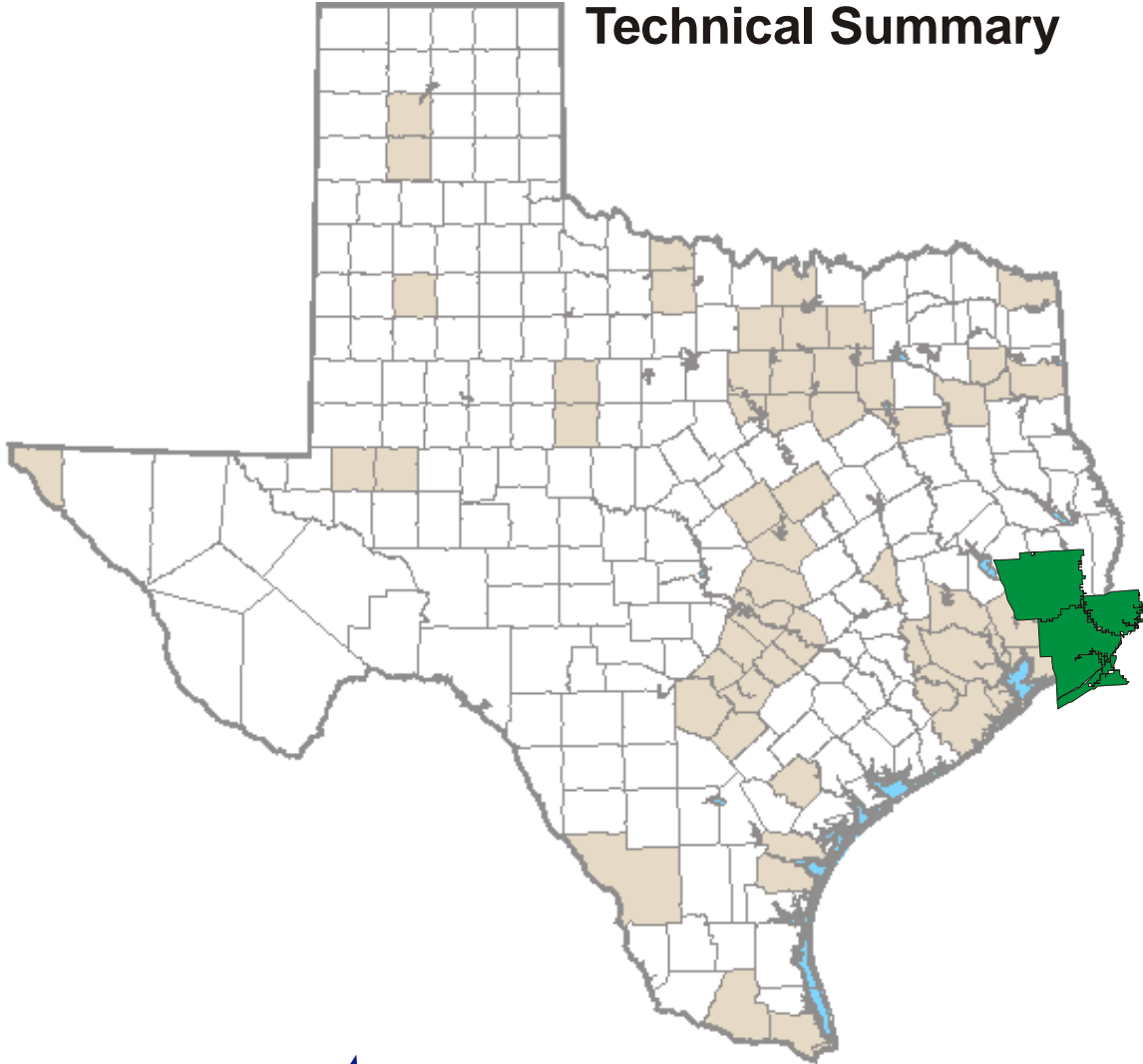


2010 Jefferson-Orange-Hardin Regional Transportation Study (JOHRTS) Commercial Vehicle Travel Survey Technical Summary



Prepared by the
Texas Transportation Institute
May 2012

**2010 Jefferson-Orange-Hardin Regional
Transportation Study (JOHRTS)
Commercial Vehicle Survey**

TECHNICAL SUMMARY

Texas Department of Transportation Travel Survey Program

Prepared by

Steve Farnsworth
Associate Research Scientist

and

Jack Bauer
Graduate Assistant Researcher

of the
Texas Transportation Institute

May 2012

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 data, findings, and conclusions presented herein. The contents do not necessarily reflect the official views or policies of the Federal Highway Administration or the Texas Department of Transportation (TxDOT). This report does not constitute a standard, specification, or regulation.

ACKNOWLEDGEMENTS

There were a number of individuals who extended technical support and assistance during the preparation of this report. Special thanks are due to Stella Nepal, Mark Ojah, Dr. Dennis Perkinson, and Gary Lobaugh of the Texas Transportation Institute.

