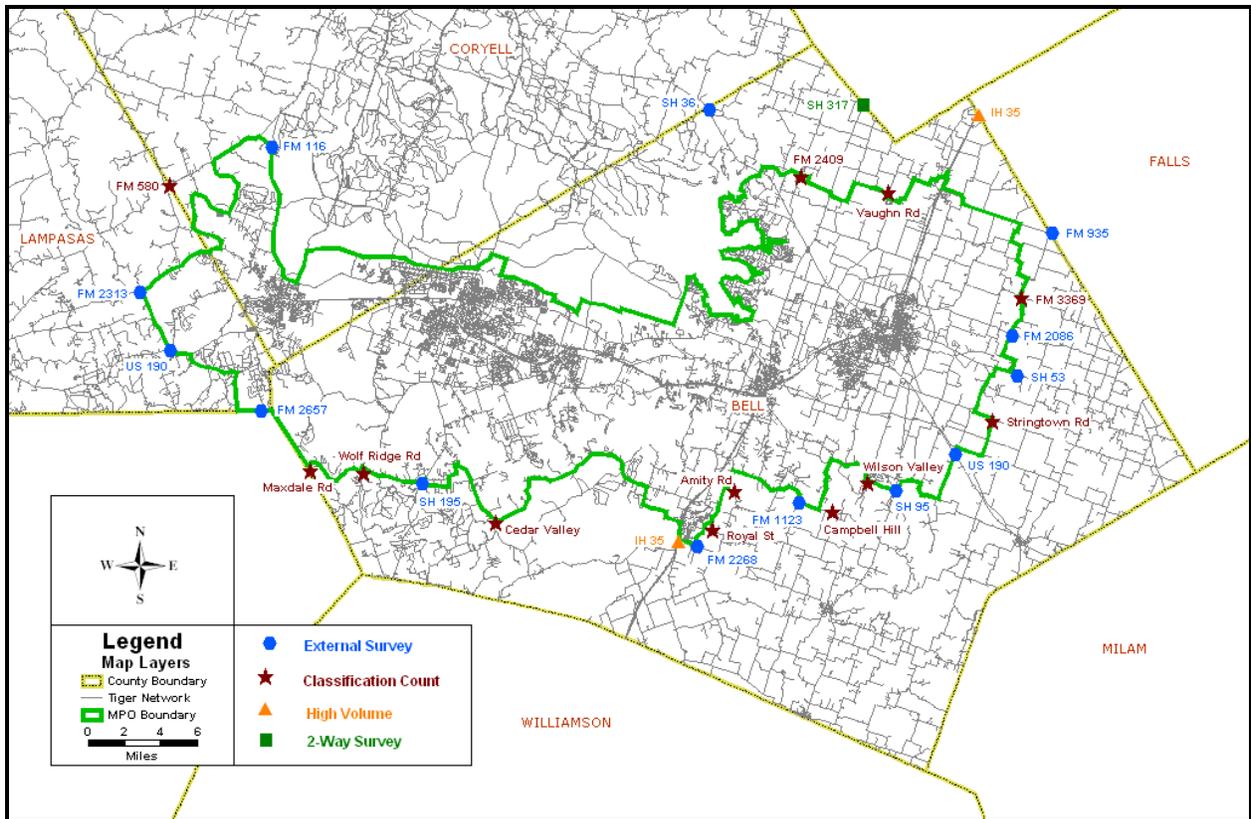
Figure 2. KTUTS External Station Locations.

In addition to the 14 survey sites, two other locations were identified as high-volume sites. Non-commercial vehicles on high-volume roadways were not surveyed, but instead a license plate matching methodology was employed to provide information on the number of through and local trips. Commercial vehicles were surveyed at weigh stations, rest areas, and truck stops using an intercept interview method. Additionally, commercial vehicles were included in the license plate matching data collection effort. More details on this methodology are provided later in the analysis.

Table 1. KTUTS External Stations.

Station Number	Facility	Location	Surveyed	24-Hour Vehicle Count		Location Group
				Inbound	Outbound	
511	SH 36	at Coryell County line	Yes	2,547	2,572	North
512	FM 2409	in Bell County	No	180	186	
513	SH 317	at McLennan County line	Yes	4,268	3,894	
514	Vaughn Rd.	in Bell County	No	27	30	
515	IH 35	at Falls County line	High Volume	26,922	26,280	
539	FM 116	in Coryell County	Yes	2,594	2,643	
516	FM 935	at Falls County line	Yes	307	233	East
518	FM 3368	in Bell County	No	256	276	
519	FM 2086	in Bell County	Yes	292	235	
520	SH 53	in Bell County	Yes	2,633	2,621	
521	Stringtown Rd.	in Bell County	No	110	116	
522	US 190	in Bell County	Yes	4,674	4,774	
523	SH 95	in Bell County	Yes	2,646	2,581	South
524	Wilson Valley	in Bell County	No	2,525	2,409	
525	Campbell Hill	in Bell County	No	1,383	1,367	
526	FM 1123	in Bell County	Yes	293	268	
527	Amity Rd.	in Bell County	No	422	421	
528	Royal Rd.	in Bell County	No	1,015	1,065	
529	FM 2286	in Bell County	Yes	1,563	1,565	
530	IH 35	in Bell County	High Volume	23,364	24,169	
531	Cedar Valley	in Bell County	No	576	577	
532	SH 195	in Bell County	Yes	4,134	3,984	
533	Wolf Ridge Rd.	in Bell County	No	77	79	
534	Maxdale Rd.	at Burnet County line	No	64	66	West
535	FM 2657	at Burnet County line	Yes	951	886	
536	US 190	in Lampasas County	Yes	4,672	4,641	
537	FM 2313	in Lampasas County	Yes	491	538	
538	FM 580	at Lampasas County line	No	209	260	
		Total		89,195	88,736	

SURVEY METHODOLOGY

Two methodologies were employed in the conduct of the survey. For roadways with low-to-moderate traffic volumes, a roadside intercept interview method was used. For external stations on high-volume roadways, commercial and non-commercial vehicles were surveyed using a license plate match method. Commercial vehicles were also surveyed at weigh stations, rest areas, and truck stops using an intercept interview method. For the purpose of this study,

roadways with traffic volumes in excess of 20,000 vehicles per day were considered high-volume.

For each external station surveyed using the roadside intercept interview method, traffic control plans were set up and vehicles in the outbound direction (i.e. leaving the study area) were directed into an area where trained survey personnel interviewed the drivers. Those declining were allowed to continue on their trip. Drivers of commercial and non-commercial vehicles were interviewed using different survey instruments and those forms are provided in the Appendix. Figure 3 shows a typical intercept interview survey at an external station.

Figure 3. Typical External Survey Station.

The intercept interview method was also used to conduct commercial vehicle surveys at weigh stations, rest areas, and truck stops located along high-volume facilities. The surveys were conducted by interviewing drivers of commercial vehicles when the driver stopped for gas, to

eat, or other personal reasons. Since this method involved surveying the drivers off of the roadways, there was no traffic control required.

Two external stations in the KTUTS study area could not be surveyed using the intercept interview method because traffic volumes were too high to safely stop traffic and interview motorists. In lieu of intercept surveys at these two locations, a license plate match method was used as a means to estimate the amount of non-commercial vehicles traveling through the study area on high-volume facilities.

For a more detailed discussion and description of the survey methodology, see the report, *Waco MPO and KUTS External Station Travel Survey*, prepared by Gram Traffic Counting, Inc., the vendor selected to conduct the survey.

DATA ANALYSIS

Data analysis for non-commercial and commercial vehicles is developed separately and presented in this section. Non-commercial vehicles are typically personal use passenger cars, trucks, vans, and motorcycles. Commercial vehicles are those used for commercial purposes and, in most cases, consist of heavy-duty trucks.

The analysis is based on information obtained from completed interviews of motorists. In the KTUTS area, the majority of vehicles surveyed were non-commercial. Approximately 81 percent of the surveys were non-commercial vehicles. The number of surveys for commercial and non-commercial vehicles by station as well as the outbound traffic volume during the survey period is provided in Table 2. Approximately 17 percent of non-commercial vehicles and 9 percent of commercial vehicles that traveled through the external stations during survey hours were interviewed.

Trip Types

There are two types of trips identified as part of an external survey; external-local trips and external-through trips. A local trip is one where either the origin or destination of the trip is in the study area and the other trip end is outside the study area. A through trip is one traveling through the study area without stopping. Table 3 presents the survey data for non-commercial

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and commercial vehicles in terms of trips identified as local or through movements. Nearly 91 percent of non-commercial vehicle trips and nearly 58 percent of commercial vehicle trips were local trips. Approximately 76 percent of the commercial vehicle through trips were made on the two high-volume external sites.

Table 2. Number of Non-Commercial and Commercial Vehicle Surveys.

Station Number	Facility	Location	Non-Commercial		Commercial	
			Surveyed	Count*	Surveyed	Count*
511	SH 36	at Coryell County line	305	1,708	50	304
513	SH 317	at McLennan County line	297	3,089	64	209
515^	IH 35	at Falls County line	N/A	N/A	119	3,142
516	FM 935	at Falls County line	132	128	17	52
519	FM 2086	in Bell County	61	144	6	22
520	SH 53	in Bell County	295	1,774	55	296
522	US 190	in Bell County	321	3,026	53	648
523	SH 95	in Bell County	326	1,693	59	354
526	FM 1123	in Bell County	122	168	18	44
529	FM 2286	in Bell County	265	1,186	34	123
530^	IH 35	in Bell County	N/A	N/A	195	3,792
532	SH 195	in Bell County	315	2,699	56	186
535	FM 2657	at Burnet County line	243	512	20	83
536	US 190	in Lampasas County	367	3,490	53	251
537	FM 2313	in Lampasas County	189	345	18	96
539	FM 116	in Coryell County	386	1,951	56	163
Total			3,624	21,913	873	9,765

 * Outbound volumes during approximate time of survey (7 a.m. to 7 p.m.)

 ^ High-volume location. Commercial Vehicle Surveys only.

Table 3. Survey Results by Trip Type (Non-Commercial and Commercial Vehicles).

Station Number	Facility	Non-Commercial Vehicles			Commercial Vehicles		
		Local	Through	Total	Local	Through	Total
511	SH 36	264	41	305	35	15	50
513	SH 317	279	18	297	59	5	64
515*	IH 35	N/A	N/A	N/A	9	110	119
516	FM 935	118	14	132	13	4	17
519	FM 2086	60	1	61	6	0	6
520	SH 53	274	21	295	48	7	55
522	US 190	298	23	321	45	8	53
523	SH 95	288	38	326	43	16	59
526	FM 1123	119	3	122	18	0	18
529	FM 2286	199	66	265	18	16	34
530*	IH 35	N/A	N/A	N/A	28	167	195
532	SH 195	311	4	315	54	2	56
535	FM 2657	206	37	243	18	2	20
536	US 190	348	19	367	47	6	53
537	FM 2313	184	5	189	17	1	18
539	FM 116	360	26	386	50	6	56
Total		3,308	316	3,624	508	365	873

*High-volume location. Commercial vehicle surveys only.

The second type of trip identified in the survey is a sub-category of external local trips. These are reported as resident and non-resident trips. A resident is a survey respondent that reported they resided in the KTUTS study area. A non-resident is a respondent that reported they lived outside of the KTUTS study area. Table 4 presents the survey data by residents and non-residents as well as the number of trips made by non-residents within the study area. An important element of the trips reported by non-residents is the number of trips made prior to being surveyed. Based on the information provided in the survey, these trips are evaluated to estimate the number of internal trips, trips where both the origin and destination are within the study area, made by non-residents. By measuring the number of non-residents that travel in and out of KTUTS study area and the number of internal trips they make, an estimate of the total internal trips within the study area attributable to non-residents can be developed.

Table 4. Survey Results by Residency (Non-Commercial Vehicles Only).