The authors would like to thank Charlie Hall, TxDOT Travel Survey Program Manager, and the Department for its continuing program to collect and analyze urban travel data to support travel demand modeling.

TABLE OF CONTENTS

List of Figures.....	vii
List of Tables	viii
Introduction.....	1
Survey Methodology.....	2
Survey Results	4
Vehicle Characteristics	4
Registered Commercial Vehicles.....	4
Surveyed Commercial Vehicles.....	5
Trip Frequency.....	11
Trip Characteristics.....	13
Cargo Characteristics	15
Trip Length	25
Travel Time and Speed	30
Trip Tours	34
Survey Expansion	39
Survey Summary.....	43
Appendix.....	47

LIST OF FIGURES

Figure 1. JOHRTS Study Area.	1
Figure 2. Model Year of Registered Trucks in the JOHRTS Study Area.....	5
Figure 3. Type of Fuel Used by Surveyed Commercial Vehicles.	7
Figure 4. Vehicle Model Year.	9
Figure 5. Inter-Zonal, Intra-Zonal, and External Trips.	11
Figure 6. Total Trips per Vehicle.....	12
Figure 7. Total Internal Trips per Vehicle.	13
Figure 8. Cargo Trip Purposes at the Trip Destinations.	20
Figure 9. TAZ Boundary and Base Locations of Surveyed Commercial Vehicles.	25
Figure 10. Trip Origins and Destinations of Surveyed Commercial Vehicles.	26
Figure 11. Surveyed Commercial Vehicle Trips TLFD.	27
Figure 12. Surveyed Commercial Vehicle Trips Travel Time.	31
Figure 13. Cargo Vehicle Trips within Trip Tours by Trip Type.....	38
Figure 14. Service Vehicle Trips within Trip Tours by Trip Type.....	38

LIST OF TABLES

Table 1. Survey Participation Rates.....	3
Table 2. Gross Vehicle Weight of Registered Trucks in the JOHRTS Study Area.....	4
Table 3. Vehicle Classification Type of Surveyed Commercial Vehicles.....	6
Table 4. Gross Vehicle Weight.....	8
Table 5. Average of Reported Odometer Readings by Model Year.....	10
Table 6. Total Internal and External Trips.....	12
Table 7. Distribution of Internal Trips by Land Use Type at Trip Destinations.	14
Table 8. Trip Purposes at Destination Locations.....	15
Table 9. Cargo Classification Types.....	16
Table 10. Distribution of Trips by Cargo Type at Destinations.	17
Table 11. Equivalency between SAM Commodity Groups and Survey Classifications..	18
Table 12. Equivalency between Land Use Category and Survey Type of Place.....	18
Table 13. Cargo Trips by Commodity Group and Land Use Destinations.....	19
Table 14. Cargo Trips by Commodity Group and Trip Purpose at the Trip Destinations.	20
Table 15. Average Net Cargo Weight (lbs.) by Commodity Group and Land Use at Trip Destinations.....	22
Table 16. Average Net Cargo Weight (lbs.) by Commodity Group and Trip Purpose at Trip Destinations.	22
Table 17. Cargo Trips and Net Cargo Weight by Commodity Group at Trip Destinations.	23
Table 18. Cargo Trips and Average Net Cargo Weights by Land Use at Trip Destinations.	24
Table 19. Cargo Trips and Average Net Cargo Weights by Trip Purpose at Trip Destinations.....	24
Table 20. Trip Length Frequency Distribution (Grouped Interval).....	27
Table 21. Trip Length Frequency Distribution (Ungrouped).	28
Table 22. Average Trip Length to Destinations by Land Use Type.....	29
Table 23. Average Trip Length to Destinations by Commodity Group.	30
Table 24. Travel Time Frequency Distribution (Grouped Interval).	31
Table 25. Travel Time Frequency Distribution (Ungrouped).....	32
Table 26. Average Travel Time and Speed to Destinations by Land Use Type.....	33
Table 27. Average Travel Time and Speed to Destinations by Commodity Group.	34
Table 28. Base and Non-Base Trips.	35
Table 29. Trip Tours per Vehicle.....	36
Table 30. External, Inter-Zonal and Intra-Zonal Trips within Trip Tours.....	37
Table 31. Non-Base Trips within Trip Tours.....	37
Table 32. Summary of Open Tour Trips.....	39
Table 33. 2008 HPMS Estimates of Weekday VMT in the JOHRTS Study Area.	40
Table 34. Percentage of Commercial and Non-Commercial Vehicles by Functional Classification.....	41
Table 35. Estimated VMT for Commercial and Non-Commercial Vehicles.	41
Table 36. Key Survey Results and Expanded Trip and VMT Data.....	43

INTRODUCTION

In 2010, the Texas Department of Transportation (TxDOT) funded a commercial vehicle survey in the Jefferson-Orange-Hardin Regional Transportation Study (JOHRTS) area. The purpose of this survey was to provide data that would enable TxDOT to forecast total commercial vehicle travel demand within the three-county Jefferson-Orange-Hardin area.

The study area is located in East Texas and, as shown in Figure 1, comprises the entirety of Jefferson, Orange, and Hardin counties. The cities of Beaumont, Port Arthur, and Orange had an approximate total combined population of 191,000 in 2010, while the three-county area had an approximate 2010 population of 388,700.

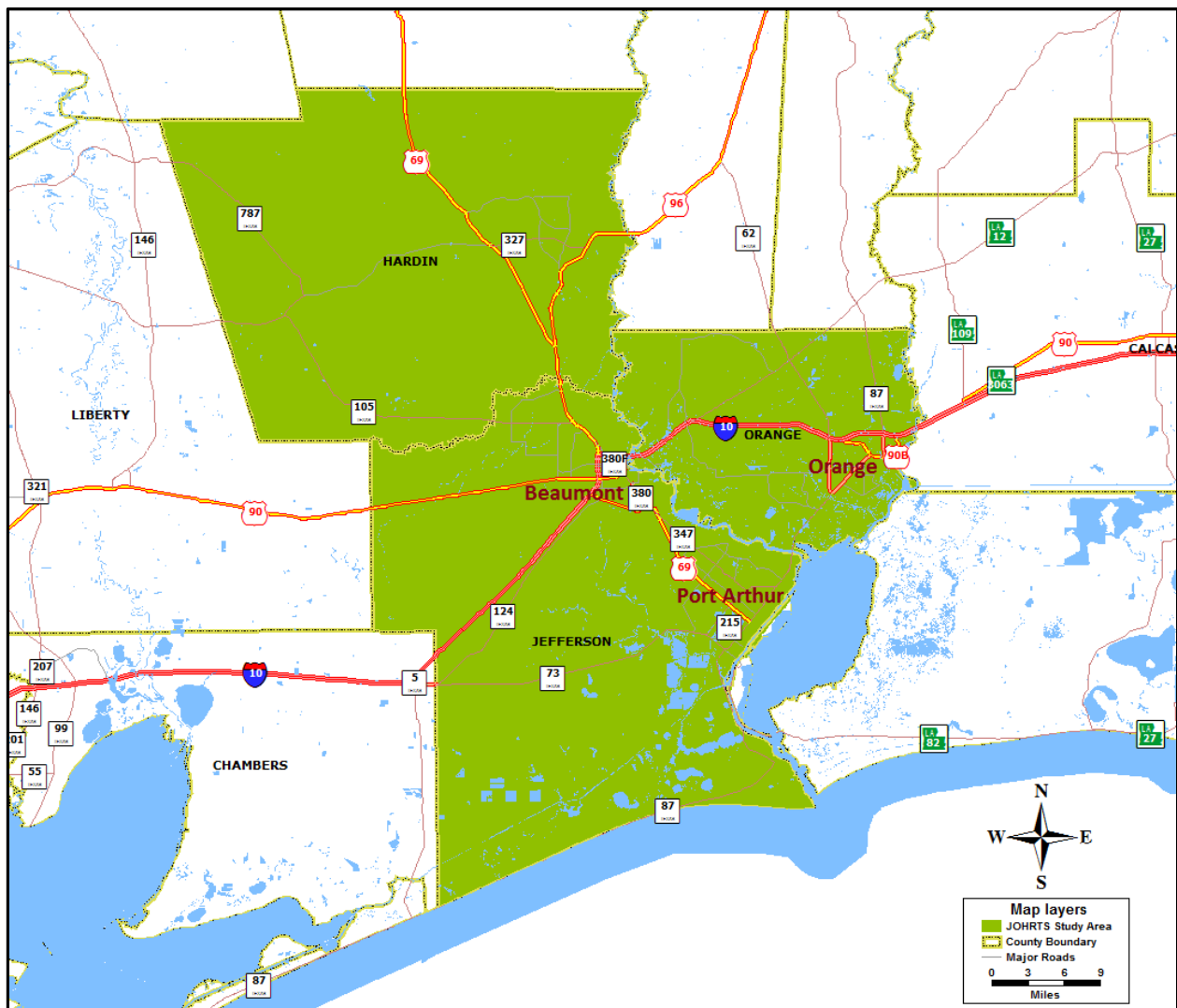


Figure 1. JOHRTS Study Area.

This report presents a technical summary of the commercial vehicle travel survey conducted in 2010 in the Jefferson-Orange-Hardin regions and documents the data collected and the analysis of results for the study area. The forms used in the survey are included in the Appendix of this report.