Station Number	Facility	Number of Surveys	Residents	Percent	Non-Residents	Percent	Internal Trips (non-residents)
511	SH 36	305	224	73.44	81	26.56	27
513	SH 317	297	128	43.10	169	56.90	7
516	FM 935	132	43	32.58	89	67.42	56
519	FM 2086	61	30	49.18	31	50.82	17
520	SH 53	295	130	44.07	165	55.93	74
522	US 190	321	180	56.07	141	43.93	52
523	SH 95	326	231	70.86	95	29.14	25
526	FM 1123	122	110	90.16	12	9.84	6
529	FM 2286	265	215	81.13	50	18.87	16
532	SH 195	315	158	50.16	157	49.84	58
535	FM 2657	243	167	68.72	76	31.28	24
536	US 190	367	301	82.02	66	17.98	12
537	FM 2313	189	182	96.30	7	3.70	7
539	FM 116	386	365	94.56	21	5.44	3
Total		3,624	2,464	67.99	1,160	32.01	384

The residency questions were only asked of respondents in non-commercial vehicles. Table 4 illustrates that individuals who do not live in the study area make a sizeable proportion, 32 percent, of the non-commercial travel in and out of the KTUTS study area. The average number of internal trips made by those individuals is 0.33 trips per vehicle.

Travel Purpose

To understand the reasons people travel, the survey included questions about the driver's purpose for being at the location where the trip began (i.e., trip origin) and the purpose for traveling to their destination. There were 18 different purposes included on the survey instrument for non-commercial vehicles and 10 purposes on the commercial vehicle survey. Table 5 provides the trip purposes for each survey. For the purpose of presenting survey results, the trip purpose categories are combined into a fewer number to reflect the primary purposes of travel.

Table 5. Trip Purpose Categories.

Code	Non-Commercial Vehicle Trip Purpose	Code	Commercial Vehicle Trip Purpose
1	Home/Return Home	1	Base location/Return to Base location
2	Go/Return to Work	2	Delivery
3	Work Related	3	Pick Up
4	School	4	Maintenance
5	Vacation	5	Driver Needs (lunch, etc)
6	Visit Friends/Family	6	To Home
7	Eat Out	7	Buy Fuel
8	Shop	8	Other (specify)
9	Buy Gas	9	Unknown
10	Personal Business	99	Refused
11	Pick Up/Drop Off Passenger		
12	Change Travel Mode		
13	Delivery		
14	Recreation		
15	Overnight Stay		
16	Other		
17	Unknown		
99	Refused/Do Not Know		

For non-commercial vehicles, the trip purposes listed in Table 5 were combined into the following six categories:

Category	Trip Purpose Codes (from Table 5)
Home	1
Work	2 and 3
School	4
Personal	5, 6, 10, 11, and 14
Shop	7, 8, and 9
Other	12, 13, 15, 16, 17, and 99

Figure 4 presents the distribution of non-commercial vehicles by reported trip purpose at the origin of the trip and Figure 5 shows the distribution at the destination of the trip. Additionally, Table 6 provides the data shown in Figures 4 and 5 in tabular form for comparative purposes.

The information is provided for residents, non-residents, and both groups combined. The distribution for the origin purpose shows that the largest percentage of trips for residents (38 percent) began at home, while the most common non-resident trip origin purposes were work and personal (33 percent each). For both groups combined, the most common origin purposes were home (28 percent), work (27 percent), and personal (25 percent).
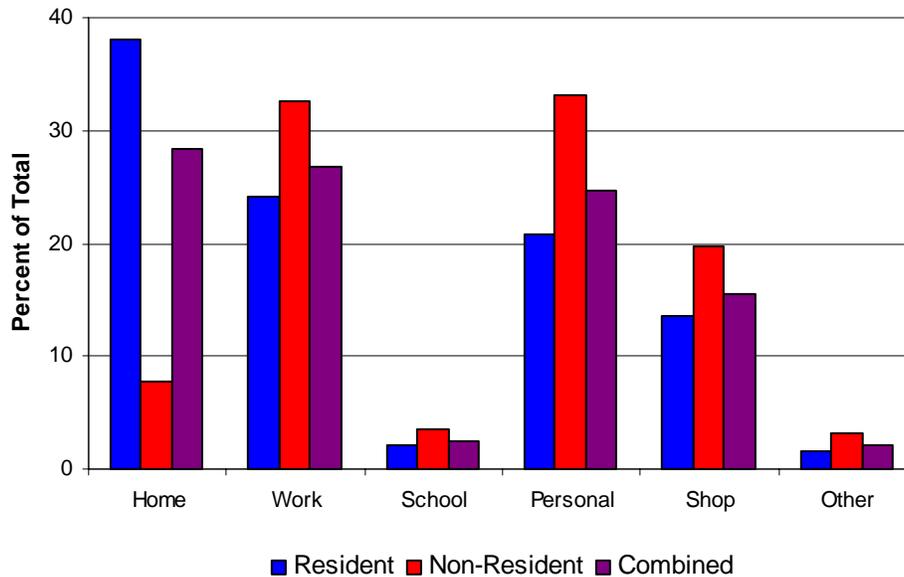

Figure 4. Trip Purpose at Origin for Non-Commercial Vehicles.

Figure 5 shows that the largest distribution of destination purpose for non-residents was home (65 percent). The trip purpose at the destination for residents was primarily comprised of personal and home trips (34 percent each). For both groups combined, home (43 percent), personal (28 percent), and work (22 percent) were the most common trip purposes.
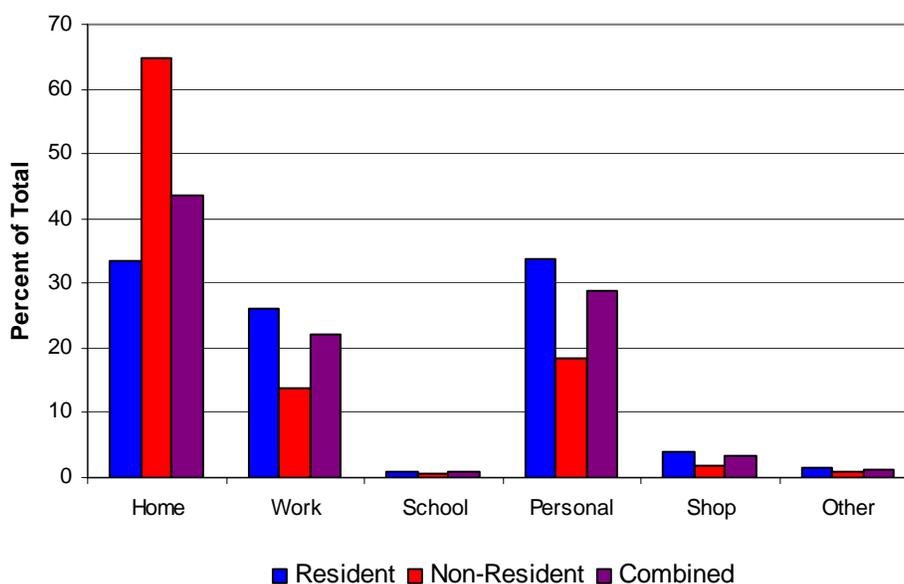
Figure 5. Trip Purpose to Destination for Non-Commercial Vehicles

Table 6. Percent Distribution of Non-Commercial Vehicle Trip Purpose at Origin and Destination.

Trip Purpose	Origin			Destination		
	Resident	Non-Resident	Combined	Resident	Non-Resident	Combined
Home	37.99	7.67	28.28	33.52	64.65	43.49
Work	24.11	32.68	26.85	26.02	13.71	22.08
School	2.03	3.53	2.51	0.97	0.52	0.83
Personal	20.78	33.19	24.75	33.77	18.44	28.86
Shop	13.51	19.74	15.51	4.14	1.90	3.42
Other	1.58	3.19	2.10	1.58	0.78	1.32

A detailed analysis of specific subsets of the survey data was performed. Approximately 38 percent of the surveyed study area residents began their trip at home. Of that group of respondents, approximately 39 percent of those home-based trips had a destination purpose that was work or work-related. Nearly 65 percent of the surveyed non-residents cited home as the trip purpose for traveling to their destination. Of that group of non-residents, nearly 36 percent of the trip origins were work or work-related trips and approximately 57 percent of the trip origins were for personal business or shopping purposes.

The trip purposes normally used in travel demand modeling are home-based work (HBW), home-based non-work (HBNW), and non-home based (NHB). HBW trips are those that have one end of the trip at home and the other end of the trip at work. Trips that begin at home and end at work or those that begin at work and end at home are HBW. A HBNW trip is one that one end of the trip is at home and the other trip end is any location other than work. A NHB trip is a trip that does not begin or end at home. A distribution of trips by trip purpose for residents, non-residents, and both groups combined is provided in Figure 6. For residents, HBNW trips were the most commonly cited trip purpose (42 percent). For non-residents, HBNW trips accounted for nearly half (46 percent) of the trips. HBNW trips were the most common trip purpose for residents and non-residents combined (44 percent).
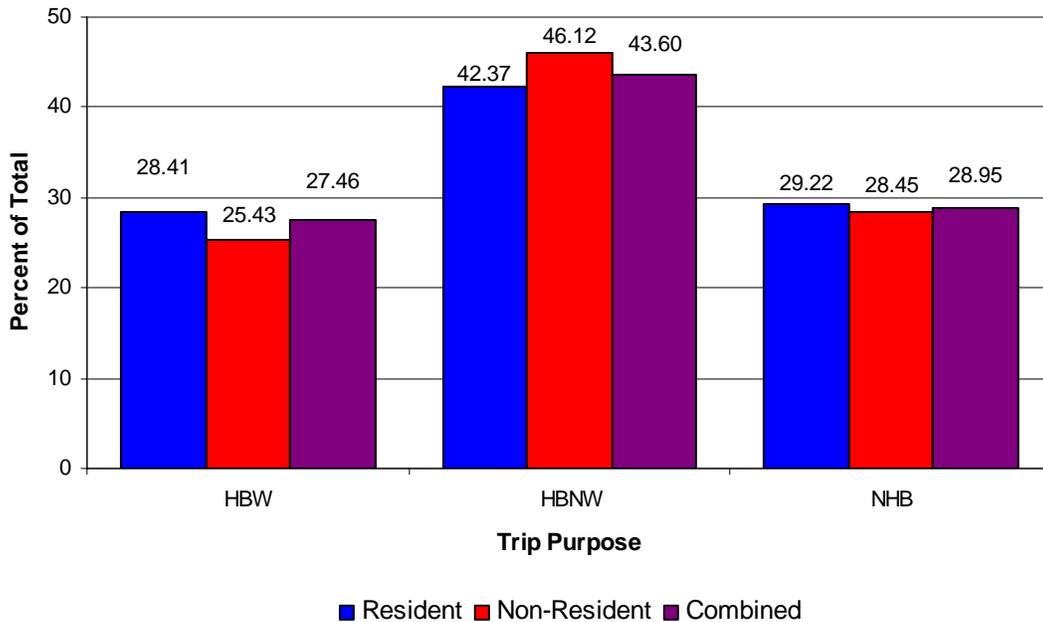
Figure 6. Distribution of Non-Commercial Vehicle Trips by Trip Purpose.

For commercial vehicles, the trip purposes shown in Table 5 were combined into the following five categories:

Category	Trip Purpose Codes
Base Location	1
Delivery	2
Pick Up	3
Support Functions	4, 5, 6, and 7
Other	8, 9, and 99

Figures 7 and 8 present the distribution of commercial vehicle trips by reported trip purpose at the origin and destination of the trip. At the origin, support functions was the most common origin trip purpose (40 percent). Pick-up (22 percent), delivery (18 percent), and base (17 percent) were the other most commonly cited trip purposes at the origin. The distribution for destination trip purpose shows that 39 percent of the trips were destined for delivering cargo and another 14 percent were destined for picking up cargo. Approximately 32 percent of the trip destinations were for support functions and 11 percent of the destinations were for base operations.
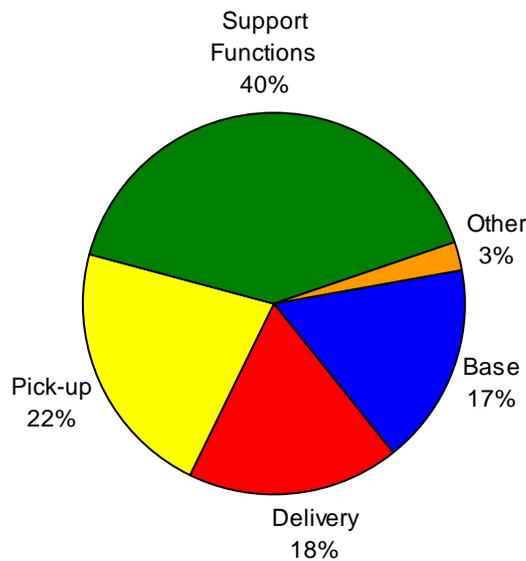
Figure 7. Trip Purpose at Origin for Commercial Vehicles.
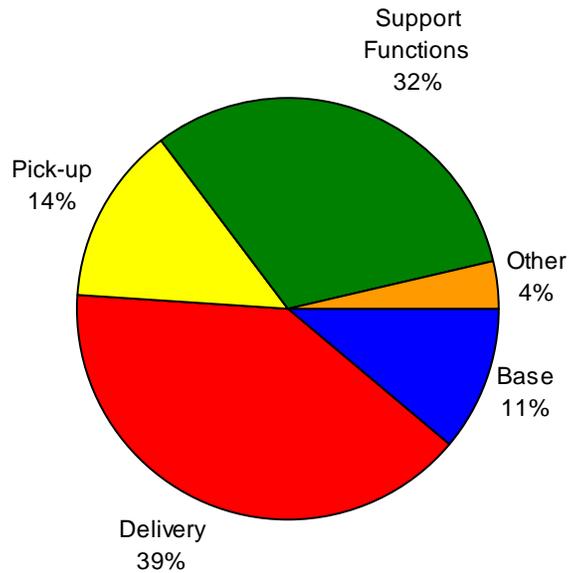
Figure 8. Trip Purpose to Destination for Commercial Vehicles.