SURVEY METHODOLOGY

The commercial vehicle surveys for the JOHRTS study area were conducted during the period between February 2010 and October 2010, with a break during the months of June and July in 2010. Alliance Transportation Group (ATG) was contracted by TxDOT to conduct the commercial vehicle surveys for the study area, with technical assistance from the Texas Transportation Institute (TTI). Prior to these surveys, a pilot study was carried out which consisted of 25 usable surveys from 14 companies. The over-sample rate was established at 35 percent, and a target number of 676 commercial vehicles was established for the JOHRTS survey area.¹

The survey sample was randomly selected from a listing of all business individuals, companies, and public agencies that own, operate, or lease commercial vehicles within the study areas. This list was generated from the Texas Workforce Commission (TWC) employer database that was provided by TxDOT in random order. Selected businesses were contacted and requested to participate in the survey. Those who agreed to participate were provided survey packets and instructions on how the survey forms should be filled out. The drivers of the commercial vehicles were asked to keep a 24-hour diary of the locations of all trips made by each vehicle.

As Table 1 shows, more than 8,000 companies/individuals were contacted during the recruitment process. Contacts were tracked based on the following three categories:

- Agreed to Participate – The company or individual operated qualifying vehicles making trips within the study area, agreed to participate, and complete and return the survey materials.
- Refused to Participate – The company or individual operated qualifying vehicles making trips within the study area but refused to participate in the survey.

¹ H-GAC JOHRTS Commercial Vehicle Survey – Final Report. Alliance Transportation Group, Inc. March 2011.

- Not Participating – The company or individual did not operate a qualifying vehicle making trips within the study area; or the company or individual did operate a qualifying vehicle that did not make trips within the study area.

Table 1. Survey Participation Rates.

Category	Contact Calls	
	Number	Percent of Total
Agreed to Participate	260	3.2
Refused to Participate	744	9.3
Not participating	7,007	87.5
Total	8,011	100.0

Source: H-GAC JOHRTS Commercial Vehicle Survey – Final Report. ATG

A total of 241 companies participated in the JOHRTS commercial vehicle survey, from which a total of 532 commercial vehicle surveys were obtained. Data editing and review processes were performed by TTI to ensure that the survey data collected were complete and followed the guidelines set forth in TxDOT’s bid specification for the project. A data check program was also utilized to examine the accuracy of geocoding of locations and logic of survey responses. The majority of data errors were expected to be corrected prior to final data submittals by the contractor (ATG). However, it was not unusual to find errors during actual data processing and analysis. In this study, survey responses with irreconcilable data were not included in the survey analysis. Also, inconsistent trip records were dropped from the survey analysis. As a result of this process, the data from two survey records were dropped from the analyses.

The results presented in this technical summary are therefore based on data from 530 surveyed commercial vehicles.

SURVEY RESULTS

Vehicle Characteristics

This section presents the characteristics of registered trucks and surveyed commercial vehicles to provide an overview of the type and condition of commercial vehicles operating within the JOHRTS study area. Information on registered trucks include the number of diesel-fueled, gasoline-fueled, propane-fueled, and other-fueled trucks by gross vehicle weight and by model year. Information on surveyed commercial vehicles include the vehicle's make, model and year, odometer reading, gross vehicle weight, vehicle classification, and fuel use.

Registered Commercial Vehicles

Based on TxDOT's vehicle registration data, there were nearly 7,200 trucks registered in the JOHRTS study area in 2010. Table 2 shows the distribution of registered diesel trucks and gasoline trucks by gross vehicle weight. Approximately 81 percent of all trucks registered in the JOHRTS study area are diesel-fueled vehicles. Over half of all registered trucks had a gross vehicle weight of less than 10,000 pounds.

Table 2. Gross Vehicle Weight of Registered Trucks in the JOHRTS Study Area.

Gross Vehicle Weight	Diesel Trucks		Gasoline Trucks		Total	
	Number of Vehicles	% of Diesel Trucks	Number of Vehicles	% of Gasoline Trucks	Number of Vehicles	% of Total Trucks
< 10000	3,172	54.6	793	58.2	3,965	55.3
> 10000	511	8.8	286	21.0	797	11.1
> 14000	219	3.8	68	5.0	287	4.0
> 16000	233	4.0	46	3.4	279	3.9
> 19500	496	8.5	96	7.0	592	8.3
> 26000	238	4.2	23	1.6	261	3.6
> 33000	795	13.7	42	3.1	837	11.7
> 60000	142	2.4	9	0.7	151	2.1
Total	5,806	100.0	1,363	100.0	7,169	100.0

Source: TxDOT 2010

Figure 2 shows the distribution of registered diesel trucks and gasoline trucks by model year. Registered diesel trucks were slightly newer relative to the gasoline trucks. The majority of the diesel trucks (78 percent) were less than ten years old, which was more than the 62 percent of gasoline trucks within that age range. Less than four percent of the nearly 5,800 registered diesel trucks were older than 20 years, while slightly more than nine percent of registered gasoline trucks were older than 20 years.