In addition to obtaining information on the purpose of travel, questions were asked to identify the type of place associated with the origin of the trip. Table 7 provides the results of the responses provided for both commercial and non-commercial vehicles. For non-commercial vehicles, the largest percentage of respondents listed residential (40 percent) as the type of place at the origin. An additional 16 percent of the non-commercial vehicles cited retail/shopping/gas as the type of place. For commercial vehicles, over 40 percent of the respondents listed industrial/manufacturing as the type of place at the origin. Retail/shopping/gas had the next largest percentage of type of place at the origin for commercial vehicles at 20 percent.

Table 7. Type of Place at Trip Origin.

Type of Place	Non-Commercial Vehicles		Commercial Vehicles*	
	Number	Percent	Number	Percent
Office Building	264	7.28	48	8.59
Retail/Shopping/Gas	596	16.45	110	19.68
Industrial/Manufacturing	269	7.42	229	40.97
Medical	309	8.53	5	0.89
Educational	187	5.16	5	0.89
Government	184	5.08	20	3.58
Residential	1,440	39.74	82	14.67
Airport	14	0.39	2	0.36
Eating Establishment	124	3.42	18	3.22
Hotel/Motel	31	0.86	3	0.54
Other	206	5.68	37	6.62
Total	3,624	100.00	559	100.00

 * Commercial Vehicles at High Volume locations were not asked this question

Time-of-Day

Vehicle classification counts were conducted at each external survey location on the same day as the survey. These counts were for a 24-hour period and they include data by time-of-day and by direction. This information is primarily used for expansion of the survey data, but is also of interest to examine the distribution of vehicles by time-of-day. Figures 9 and 10 provide the distribution of non-commercial and commercial vehicles by time-of-day for all of the external locations by inbound and outbound direction, respectively.

For inbound non-commercial vehicles (Figure 9), the morning peak occurs between 7:15 a.m. and 8:15 a.m. There is an afternoon peak period for non-commercial vehicles between 5:00 p.m. and 5:45 p.m. While inbound commercial vehicle levels remain fairly constant from 8:00 a.m. to 5:00 p.m., the actual peak occurs around 2:30 in the afternoon. For outbound traffic (Figure 10), the morning peak period for non-commercial vehicles is not as significant as the peak for the inbound direction, and it occurs between 7:15 a.m. and 8:30 a.m. The afternoon peak for non-commercial vehicles traveling outbound is larger and longer than the inbound afternoon peak.

For outbound commercial vehicles, there appears to be no significant peak. The traffic levels remain fairly constant between 9 a.m. and 5 p.m.
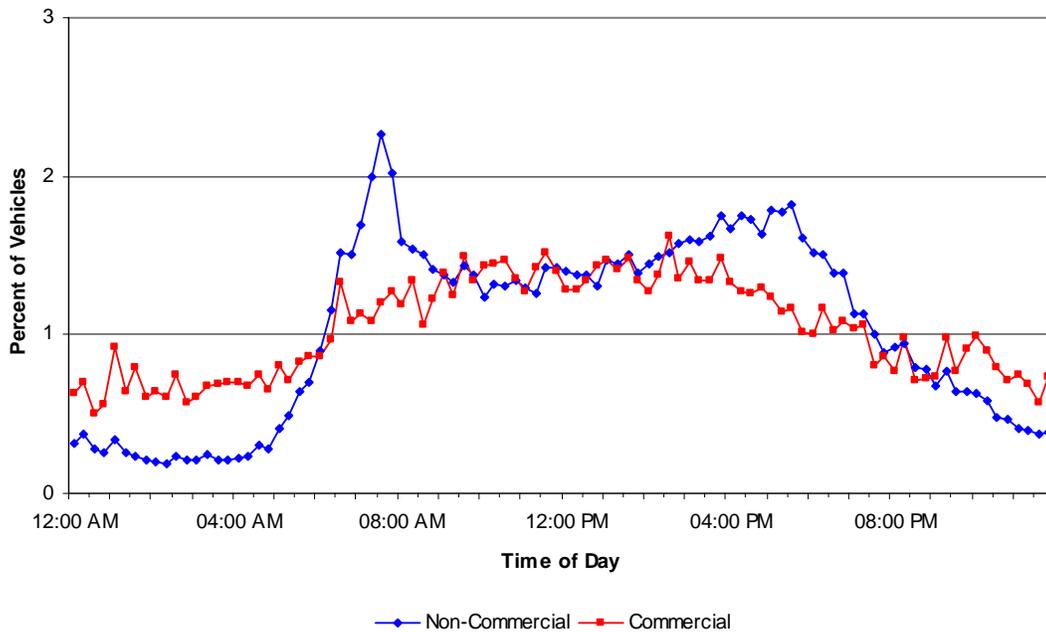

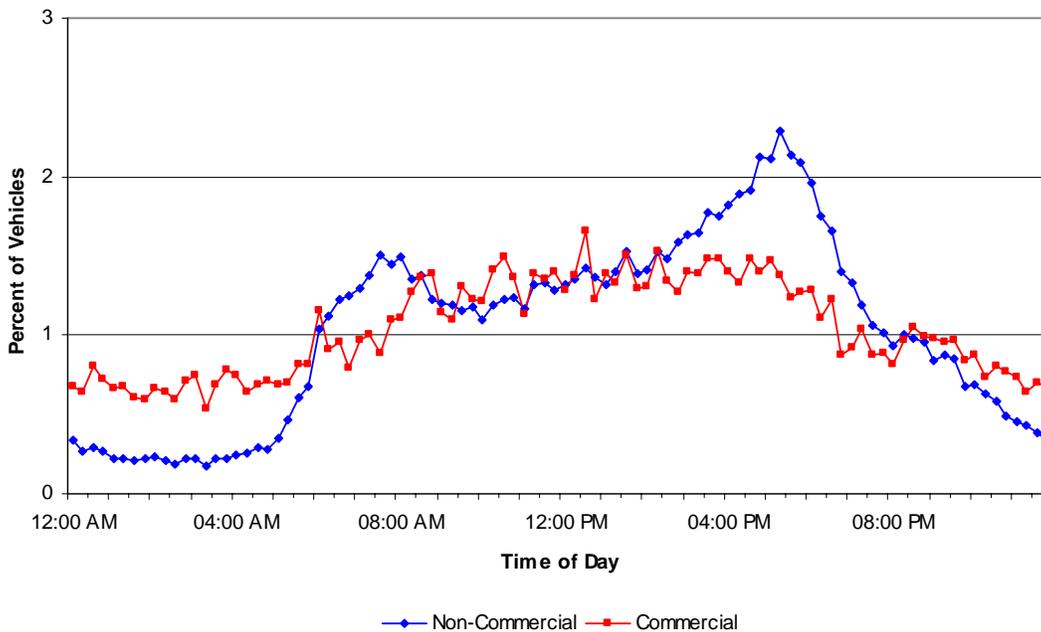**Figure 9. Distribution of Inbound Vehicles by Time-of-Day.**

Figure 10. Distribution of Outbound Vehicles by Time-of-Day.

An additional analysis that compared the number of surveys and vehicle counts by time of day was conducted. In this analysis, the percent of vehicles surveyed and the percent of outbound vehicles counted were grouped in hourly increments during the time period in which the survey was conducted. The results for non-commercial vehicles are provided in Figure 11 and commercial vehicles are shown in Figure 12.

With the exception of the 9:00 a.m. to 10:00 a.m. hour, the percent of non-commercial surveys completed each hour increased gradually throughout the day. After 10:00 a.m. the counts for non-commercial vehicles gradually increased throughout the remainder of the morning and the afternoon. Approximately 17 percent of the non-commercial vehicles that were traveling out of the study area (at surveyed external stations) were successfully interviewed during survey hours.
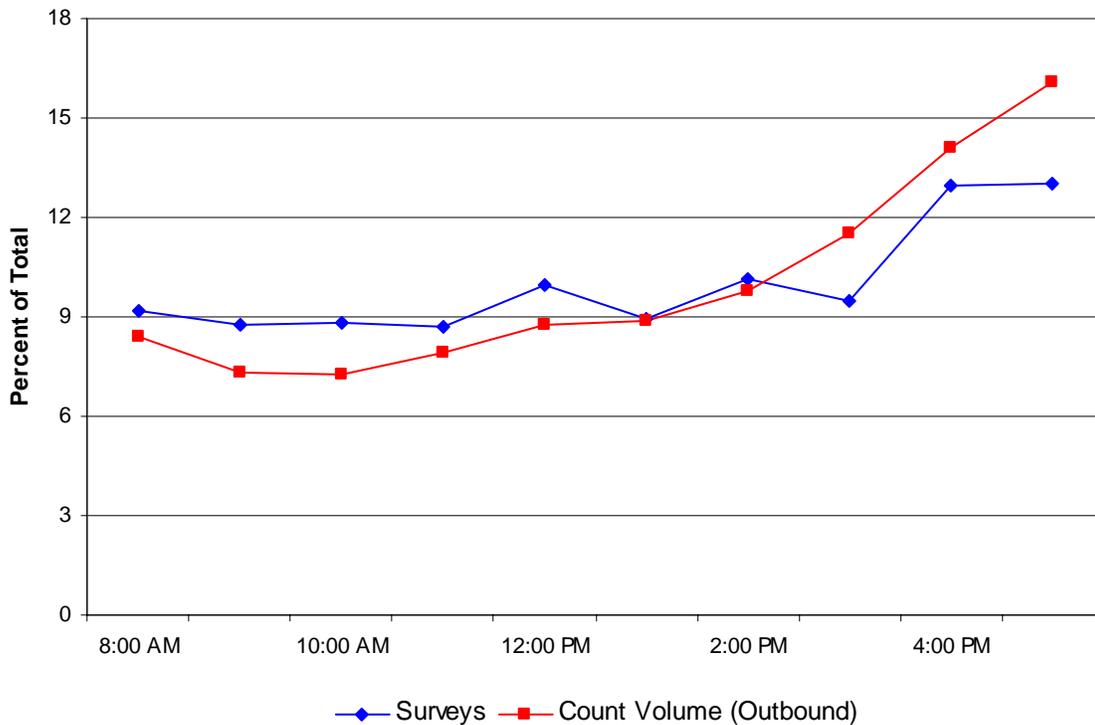
Figure 11. Distribution of Non-Commercial Vehicles and Surveys by Time-of-Day.