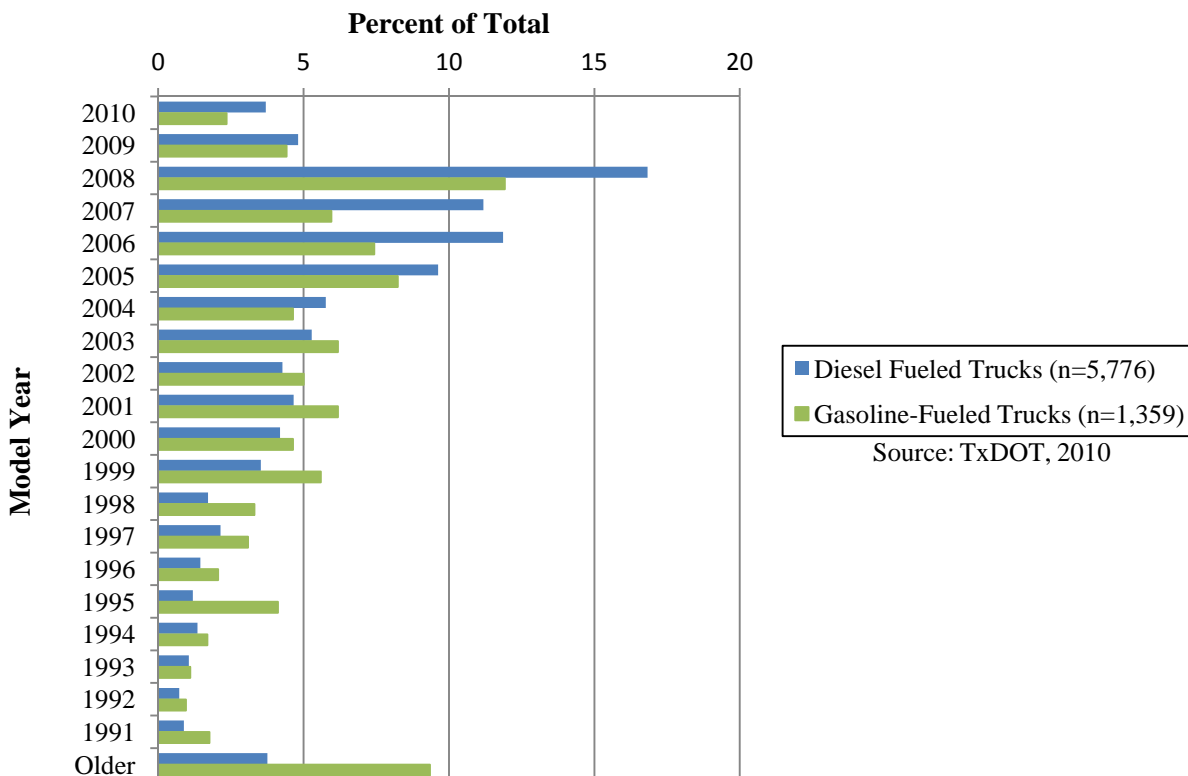


Figure 2. Model Year of Registered Trucks in the JOHRTS Study Area.

Surveyed Commercial Vehicles

Commercial vehicles that participated in the JOHRTS commercial vehicle survey were distinguished based on the ten classification types listed in Table 3. These were further categorized by commercial type as either major cargo/freight transport or local service vehicles, simply referred to in this report as cargo vehicles and service vehicles.

Cargo vehicles were defined as vehicles mainly used to transport cargo or freight which were typically bulk goods, materials, and cargo in large quantities for wholesale distribution. Service

vehicles were defined as vehicles mainly used to perform services such as those used by building contractors, plumbers, electricians, cable and telephone services/repairs, and delivery vans/vehicles used by local retailers. These also included company fleet vehicles or fleets and maintenance vehicles of public agencies such as TxDOT, city, county or school district.

Table 3 shows the distribution of surveyed vehicles by vehicle classification type and commercial type. Out of the total 530 vehicles surveyed, 259 were cargo vehicles and 271 were service vehicles. Among cargo vehicles, approximately 32 percent were single unit 2-axle trucks (6-wheelers), 19 percent were pick-up trucks, 17 percent were semi-tractor/trailer combinations, and 11 percent were single unit 3-axle (10-wheelers). Among service vehicles, approximately 60 percent were pick-up trucks, 18 percent were vans, and nine percent were either single unit 2-axle or 3-axle trucks.

Table 3. Vehicle Classification Type of Surveyed Commercial Vehicles.