The trend among commercial vehicles was slightly different than the trend for non-commercial vehicles. The percent of vehicles counted was fairly constant throughout the day, while the

percent of completed surveys peaked between 8:00 a.m. and 9:00 a.m. and then declined through the remainder of the day. Overall, nine percent of the commercial vehicles that were counted during the survey period were interviewed.
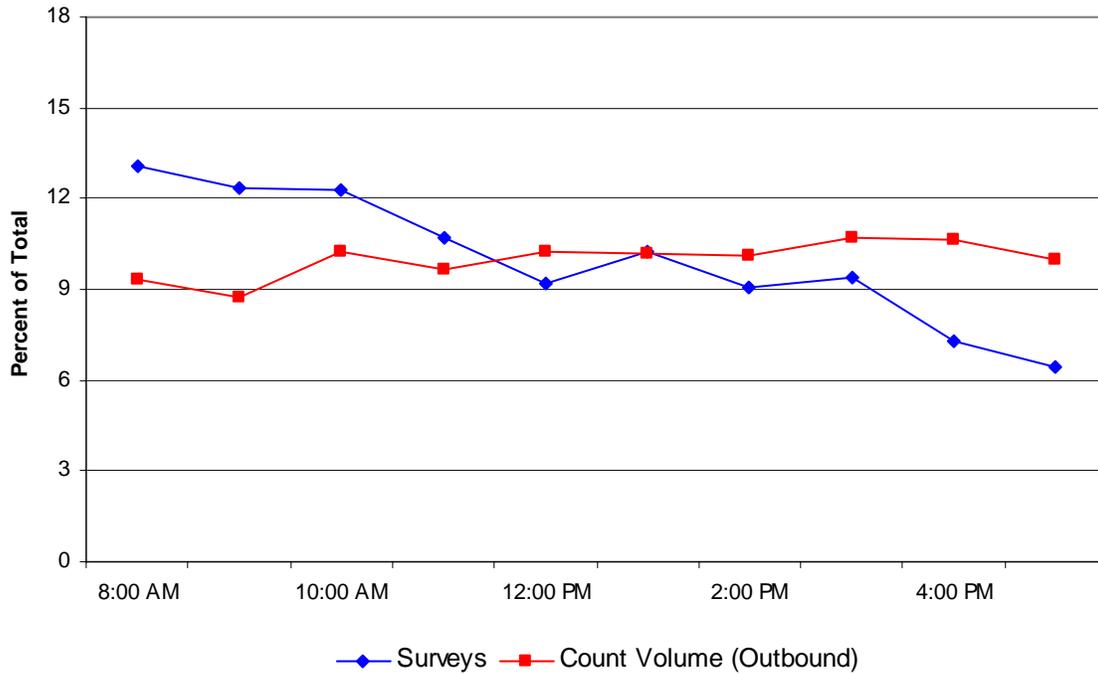

Figure 12. Distribution of Commercial Vehicles and Surveys by Time-of-Day.

A final comparison of the survey and count totals for the survey locations was conducted. In this analysis, the percent of counted vehicles that were surveyed per hour was determined for both non-commercial and commercial vehicles. This data was compared against the total count volumes for the survey period, and the results are provided in Figure 13. Generally, a larger percentage of non-commercial vehicles than commercial vehicles were surveyed throughout the course of the day. These trend lines compared against the total volumes illustrate that as the count volumes increase, the percentage of surveyed vehicles decrease. This is logical since the number of surveyors was constant during the survey period.
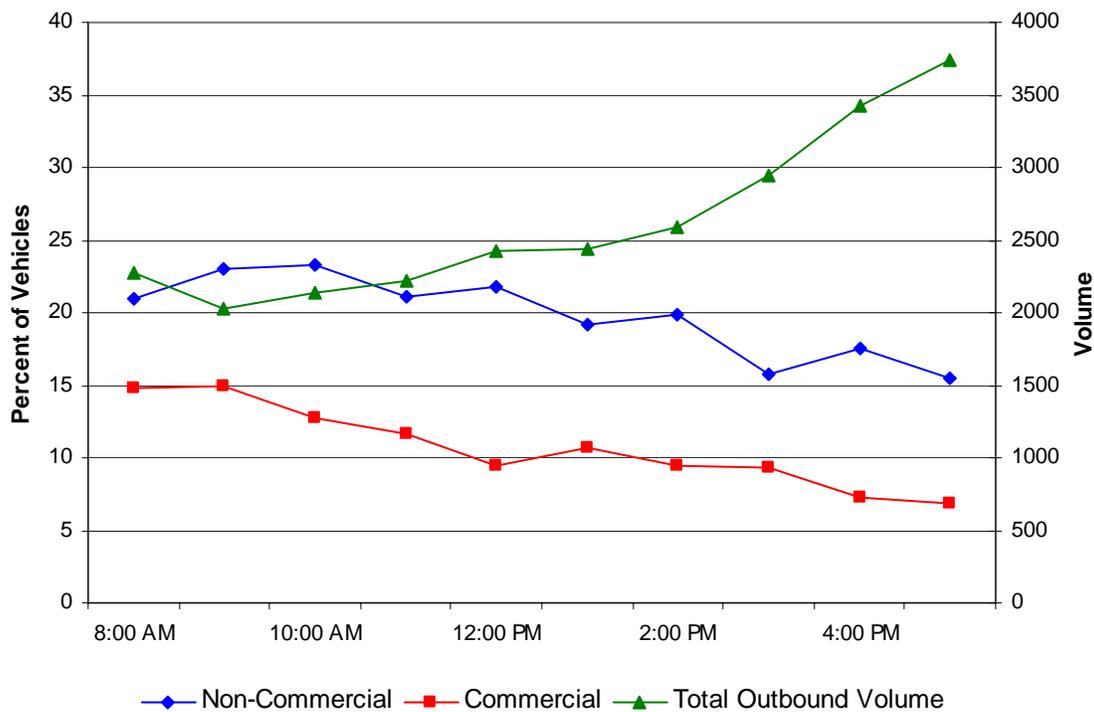
Figure 13. Distribution of Counted Vehicles That Were Surveyed.

Vehicle Characteristics

As part of the survey, interviewers collected data on the year, make, odometer readings, and model of each vehicle surveyed. This provides an indication of the distribution of vehicles traveling through the external stations by type, age, and condition (as implied by the number of miles on the vehicle). Figure 14 represents the percent distribution of non-commercial and commercial vehicles by age as reported in the surveys. The average age for surveyed vehicles was approximately 6.5 years for non-commercial vehicles and 6.1 years for commercial vehicles. The median vehicle model year was 2002 for both non-commercial and commercial vehicles.

Figure 15 presents the average odometer reading for non-commercial and commercial vehicles by age. This data shows the difference in mileage accumulation rates of commercial vehicles as compared to non-commercial vehicles. Unlike non-commercial vehicles, the data for commercial vehicles do not show smooth trends, especially for vehicles that are more than 10 years old. This is due in part to the total number of observations in the non-commercial and commercial surveys (3,624 and 873, respectively).
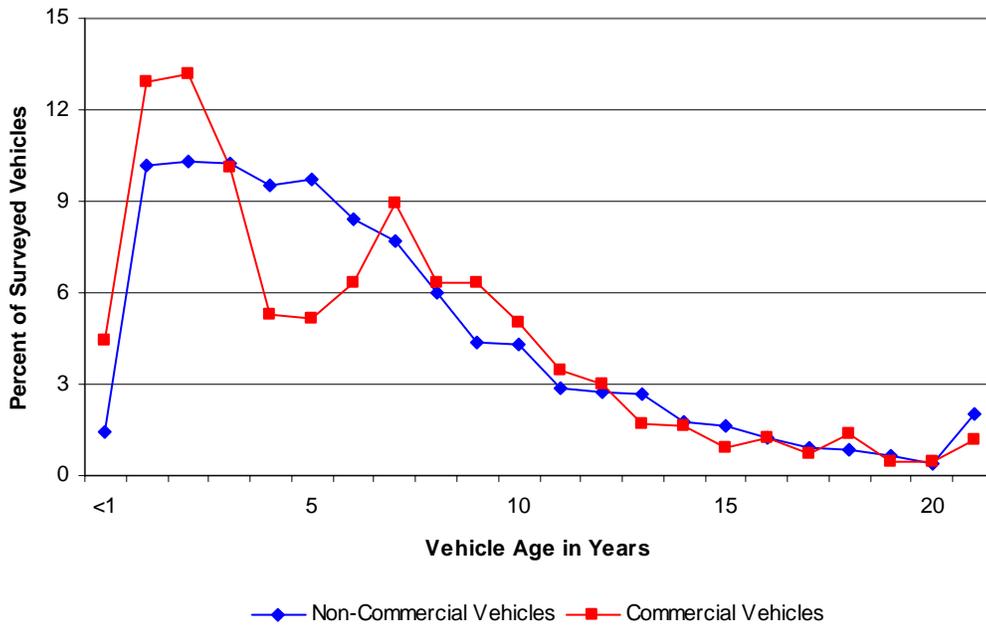
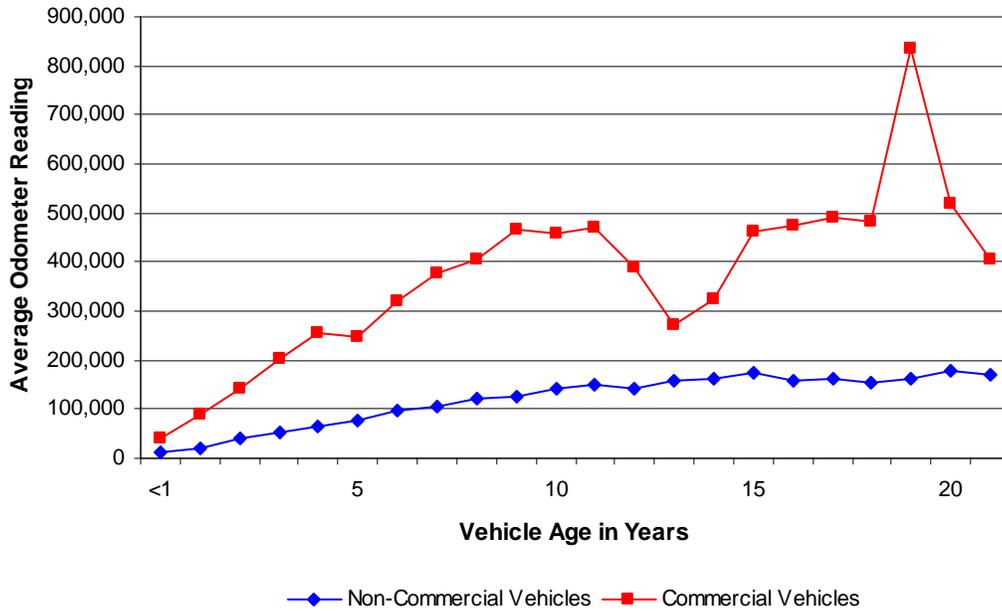**Figure 14. Distribution of Surveyed Vehicles by Age of Vehicle.**

Figure 15. Average Odometer Readings for Vehicles by Age of Vehicle.

The average odometer reading for non-commercial vehicles was 88,740 and the average commercial vehicle odometer reading was 278,757. This information indicates that commercial vehicles accumulated mileage at nearly three times the rate of non-commercial vehicles. For more detailed information, Table 8 presents the numerical values for the non-commercial data plotted in Figures 13 and 14. Table 9 provides similar information for commercial vehicles.

Table 8. Distribution of Non-Commercial Vehicles by Age and Average Odometer Reading.

Age	Number of Vehicles	Percent of Total	Cumulative Percent of Total	Average Reported Odometer Value
<1	52	1.43	1.43	11,458
1	369	10.18	11.62	20,534
2	374	10.32	21.94	39,541
3	371	10.24	32.17	52,073
4	346	9.55	41.72	65,515
5	352	9.71	51.43	78,333
6	306	8.44	59.88	95,305
7	280	7.73	67.60	105,910
8	217	5.99	73.59	122,198
9	158	4.36	77.95	125,834
10	157	4.33	82.28	143,728
11	103	2.84	85.13	148,867
12	100	2.76	87.89	141,500
13	96	2.65	90.54	158,986
14	64	1.77	92.30	160,714
15	60	1.66	93.96	172,594
16	45	1.24	95.20	158,026
17	34	0.94	96.14	161,896
18	31	0.86	96.99	154,840
19	23	0.63	97.63	162,380
20	13	0.36	97.99	176,587
>20	73	2.01	100.00	170,632
Total	3,624	100.00		

Table 9. Distribution of Commercial Vehicles by Age and Average Odometer Reading.