Vehicle Classification	Cargo Vehicles		Service Vehicles		Total Vehicles	
	Number of Vehicles	Percent of Cargo	Number of Vehicles	Percent of Service	Number of Vehicles	Percent of Total
Passenger Car	5	1.9	11	4.1	16	3.0
Pickup Truck	50	19.4	164	60.5	214	40.4
Van (passenger or mini)	35	13.5	49	18.1	84	15.8
Sport Utility Vehicle	6	2.3	14	5.2	20	3.8
Single Unit 2-axle (6 wheels)	83	32.0	20	7.4	103	19.5
Single Unit 3-axle (10 wheels)	28	10.8	5	1.7	33	6.2
Single Unit 4-axle (14 wheels)	6	2.3	0	0.0	6	1.1
Semi (Tractor-Trailer)	43	16.6	7	2.6	50	9.4
Other	3	1.2	1	0.4	4	0.8
Total	259	100.0	271	100.0	530	100.0

Figure 3 shows the distribution of surveyed vehicles by fuel type. Approximately 57 percent of the surveyed vehicles used unleaded gasoline and 42 percent used diesel. Less than one percent of all vehicles used other fuel types (two vehicles listed propane and one vehicle listed ‘other’ as the fuel type). Among cargo vehicles, 65 percent used diesel and 35 percent used gasoline. Among service vehicles, 79 percent used gasoline and 21 percent used diesel.

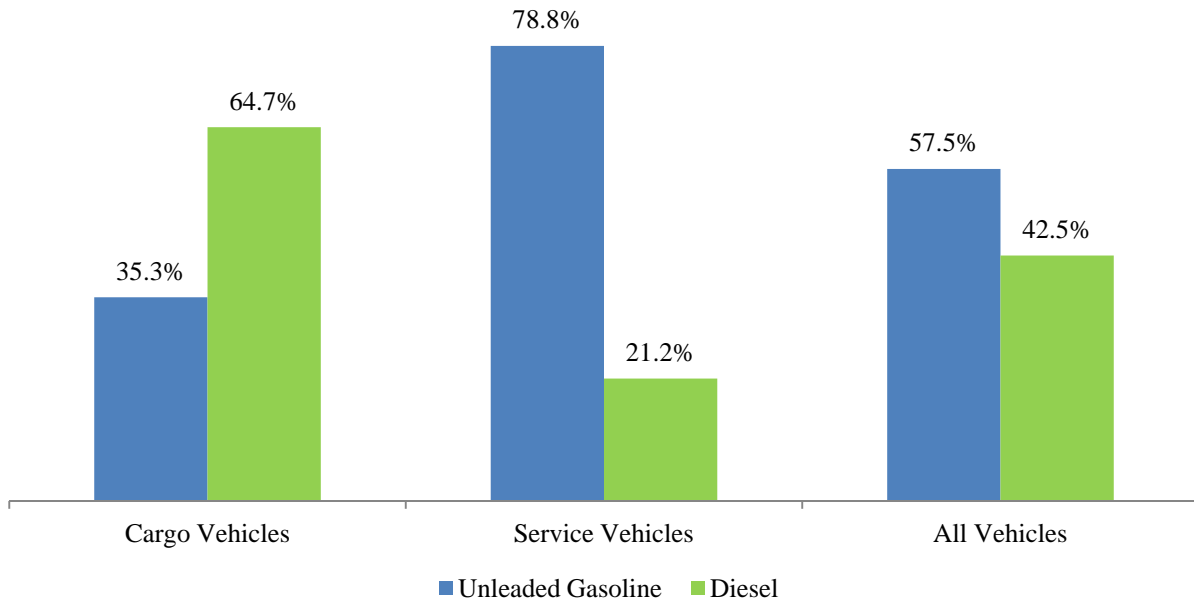


Figure 3. Type of Fuel Used by Surveyed Commercial Vehicles.

Table 4 shows the distribution of surveyed vehicles by gross vehicle weight. The survey included commercial vehicles with gross vehicle weight of less than 10,000 pounds. Approximately 88 percent of the service vehicles belonged to this category, while approximately 42 percent of the cargo vehicles weighed more than 19,500 pounds.

Table 4. Gross Vehicle Weight.

Gross Vehicle Weight (lbs.) Min / Max	Cargo		Service		Total	
	Number of Vehicles	% of Cargo Vehicles	Number of Vehicles	% of Service Vehicles	Number of Vehicles	% of Total Vehicles
0 / 10,000	106	40.9	238	87.8	344	64.9
10,001 / 14,000	14	5.4	8	3.0	22	4.2
14,001 / 16,000	16	6.2	5	1.8	21	4.0
16,001 / 19,500	13	5.0	2	0.7	15	2.8
19,501 / 26,000	17	6.6	2	0.7	19	3.6
26,001 / 33,000	28	10.8	3	1.1	31	5.8
33,001 / 60,000	23	8.9	11	4.1	34	6.4
> 60,001	41	15.8	1	0.4	42	7.9
Unknown	1	0.4	1	0.4	2	0.4
Total	259	100.0	271	100.0	530	100.0

Figure 4 shows the distribution of surveyed vehicles by model year. Approximately 73 percent of service vehicles and 71 percent of cargo vehicles were less than 10 years old. The average age for cargo vehicles was 6.4 years, while the average age for service vehicles was 6.5 years.