Age	Number of Vehicles	Percent of Total	Cumulative Percent of Total	Average Reported Odometer Value
<1	39	4.47	4.47	40,953
1	113	12.94	17.41	87,739
2	115	13.17	30.58	142,616
3	88	10.08	40.66	200,862
4	46	5.27	45.93	253,976
5	45	5.15	51.09	246,299
6	55	6.30	57.39	319,149
7	78	8.93	66.32	376,675
8	55	6.30	72.62	404,296
9	55	6.30	78.92	467,085
10	44	5.04	83.96	458,333
11	30	3.44	87.40	470,733
12	26	2.98	90.38	388,211
13	15	1.72	92.10	271,507
14	14	1.60	93.70	324,389
15	8	0.92	94.62	464,167
16	11	1.26	95.88	473,436
17	6	0.69	96.56	489,730
18	12	1.37	97.94	483,468
19	4	0.46	98.40	834,708
20	4	0.46	98.85	520,738
>20	10	1.15	100.00	406,093
Total	873	100.00		

Vehicle Occupancy

As vehicles were surveyed, one of the data items recorded was the class or type of vehicle and the number of persons in the vehicle. This information provides a means for estimating the number of persons traveling into and out of the KTUTS study area. Table 10 presents the number of observed non-commercial and commercial vehicles by class and average occupancy. Nearly all of the non-commercial vehicles (99 percent) were classified as passenger vehicles. Half of the commercial vehicles (50 percent) were semi/tractor-trailer combinations. The overall average occupancy for non-commercial vehicles was 1.25 and 1.10 for commercial vehicles.

Table 10. Distribution of Vehicles by Class and Average Occupancy.

Non-Commercial Vehicles	Observed Vehicles	Average Occupancy	Commercial Vehicles	Observed Vehicles	Average Occupancy
Passenger Vehicle	3,593	1.25	Single Unit 2-axle (6 wheels)	152	1.14
Bus	0	—	Single Unit 3-axle (10 wheels)	30	1.10
Taxi/Paid Limo	0	—	Single Unit 4-axle (14 wheels)	25	1.08
School Bus	0	—	Semi (tractor-trailer)	433	1.07
Commercial Vehicle (over 1 ton)	4	1.00	Other	233	1.11
Motorcycle	23	1.00			
Recreational Vehicle	3	1.00			
Other	1	1.00			
Total	3,624	1.25	Total	873	1.10

COMMERCIAL VEHICLE CARGO CHARACTERISTICS

Commercial vehicles represent a major component of travel into, out of, and through most study areas. Specific questions were included in the commercial vehicle survey to obtain information about the type of commercial vehicle, the cargo being transported, the type of facility where it was picked up and dropped off, and how the cargo was transported to the vehicle. Table 11 presents data on the number and type of commercial vehicles surveyed by external station, the number and percent of vehicles not transporting any cargo, and whether or not their cargo was from Mexico.

Nearly one-third of the cargo transporting type vehicles (31 percent) reported not carrying any cargo. Of those vehicles transporting cargo, 90 percent of those cargos were not from or headed to Mexico. Only forty vehicles indicated that their cargo was from or destined to Mexico. Of those forty vehicles, thirty-eight (95 percent) traversed the area on IH 35. Furthermore, of all the commercial vehicles surveyed at IH 35 survey locations, nearly 12 percent (38 of 314) had a cargo that was from or destined to Mexico.

For those vehicles carrying a cargo, approximately 7 percent reported picking their cargo up at an interposal transfer or custom brokerage facility and 6 percent indicated that they would be dropping their cargo off at the same type of facility. Interposal transfer or custom brokerage

facilities are sites where cargo may be transferred between several different modes (e.g. rail to truck, ship to truck, etc.).

Table 11. Commercial Vehicles with Cargo from Mexico.

Station Number	Facility	Vehicles Surveyed			Empty Vehicles*	Percent Empty*	Vehicles with Mexico Cargo*	Vehicles without Mexico Cargo*
		Cargo Transport	Service	Total				
511	SH 36	33	17	50	8	24.24	0	25
513	SH 317	28	36	64	9	32.14	1	18
515	IH 35	119	0	119	33	27.73	18	68
516	FM 935	5	12	17	2	40.00	0	3
519	FM 2086	1	5	6	0	0.00	0	1
520	SH 53	34	21	55	11	32.35	0	23
522	US 190	27	26	53	10	37.04	0	17
523	SH 95	30	29	59	12	40.00	0	18
526	FM 1123	8	10	18	2	25.00	0	6
529	FM 2286	10	24	34	1	10.00	0	9
530	IH 35	195	0	195	65	33.33	20	110
532	SH 195	27	29	56	4	14.81	1	22
535	FM 2657	9	11	20	1	11.11	0	8
536	US 190	34	19	53	12	35.29	0	22
537	FM 2313	4	14	18	1	25.00	0	3
539	FM 116	25	31	56	9	36.00	0	16
Total		589	284	873	180	30.56	40	369

 * Pertains to only Cargo Transport Vehicles.

A detailed summary of cargo types reported for commercial vehicles is provided in Table 12. Empty vehicles comprised 31 percent of those surveyed. For vehicles with identified cargo types, 27 percent reported their cargo as manufactured goods/equipment, 11 percent were reported as food, health, and beauty products, and 6 percent reported the cargo as farm products.

Table 12. Distribution of Commercial Vehicles by Type of Cargo.

		Cargo Description	Number of Vehicles	Percent of Vehicles
1	—	Farm Products	34	5.77
2	—	Forest Products	0	0.00
3	—	Marine Products	1	0.17
4	—	Metals and Minerals	32	5.43
5	—	Food, Health, and Beauty Products	62	10.53
6	—	Tobacco Products	0	0.00
7	—	Textiles	2	0.34
8	—	Wood Products	27	4.58
9	—	Printer Matter	0	0.00
10	—	Chemical Products	4	0.68
11	—	Refined Petroleum or Coal Products	10	1.70
12	—	Rubber, Plastic, and Styrofoam Products	7	1.19
13	—	Clay, Concrete, Glass, or Stone	33	5.60
14	—	Manufactured Goods/Equipment	160	27.16
15	—	Wastes	1	0.17
16	—	Miscellaneous Shipments	14	2.38
17	—	Hazardous Materials	0	0.00
18	—	Transportation	18	3.06
19	—	Unclassified Cargo	0	0.00
20	—	Driver Refused to Answer	2	0.34
21	—	Unknown to Driver	2	0.34
22	—	Empty	180	30.56
		Total	589	100.00

Figures 16 and 17 present the distribution of surveyed commercial vehicles by the type of cargo transfer at the origin (point of pick-up) and at the destination (point of delivery). Warehouse-to-truck and truck-to-truck accounted for the majority of cargo transfers at both the origin and destination. At the origin, 75 percent of the transfers were warehouse-to-truck and 18 percent were truck-to-truck. At the destination, warehouse-to-truck (72 percent) and truck-to-truck (20 percent) transfers accounted for the majority of the transfers.
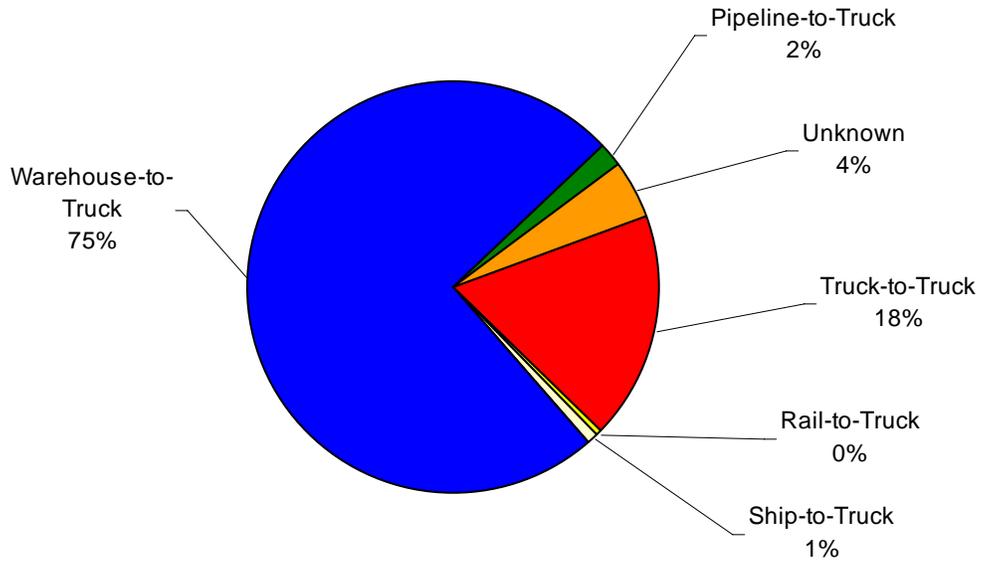
Figure 16. Cargo Transfer at Point of Pick-Up.
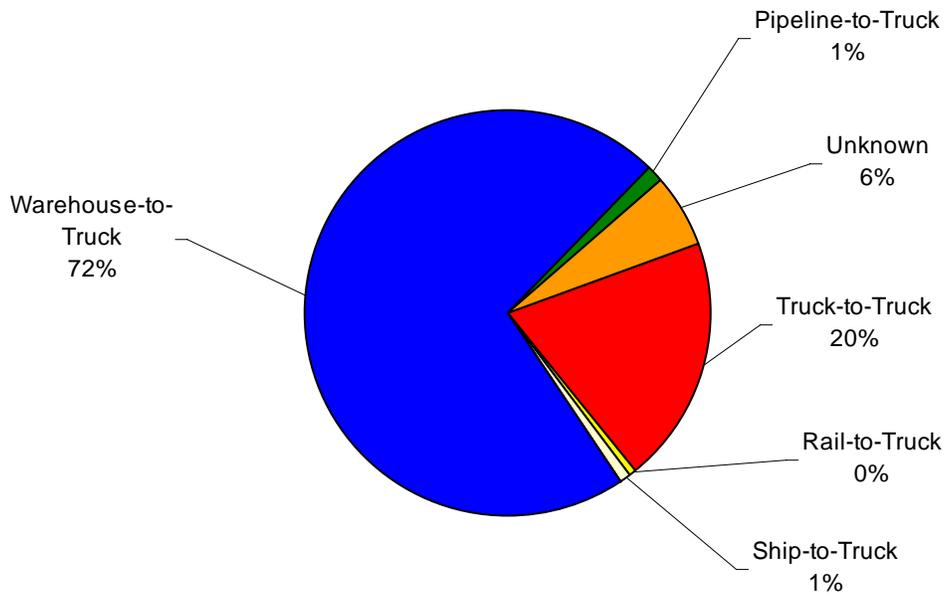
Figure 17. Cargo Transfer at Point of Drop-Off.

HIGH VOLUME LICENSE PLATE MATCH SURVEYS

Two locations in the KTUTS study area had traffic volumes that were too high to safely stop traffic and interview motorists. For these locations, a license plate match method was used as a means to estimate the number of external-local and external-through trips. The license plate matching survey was conducted using high-speed digital cameras which recorded license plates of commercial and non-commercial vehicles entering and exiting the study area at both high-volume locations. As previously mentioned, for the purpose of this study, any roadway that had more than 20,000 vehicles per day was considered high-volume. The license plate information for both locations was gathered on the same day. After the plate information was recorded, it was processed through a computer program that determined the number of license plate matches between each license plate survey location. The KTUTS high-volume locations, the number of license plates recorded, and the 24-hour traffic counts for these locations are provided in Table 13.

Table 13. KTUTS High-Volume Locations.

Non-Commercial Vehicles						
Station Number	Facility	Location	License Plates Recorded		24-Hour Vehicle Count	
			Inbound	Outbound	Inbound	Outbound
515	IH 35	at Falls Co. line	9,977	9,728	19,854	20,819
530	IH 35	at Williamson Co. line	7,970	8,006	17,920	18,093
Commercial Vehicles						
Station Number	Facility	Location	License Plates Recorded		24-Hour Vehicle Count	
			Inbound	Outbound	Inbound	Outbound
515	IH 35	at Falls Co. line	2,366	2,631	7,068	5,461
530	IH 35	at Williamson Co. line	1,968	1,893	5,444	6,076

Only matches meeting specified criteria that occurred within acceptable time limits between each survey location were considered valid matches. One criterion for license plate data was that at least five of the six characters (in consecutive and positional order) match in order for the plate to be considered valid. Additionally, travel time runs were made for the peak and off-peak periods in order to establish reasonable time limits for an external-through vehicle to travel between license plate survey stations. The travel times were then increased by 20 percent for

peak periods and 10 percent for off-peak periods to account for variation in travel speeds among motorists. Table 14 provides the travel times utilized for the analysis of license plate data.

Table 14. High-Volume Travel Times.

Movement	Travel Time in Minutes	
	Peak	Off-Peak
Northbound IH 35 (530) to IH 35 (515)	42	51
Southbound IH 35 (515) to IH 35 (530)	46	34

* Station numbers are shown in ( )

Using the travel time estimates provided in Table 14, the total number of license plate matches between the high-volume locations was ascertained. The results of this analysis for non-commercial and commercial vehicles are provided in Table 15. The table shows the location, the number of license plates recorded, the number of matches for each pair of sites, the inbound volume at the recording location, and the expanded number of through trips. The number of expanded through trips was determined by obtaining the percentage of recorded vehicles for a location that were matched at another location. This percentage was then multiplied by the total inbound volume for the recording location. For example, of the 7,970 inbound non-commercial vehicles recorded at IH 35 at the Williamson County line, 3,363 (42.2 percent) were matched exiting the study area on IH 35 at the Falls County line. Therefore, the total inbound volume at the recording location (17,920 vehicles) multiplied by the percent matched (42.2 percent) equates to an estimated 7,562 through trips traveling on IH 35 from the Williamson County line to the Falls County line.

Table 15. Results of License Plate Matching for High-Volume Locations.

Non-Commercial Vehicles					
From Location	To Location	License Plates Recorded		Expanded Total	
		Recorded	Matches	Inbound Volume	Through Trips
IH 35 at Williamson Co. line	IH 35 at Falls Co. line	7,970	3,363	17,920	7,562
IH 35 at Falls Co. line	IH 35 at Williamson Co. line	9,977	2,730	19,854	5,440
Commercial Vehicles					
From Location	To Location	License Plates Recorded		Expanded Match	
		Recorded	Matches	Inbound Volume	Through Trips
IH 35 at Williamson Co. line	IH 35 at Falls Co. line	1,968	1,031	5,444	2,853
IH 35 at Falls Co. line	IH 35 at Williamson Co. line	2,366	629	7,068	1,880

SURVEY DATA EXPANSION

The vehicle survey data were expanded based on the 24-hour directional vehicle classification counts conducted at each survey site on the day the site was surveyed. The assumption is made that the traffic in the non-surveyed direction is a mirror image of the traffic in the surveyed direction. For example, if 10 percent of the surveyed outbound traffic was through trips, it is assumed that 10 percent of the inbound traffic will be through trips. It is also assumed that the surveyed vehicles are a representative sample of the vehicles at each site for a 24-hour period. Table 16 presents the expanded estimates of external-local and external-through trips for non-commercial and commercial vehicles by site as well as estimates of local trips made by residents and visitors (non-residents) in non-commercial vehicles. It should be noted that estimates are included in Table 16 for the non-surveyed sites. For non-surveyed sites, it was assumed that all trips made were local trips. Additionally, the number of residents and visitors for the non-surveyed sites was determined using the percentage of residents and visitors from a proximal surveyed site. For example, the percentage of residents as determined from the survey for FM 935 (station number 516) was applied to the total number of trips for FM 3368 (station number 518), which was a non-surveyed location.

Table 16. Expanded Survey Results by Station.

Station Number	Facility	Non-Commercial Vehicles			Residents	Visitors	Commercial Vehicles		
		Local	Through	Total			Local	Through	Total
511	SH 36	3,893	384	4,277	2,859	1,034	668	174	842
512	FM 2409	336	0	336	145	191	30	0	30
513	SH 317	7,369	271	7,640	3,176	4,193	504	18	522
514	Vaughn Rd.	52	0	52	22	30	5	0	5
515	IH 35	27,143	13,530	40,673	18,457	8,686	7,616	4,913	12,529
516	FM 935	432	26	458	141	291	69	13	82
518	FM 3368	472	0	472	154	318	60	0	60
519	FM 2086	465	3	468	228	236	59	0	59
520	SH 53	4,361	233	4,594	1,922	2,439	590	70	660
521	Stringtown Rd.	207	0	207	91	116	19	0	19
522	US 190	7,471	507	7,978	4,190	3,282	1,253	217	1,470
523	SH 95	4,231	308	4,539	2,998	1,233	547	141	688
524	Wilson Valley	4,323	25	4,348	3,065	1,258	586	0	586
525	Campbell Hill	2,338	0	2,338	2,109	229	412	0	412
526	FM 1123	444	5	449	400	44	112	0	112
527	Amity Rd.	749	0	749	676	73	94	0	94
528	Royal Rd.	1,941	16	1,957	1,574	367	123	0	123
529	FM 2286	2,372	356	2,728	1,925	448	336	64	400
530	IH 35	22,330	13,683	36,013	15,184	7,146	6,659	4,861	11,520
531	Cedar Valley	1,074	12	1,086	539	535	67	0	67
532	SH 195	7,571	103	7,674	3,797	3,773	402	42	444
533	Wolf Ridge Rd.	125	6	131	63	62	25	0	25
534	Maxdale Rd.	121	0	121	83	38	9	0	9
535	FM 2657	1,486	167	1,653	1,021	465	170	14	184
536	US 190	8,142	444	8,586	6,678	1,464	641	86	727
537	FM 2313	845	15	860	814	31	163	6	169
538	FM 580	341	32	373	323	18	96	0	96
539	FM 116	4,633	200	4,833	4,381	252	379	25	404
Total		115,265	30,328	145,593	77,014	38,251	21,695	10,643	32,338

The expanded survey data were used to develop zone-to-zone estimates of non-commercial and commercial vehicle trips based on the geocoded origins and destinations for the surveyed trips.

Trips for the non-surveyed sites were distributed to the destination zones observed from the surveyed sites on a proportional basis. It is assumed that the surveyed sites are representative of the most likely destination zones for the non-surveyed sites. Since the volume of vehicle trips at the non-surveyed sites is typically low, the amount of error that may be generated by that assumption is believed to be small.

Figure 18 shows the estimates of external-local trip movements by direction and location group. The South group had the largest estimated number of external-local trip movements, with nearly 57,000 total daily trips. The North group had the second highest estimated number of external-local trip movements with over 52,000 daily trips.
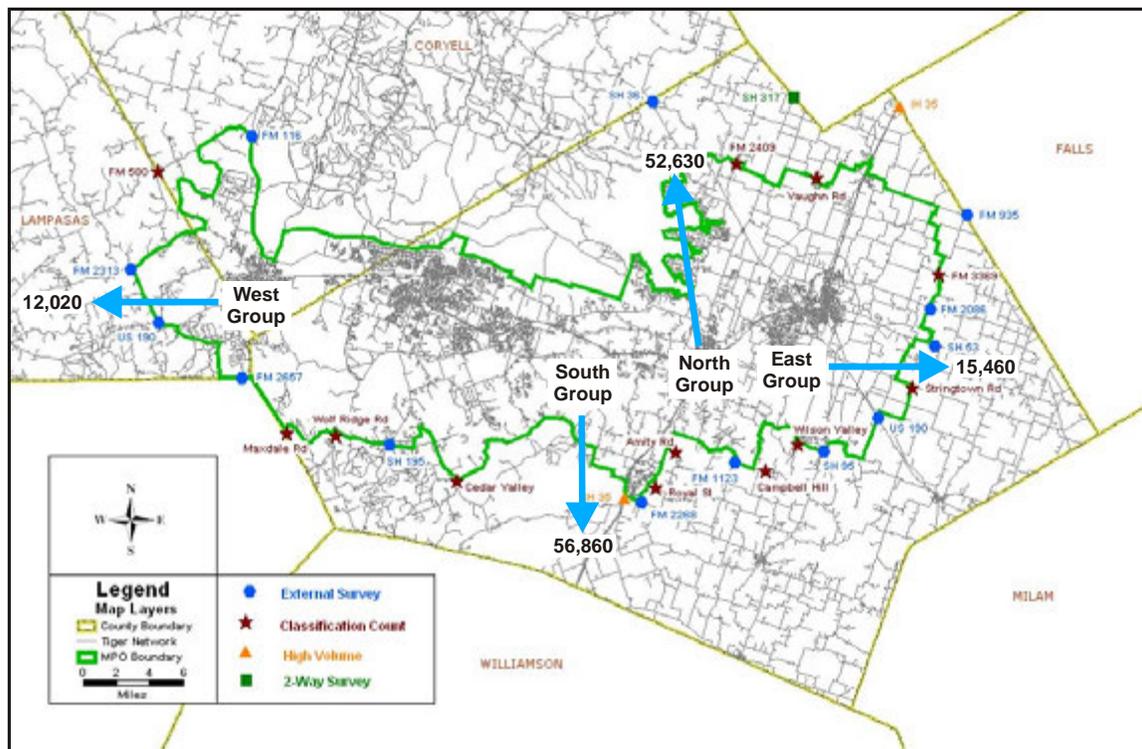
Figure 18. Estimates of External-Local Trip Movements by Location Group.

Figure 19 shows the estimates of external-through trip movements by direction and location group. The most common external-through movements were between the North and South groups. Nearly 37,000 external-through trips are estimated to be made on a daily basis between the North and South sides of the study area. This may be a little distorted due to the influence of

through trips on IH 35. Northeast-Southeast external-through trips were the second most common movement.
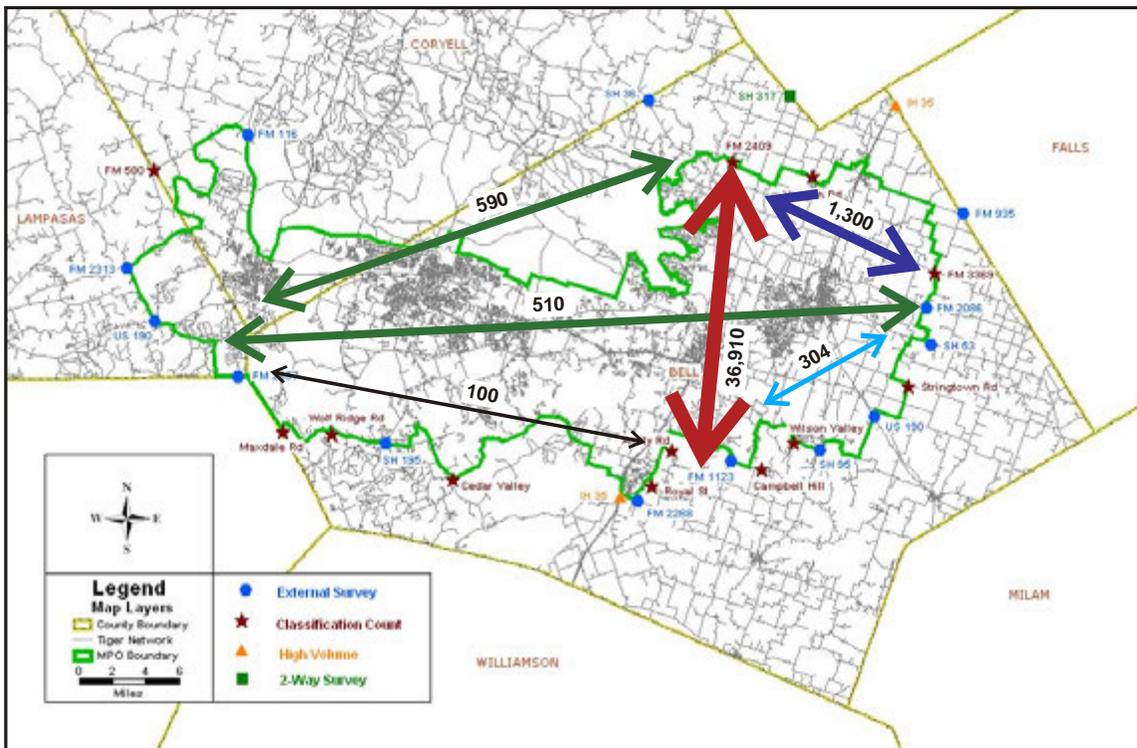
Figure 19. Estimates of External-Through Trip Movements by Location Group.