Model Year

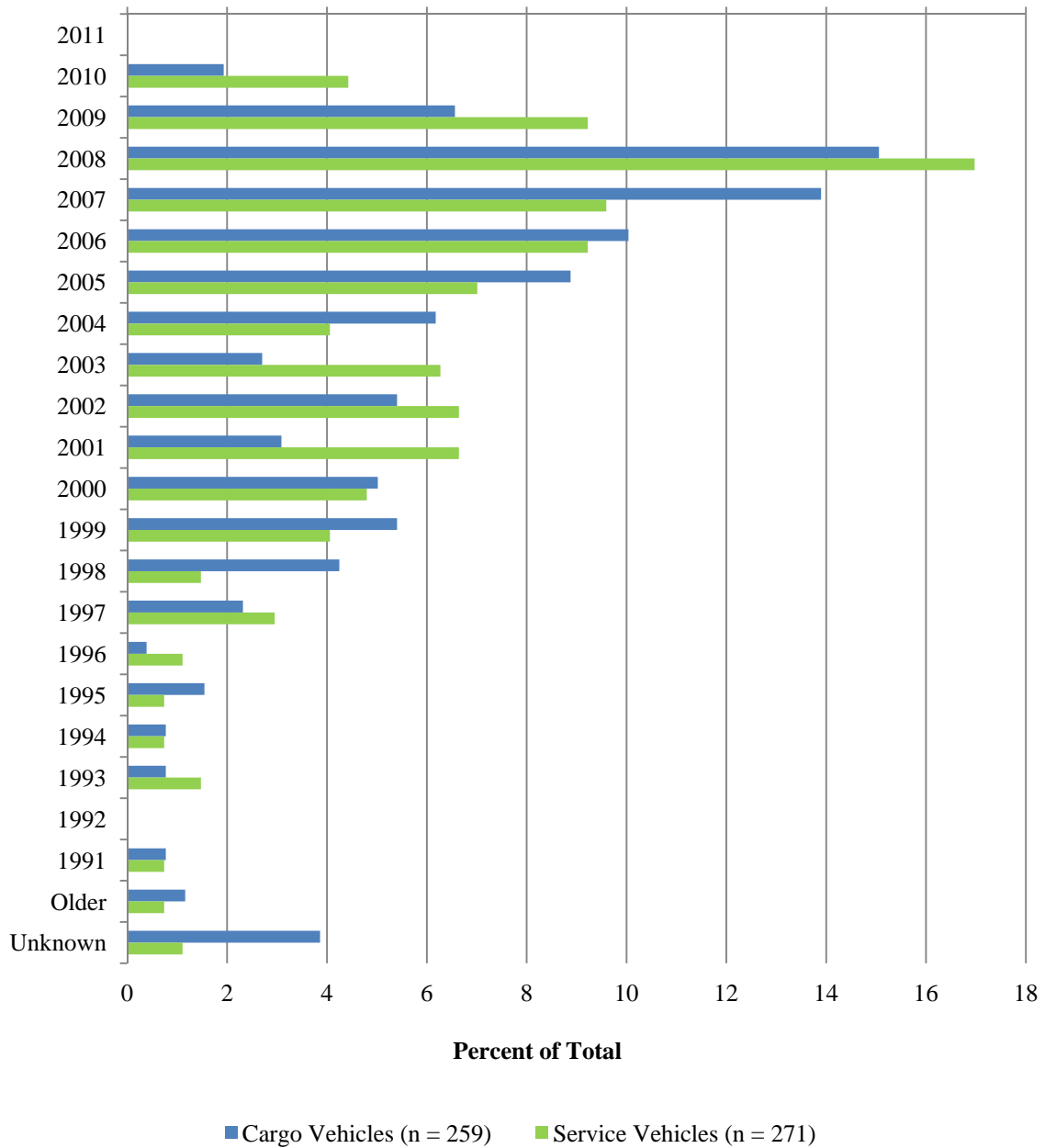


Figure 4. Vehicle Model Year.

Table 5 shows the average vehicle mileage by model year based on reported odometer readings from 530 surveyed vehicles at the beginning of their survey travel day. Cargo vehicles reported higher average odometer readings of about 183,400 miles compared to just over 99,000 miles for service vehicles.

Table 5. Average of Reported Odometer Readings by Model Year.