The final analysis performed involved ascertaining the vehicle miles of travel (VMT) for all external related trips. Using the expanded trip data and lengths provided in the transportation network travel distance matrix, the total amount of VMT attributable to commercial and non-commercial trips was determined. The results are provided in Table 17. The overall average trip length was 15.2 miles per trip.

Table 17. Summary of VMT.

Vehicle Type	Trip Type	Number of Trips	VMT	Average Trip Length
Non-Commercial	External Thru	15,164	392,914	25.91
	External Local	115,267	1,523,068	13.21
Commercial	External Thru	5,322	141,455	26.58
	External Local	21,694	333,546	15.38
Total		**157,447**	**2,390,983**	**15.19**

SURVEY SUMMARY

Nearly 178,000 vehicles enter and leave the KTUTS study area daily. Nearly 18 percent are commercial vehicles. Approximately 23 percent of the nearly 178,000 vehicles make through trips. Approximately 57 percent of the non-commercial and commercial vehicles enter or leave the KTUTS study area via the two high-volume locations (IH 35 at Williamson County and IH 35 at Falls County). Based on the average vehicle occupancy observed in the survey, an estimated 182,000 persons are entering and leaving the study area daily by non-commercial vehicle and nearly 36,000 persons are entering and leaving by commercial vehicle. The estimated number of local trips made daily by non-residents (persons that do not live in the study area) in non-commercial vehicles is approximately 38,000. Non-residents account for approximately 11,800 internal trips within the study area.

Approximately 28 percent of non-commercial trip origins were leaving home and 43 percent of non-commercial trip destinations were returning to home. HBNW trips accounted for nearly 44 percent of the non-commercial trips. The percentage of trips that were NHB and HBW were approximately 29 percent and 27 percent, respectively.

Commercial vehicle drivers reported varied trip purposes at the origin and destination ends of their trip. Approximately 40 percent of the trip origin purposes were reported as support functions. Picking up cargo accounted for 22 percent of trip origins. Delivering cargo was the stated purpose for 39 percent of the destination trips, while picking up cargo accounted for 14

percent of the destinations. Leaving/returning to base operations accounted for 17 percent of the commercial vehicle trip origins and 11 percent of the trip destinations.

For inbound vehicles, the morning peak occurs between 7:15 a.m. and 8:15 a.m. for non-commercial vehicles. There is an afternoon peak period for non-commercial vehicles between 5:00 p.m. and 5:45 p.m. While inbound commercial vehicle levels remain fairly constant from 8:00 a.m. to 5:00 p.m., the actual peak occurs at 2:30 in the afternoon. For outbound traffic, the morning peak period for non-commercial vehicles is not as significant as the peak for the inbound direction, and it occurs between 7:15 a.m. and 8:30 a.m. The afternoon peak for non-commercial vehicles traveling outbound is larger and longer than the inbound afternoon peak. For outbound commercial vehicles, there appears to be no significant peak. The traffic levels remain fairly constant between 9 a.m. and 5 p.m.

The median vehicle year for non-commercial and commercial vehicles was 2002. The average vehicle age for commercial vehicles was 6.1 years and for non-commercial vehicles it was 6.5 years. The average odometer reading for commercial vehicles was approximately three times higher than that for non-commercial vehicles. Average vehicle occupancy for non-commercial vehicles was 1.25, or nearly 15 percent greater than the 1.10 reported for commercial vehicles.

Commercial vehicles represent approximately 19 percent of the vehicles traveling into and out of the KTUTS study area on a daily basis. Nearly one-third (31 percent) of the commercial vehicles surveyed were carrying no cargo. Of those surveyed commercial vehicles that were carrying cargo, 90 percent were carrying cargo that is not from or destined to Mexico.

APPENDIX

Station # _____   Survey Date _____

Station Name/Location _____   Interviewer _____

For each vehicle you collect	Vehicle 1	Vehicle 2	Vehicle 3
Interview Begin Time Interview End Time	_____a.m. _____p.m. _____a.m. _____p.m.	_____a.m. _____p.m. _____a.m. _____p.m.	_____a.m. _____p.m. _____a.m. _____p.m.
Number of people in vehicle			
Vehicle Type			

Vehicle Type options: 1) Passenger (car/truck/van)   2) Bus   3) Taxi/Paid Limo   4) School Bus   5) Commercial Vehicle (over 1 ton)
6) Motorcycle   7) Recreational Vehicle   8) Other (specify in block)   9) Unknown   99) Refused

QUESTIONS:	Vehicle 1	Vehicle 2	Vehicle 3
1. What year, make, and model is this vehicle? Unleaded gas, diesel, hybrid, propane or other fuel?	_____ Year _____ Make _____ Model Unleaded ☐ Diesel ☐ Hybrid ☐ Propane ☐ Other ☐ _____	_____ Year _____ Make _____ Model Unleaded ☐ Diesel ☐ Hybrid ☐ Propane ☐ Other ☐ _____	_____ Year _____ Make _____ Model Unleaded ☐ Diesel ☐ Hybrid ☐ Propane ☐ Other ☐ _____
2. What is the mileage on your odometer?			
3. What county do you live in? (If other, go to 4)	☐ McLennan ☐ Bell ☐ Coryell ☐ Lampasas ☐ OTHER	☐ McLennan ☐ Bell ☐ Coryell ☐ Lampasas ☐ OTHER	☐ McLennan ☐ Bell ☐ Coryell ☐ Lampasas ☐ OTHER
3a. What city do you live in?	(go to 5)	(go to 5)	(go to 5)
4. What city and state to you live in?	_____ (city/state in US or Mexico) ☐ Refused	_____ (city/state in US or Mexico) ☐ Refused	_____ (city/state in US or Mexico) ☐ Refused
4a. Did you stay overnight as part of your travel?	☐ Yes ☐ Refused ☐ No (go to 4d)	☐ Yes ☐ Refused ☐ No (go to 4d)	☐ Yes ☐ Refused ☐ No (go to 4d)
4b. Where did you stay?	_____ (city/state in US or Mexico) ☐ Refused	_____ (city/state in US or Mexico) ☐ Refused	_____ (city/state in US or Mexico) ☐ Refused
4c. How many nights have you stayed?	☐ Yes ☐ Refused ☐ No (go to 5)	☐ Yes ☐ Refused ☐ No (go to 5)	☐ Yes ☐ Refused ☐ No (go to 5)

4d. Did you enter Texas today?			
4e. Where outside of Texas did you travel from?	_____ _____ (city/state in US or Mexico) ☐ Refused	_____ _____ (city/state in US or Mexico) ☐ Refused	_____ _____ (city/state in US or Mexico) ☐ Refused
4f. What road or highway did you use to enter Texas?			
5. Where was the *last* place you got into your vehicle (place/address or nearest intersection/city)			
5a. What time did you leave that place?	_____a.m. _____p.m.	_____a.m. _____p.m.	_____a.m. _____p.m.
5b. What type of place was that? (choose from type of place options)			
5c. What was your purpose for being at your last location? (Choose from trip purpose options)			
5d. Was that location in the study area? (see Question 3 for study area counties)	☐ Yes ☐ No ☐ Refused (Yes go to 6)	☐ Yes ☐ No ☐ Refused (Yes go to 6)	☐ Yes ☐ No ☐ Refused (Yes go to 6)
5e. What road did you use to enter the study area? (see Question 3 for study area counties)			

Type of Place Options:
1) Office building **2)** Retail Shopping/Gas **3)** Industrial/Manufacturing/Warehouse
4) Medical **5)** Educational (12th grade or lower) **6)** Educational (college, trade, etc.)
7) Government **8)** Residential **9)** Airport **10)** Eating Establishment
11) Hotel / Motel **12)** Other (specify) **13)** Unknown **99)** Refused

Trip Purpose Options:
1) Home/Return Home **2)** Go/Return to work **3)** Work-related **4)** School
5) Vacation **6)** Visit Family/Friends **7)** Eat out **8)** Shop
9) Buy gas **10)** Personal business **11)** Pick-up/Drop off Passenger
12) Change Travel Mode **13)** Delivery **14)** Recreation **15)** Overnight stay/sleep
16) Other (specify) **17)** Unknown **99)** Refused

6. Where is your next destination? (place/address or nearest intersection/city)			
6a. What is your purpose for traveling to this destination? (Choose from trip purpose options)			
7. Are you going to a location out of Texas?	☐ Yes ☐ Refused ☐ No (go to 7d)	☐ Yes ☐ Refused ☐ No (go to 7d)	☐ Yes ☐ Refused ☐ No (go to 7d)
If Yes: 7a. What city and state are you going to?			
7b. What road/bridge will you use to leave Texas?			
7c. How many more days will you be in Texas?			
If No: 7d. What city/county in Texas are you going to?			

To measure the amount of travel you made today, we need to know the number of places you have gone today. Would you please tell us:

8. Where did your first trip today begin? (city/county/landmark)			
9. Where did you go from there? (city/county/landmark)			
10. Where did you go next? (city/county/landmark)			
11. Where did you go next? (city/county/landmark)			
12. Where did you go next? (city/county/landmark)			
13. How many more places did you stop today?			

WACO AND KILLEEN/TEMPLE EXTERNAL STATION
COMMERCIAL VEHICLE SURVEY   FORM B
(Outbound Direction)

Station # _____   Survey Date _____

Station Name/Location _____   Interviewer _____

For each vehicle you collect:	Vehicle 1	Vehicle 2	Vehicle 3
1. Interview Begin Time Interview End Time	_____ a.m. _____ p.m. _____ a.m. _____ p.m.	_____ a.m. _____ p.m _____ a.m. _____ p.m.	_____ a.m. _____ p.m. _____ a.m. _____ p.m.
2. Number of people in vehicle			
3. Vehicle Classification			
4. Vehicle Type	☐ Cargo Transport ☐ Service (go to 13)	☐ Cargo Transport ☐ Service (go to 13)	☐ Cargo Transport ☐ Service (go to 13)
5. Record the hazardous material placard (if applicable)			

6. What is the cargo ? (choose from vehicle cargo codes)
   6a. If empty, what was the last cargo you delivered?
   6b. What is the weight of your cargo?
 	
   6c. Is cargo being hauled using an multi-modal container/trailer or TEU?
If Yes:
   6d. Is the container a Reefer or Dry Box?
	_____
	☐ Empty (no cargo)
	
	(go to 13)
	_____ (lbs)
	☐ Yes
	☐ No (go to 7)
	☐ Reefer
	☐ Dry Box
		_____
		☐ Empty (no cargo)
		
		(go to 13)
		_____ (lbs)
		☐ Yes
		☐ No (go to 7)
		☐ Reefer
		☐ Dry Box
			_____
			☐ Empty (no cargo)
			
			(go to 13)
			_____ (lbs)
			☐ Yes
			☐ No (go to 7)
			☐ Reefer
			☐ Dry Box

7. Did your cargo come from or is it going to Mexico?	☐ Yes ☐ No ☐ Refused / Unknown	☐ Yes ☐ No ☐ Refused / Unknown	☐ Yes ☐ No ☐ Refused / Unknown
8. Where did you pick up your load? (place/address or nearest intersection and city)			
9. Was that location an inter-modal transfer or custom brokerage site?	☐ Yes ☐ No ☐ Refused / Unknown	☐ Yes ☐ No ☐ Refused / Unknown	☐ Yes ☐ No ☐ Refused / Unknown
10. How was your load transferred at that site (choose from transfer codes)?			
11. Where will you drop your cargo off? (place/address or nearest intersection and city)			
12. Is that location an inter-modal transfer or custom brokerage site?	☐ Yes ☐ No ☐ Refused / Unknown	☐ Yes ☐ No ☐ Refused / Unknown	☐ Yes ☐ No ☐ Refused / Unknown
13. How will the cargo be transferred at that site (choose from transfer codes)?			

Vehicle Classification Options:
1) Passenger Car	2) Pickup Truck	3) Van (full or mini)
4.) Sport Utility Vehicle SUV	5.) Passenger Vehicle with trailer	6.) Single Unit 2-axle (6 wheels)
7.) Single Unit 2-axle (6 wheels) with trailer	8.) Single Unit 3-axle (10 wheels)	9.) Single Unit 4-axle (14 wheels)
10) Semi (all tractor-trailer combinations)	11) Other (specify)	12) Unknown
99) Refused		

Cargo Transfer Options:
1) Truck-to/from-Truck	2) Rail-to/from-Truck	3) Ship-to/from-Truck	4) Airplane-to/from-Truck
5) Warehouse-to/from-Truck	6) Pipeline-to/from-Truck	7. Unknown	99) Refused

NOTE: All cargo transfer options are both ways (i.e., Truck-to-Warehouse should be coded same as Warehouse-to-Truck).

14. What is the year and gross weight rating of this vehicle? Gas (leaded, unleaded), diesel, propane or other fuel?	_____ Year _____ Gross Weight Unleaded ☐ Diesel ☐ Hybrid ☐ Propane ☐ Other ☐ _____	_____ Year _____ Gross Weight Unleaded ☐ Diesel ☐ Hybrid ☐ Propane ☐ Other ☐ _____	_____ Year _____ Gross Weight Unleaded ☐ Diesel ☐ Hybrid ☐ Propane ☐ Other ☐ _____
15. What is the mileage on your odometer?			
16. Where are you coming from? (city / state in US or Mexico)			
16a. Is that location in Texas?	☐ Yes (go to 16d) ☐ No	☐ Yes (go to 16d) ☐ No	☐ Yes (go to 16d) ☐ No
16b. (*If not in Texas*) Did you enter Texas today?	☐ Yes ☐ No (go to 16d)	☐ Yes ☐ No (go to 16d)	☐ Yes ☐ No (go to 16d)
16c. What road or highway did you use to enter Texas?			
16d. Did you stay overnight as part of your travel?	☐ Yes ☐ No (go to 17)	☐ Yes ☐ No (go to 17)	☐ Yes ☐ No (go to 17)
16e. If yes, where did you stay? (city/county/state)			
16f. How many nights have you stayed?			
17. Where was the last place you got into your vehicle? (place/address or nearest intersection/city)			
17a. What time did you leave that place?	_____ a.m. _____ p.m.	_____ a.m. _____ p.m.	_____ a.m. _____ p.m.
17b. What type of place was this? (choose from type of place options)			
17c. What was your purpose for being at your last location?			
17d. Was that location in the study area?	☐ Yes (Go to 18) ☐ No ☐ Refused	☐ Yes (Go to 18) ☐ No ☐ Refused	☐ Yes (Go to 18) ☐ No ☐ Refused
17e. What road did you use to enter the study area?			
18. Where is your next destination? (place/address or nearest intersection/city)			
18a. What is your purpose for traveling to this destination? (Choose from trip purpose options)			
19. Are you going to a location outside of Texas?	☐ Yes (Go to 19a) ☐ No (go to 19d) ☐ Refused	☐ Yes (Go to 19a) ☐ No (go to 19d) ☐ Refused	☐ Yes (Go to 19a) ☐ No (go to 19d) ☐ Refused
If Yes: 19a. What city and state are you going to?			

19b. What road or highway will you use to leave Texas?			
19c. How many more days will you be in Texas?			
If No: 19d. What city / county in Texas are you going to?			

Type of Place Options: **1)** Office building **2)** Retail Shopping/Gas **3)** Industrial/Manufacturing/Warehouse
4) Medical **5)** Educational (12th grade or lower) **6)** Educational (college, trade, etc.)
7) Government **8)** Residential **9)** Airport **10)** Eating Establishment
11) Hotel/Motel **12)** Other (specify) **13)** Unknown **99)** Refused

Trip Purpose Options: 1) Base location/return to base location 2) Delivery 3) Pick-up
4) Maintenance 5) Driver needs (lunch, etc.) 6) To Home 7) Buy fuel
8) Other (specify) 9) Unknown 99) Refused

To measure the amount of travel you made today, we need to know the places you have gone today. Would you please tell us:

20. Where did your first trip today begin? (city/county/landmark)			
21. Where did you go from there? (city/county/landmark)			
22. Where did you go next? (city/county/landmark)			
23. Where did you go next? (city/county/landmark)			
24. Where did you go next? (city/county/landmark)			
25. Where did you go next? (city/county/landmark)			
26. Where did you go next? (city/county/landmark)			
27. How many more places did you stop today?			

Vehicle Cargo Codes

1 – Farm Products	Livestock, fertilizer, dirt, landscaping, etc.
2 – Forest Products	Trees, sod, etc.
3 – Marine Products	Fresh fish, seafood, etc.
4 – Metals and Minerals	Crude petroleum, natural gas, propane, metals, gypsum, etc.
5 – Food, Health, Beauty Products	Assorted food products, cosmetics, etc.
6 – Tobacco Products	Cigarettes, cigars, and chewing tobacco
7 – Textiles	Clothing, lines, etc
8 – Wood Products	Lumber, paper, cardboard, wood pulp, etc
9 – Printed Matter	Newspapers, magazines, books, etc.
10 – Chemical Products	Soaps, paints, household or industrial chemicals, etc
11 – Refined Petroleum or Coal Products	Gasoline, etc.
12 – Rubber, Plastic, Styrofoam Products	Finished products of rubber, plastic, or Styrofoam
13 – Clay, Concrete, Glass, or Stone	Finished products of clay, concrete, glass, or stone
14 – Manufactured Goods/Equipment	Miscellaneous products such as machinery, appliances, etc
15 – Wastes	Waste products, including scrap and recyclable materials
16 – Miscellaneous Shipments	U.S. Mail, U.P.S., Federal Express, and other mixed cargo
17 – Hazardous Materials	Hazardous chemicals and substances
18 – Transportation	Automobiles, Heavy Equipment, etc.
19 – Unclassified Cargo (specify)	Cargo not falling within one of the above categories
20 – Driver Refused to Answer	Driver refused to answer
21 – Unknown to Driver	Unknown to driver
22 - Empty	Empty

WACO AND KILLEEN/TEMPLE EXTERNAL STATION
HIGH VOLUME COMMERCIAL VEHICLE SURVEY   FORM E

Station #

_____

Station Name/Location

_____

Survey Date _____

Interviewer _____

For each vehicle you collect:	Vehicle 1	Vehicle 2	Vehicle 3
1. Interview BEGIN Time	_____a.m. _____p.m.	_____a.m. _____p.m.	_____a.m. _____p.m.
2. Interview END Time	_____a.m. _____p.m.	_____a.m. _____p.m.	_____a.m. _____p.m.
3. What direction are you headed?			
4. Number of people in vehicle			
5. Vehicle Classification (Use Codes shown below)			
6. Vehicle Type	Cargo Transport Service (Go to 17)	Cargo Transport Service (Go to 17)	Cargo Transport Service (Go to 17)
7. Record the hazardous material placard (if applicable)			
8. What is the cargo ? (choose from vehicle cargo codes)	_____ Empty (no cargo)	_____ Empty (no cargo)	_____ Empty (no cargo)
8a. If empty, what was the last cargo you delivered?	_____ (go to 18)	_____ (go to 18)	_____ (go to 18)
8b. What is the weight of your cargo?	(lbs)	(lbs)	(lbs)
*Determine 8c and 8d by observation * 8c. Is cargo being hauled using an multi-modal container/trailer or TEU?	Yes No	Yes No	Yes No
If Yes: 8d. Is the container a Reefer or Dry Box?	Reefer Dry Box	Reefer Dry Box	Reefer Dry Box
9. What city, state, and country was the point of origin for your cargo?			
10. Did your cargo come from or is it going to Mexico?	Yes No Refused / Unknown	Yes No Refused / Unknown	Yes No Refused / Unknown
11. Where did you pick up your load? (place/address or nearest intersection and city)			
If in Mexico ask: 11a. What international bridge was used to enter Texas?			
If not in Texas ask: 11b. What road or highway were you on when you entered Texas?			
12. Was that location an inter-modal transfer or custom brokerage site?	Yes No Refused / Unknown	Yes No Refused / Unknown	Yes No Refused / Unknown
13. How was your load transferred at that site (choose from transfer codes)?			
14. Where will you drop your cargo off? (place/address or nearest intersection and city)			
15. Is that location an inter-modal transfer or custom brokerage site?	Yes No Refused / Unknown	Yes No Refused / Unknown	Yes No Refused / Unknown

Vehicle Classification Options:

1) Passenger car	2) Pickup Truck	3) Van (full or mini)
4.) Sport Utility Vehicle SUV	5.) Passenger Vehicle with trailer	6.) Single Unit 2-axle (6 wheels)
7.) Single Unit 2-axle (6 wheels) with trailer	8.) Single Unit 3-axle (10 wheels)	9.) Single Unit 4-axle (14 wheels)
10) Semi (all tractor-trailer combinations)	11) Other (specify)	99) Refused / Unknown

Cargo Transfer Options:

1) Truck-to/from-Truck	2) Rail-to/from-Truck	3) Ship-to/from-Truck	4) Airplane-to/from-Truck
5) Warehouse-to/from-Truck	6) Pipeline-to/from-Truck	7) Unknown	99) Refused

NOTE: All cargo transfer options are both ways (i.e., Truck-to-Warehouse should be coded same as Warehouse-to-Truck).

16. How will the cargo be transferred at that site (choose from transfer codes)?			
17. What city, state, and country is the final destination for your cargo?			
18. What is the year and gross weight rating of this vehicle? Unleaded gas, diesel, hybrid, propane or other fuel?	Year Gross Weight ☐ Unleaded ☐ Diesel ☐ Hybrid ☐ Propane ☐ Other	Year Gross Weight ☐ Unleaded ☐ Diesel ☐ Hybrid ☐ Propane ☐ Other	Year Gross Weight ☐ Unleaded ☐ Diesel ☐ Hybrid ☐ Propane ☐ Other
19. What is the mileage on your odometer?			
20. Where are you coming from? (city/state in US or Mexico)			
20a. Is that location in Texas?	Yes (go to 20d) No	Yes (go to 20d) No	Yes (go to 20d) No
20b. (*If not in Texas*) Did you enter Texas today?	Yes No (go to 20d)	Yes No (go to 20d)	Yes No (go to 20d)
20c. What road or highway did you use to enter Texas?			
20d. Did you stay overnight as part of your travel?	Yes No (go to 21)	Yes No (go to 21)	Yes No (go to 21)
20e. If yes, where did you stay? (city/county/state)			
20f. How many nights have you stayed?			
21. Where was the last place you got into your vehicle? (place/address or nearest intersection/city)			
21a. What time did you leave that place?	_____a.m. _____p.m.	_____a.m. _____p.m.	_____a.m. _____p.m.
21b. What was your purpose for being at your last location? (Choose from trip purpose options)			

22. Where is your next destination? (place/address or nearest intersection/city)			
22a. What is your purpose for traveling to this destination? (Choose from trip purpose options)			

Trip Purpose Options:

1) Base location/return to base location	2) Delivery 3) Pick-up
4) Delivery and Pick-up 5) Maintenance	6) Driver needs (lunch, etc.) 7) To Home
8) Buy fuel 9) Other (specify)	10) Unknown 99) Refused

Vehicle Cargo Codes

1 – Farm Products	Livestock, fertilizer, dirt, landscaping, etc.
2 – Forest Products	Trees, sod, etc.
3 – Marine Products	Fresh fish, seafood, etc.
4 – Metals and Minerals	Crude petroleum, natural gas, propane, metals, gypsum, etc.
5 – Food, Health, Beauty Products	Assorted food products, cosmetics, etc.
6 – Tobacco Products	Cigarettes, cigars, and chewing tobacco
7 – Textiles	Clothing, lines, etc
8 – Wood Products	Lumber, paper, cardboard, wood pulp, etc
9 – Printed Matter	Newspapers, magazines, books, etc.
10 – Chemical Products	Soaps, paints, household or industrial chemicals, etc
11 – Refined Petroleum or Coal Products	Gasoline, etc.
12 – Rubber, Plastic, Styrofoam Products	Finished products of rubber, plastic, or Styrofoam
13 – Clay, Concrete, Glass, or Stone	Finished products of clay, concrete, glass, or stone
14 – Manufactured Goods/Equipment	Miscellaneous products such as machinery, appliances, etc
15 – Wastes	Waste products, including scrap and recyclable materials
16 – Miscellaneous Shipments	U.S. Mail, U.P.S., Federal Express, and other mixed cargo
17 – Hazardous Materials	Hazardous chemicals and substances
18 – Transportation	Automobiles, Heavy Equipment, etc.
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20 – Driver Refused to Answer	Driver refused to answer
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22 – Empty	Empty