Model Year	Cargo Vehicles		Service Vehicles		Total Vehicles	
	Number of Vehicles	Avg. Odometer Reading	Number of Vehicles	Avg. Odometer Reading	Number of Vehicles	Avg. Odometer Reading
2011	0	0	0	0	0	0
2010	5	28,891	12	5,757	17	12,561
2009	17	33,131	25	30,091	42	31,321
2008	39	69,886	46	36,930	85	52,051
2007	36	105,479	26	71,405	62	91,190
2006	26	130,844	25	71,689	51	101,846
2005	23	132,913	19	111,396	42	123,179
2004	16	171,228	11	103,819	27	143,765
2003	7	125,468	17	158,117	24	148,594
2002	14	349,434	18	114,915	32	217,517
2001	8	338,419	18	247,078	26	275,183
2000	13	280,280	13	181,116	26	230,698
1999	14	201,253	11	131,372	25	170,505
1998	11	507,582	4	151,229	15	412,555
1997	6	265,578	8	167,858	14	209,738
1996	1	96,416	3	228,908	4	195,785
1995	4	409,681	2	302,893	6	374,085
1994	2	667,450	2	N/A	4	667,450
1993	2	686,171	4	130,959	6	316,030
1992	0	0	0	0	0	0
1991	2	1,575,513	2	86,859	4	831,186
Older	3	284,857	2	163,379	5	236,266
Unknown	10	50,225	3	68,286	13	54,393
Total	259	183,379	271	99,263	530	142,887

Trip Frequency

The surveyed vehicles generated a total of 3,613 trips, of which 3,307 were internal trips and 306 were external trips. Internal trips were defined as those trips made within the Jefferson-Orange-Hardin areas. These trips were further distinguished by determining whether travel occurred within or between zones. Trips made from one zone to another are referred to as inter-zonal trips, and those trips made within the same zone are referred to as intra-zonal trips. External trips were those trips made where one or both of the trip ends were outside of the study area.

Figure 5 shows the distribution of inter-zonal, intra-zonal and external trips, while the breakdown of these trips is provided in Table 6. Cargo vehicles generated 1,872 trips, of which approximately 83 percent were inter-zonal trips, five percent were intra-zonal trips, and 12 percent were external trips. Service vehicles generated 1,741 trips, of which around 84 percent were inter-zonal trips, eight percent were intra-zonal trips, and eight percent were external trips.

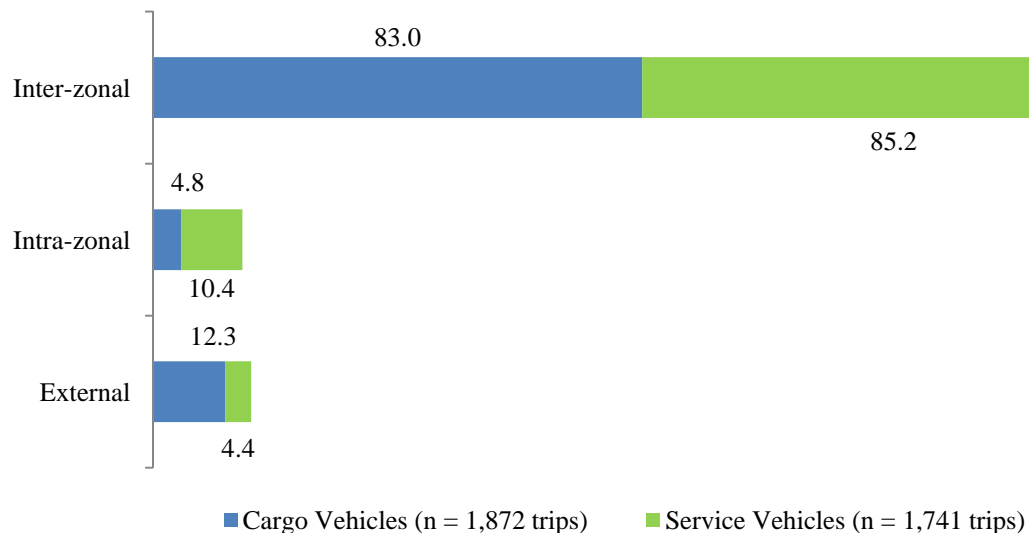


Figure 5. Inter-Zonal, Intra-Zonal, and External Trips.

Table 6. Total Internal and External Trips.

Vehicle Type Trip Type	Cargo Vehicles		Service Vehicles		Total Vehicles	
	Number	% of Total	Number	% of Total	Number	% of Total
Inter-Zonal	1,553	83.0	1,484	85.2	3,037	84.1
Intra-Zonal	89	4.7	181	10.4	270	7.4
Total Internal	1,642	87.7	1,665	95.6	3,307	91.5
External	230	12.3	76	4.4	306	8.5
Total	1,872	100.0	1,741	100.0	3,613	100.0

Figure 6 shows the distribution of total trips (internal and external trips) which varied from two trips to 23 trips per cargo and service vehicle. There was only one vehicle that made 20 or more trips on their survey day. However, these additional trips were not recorded in their travel diary due to lack of space. Including these unrecorded trips, the average number of total trips per day was 7.2 trips for cargo vehicles and 6.4 trips for service vehicles.

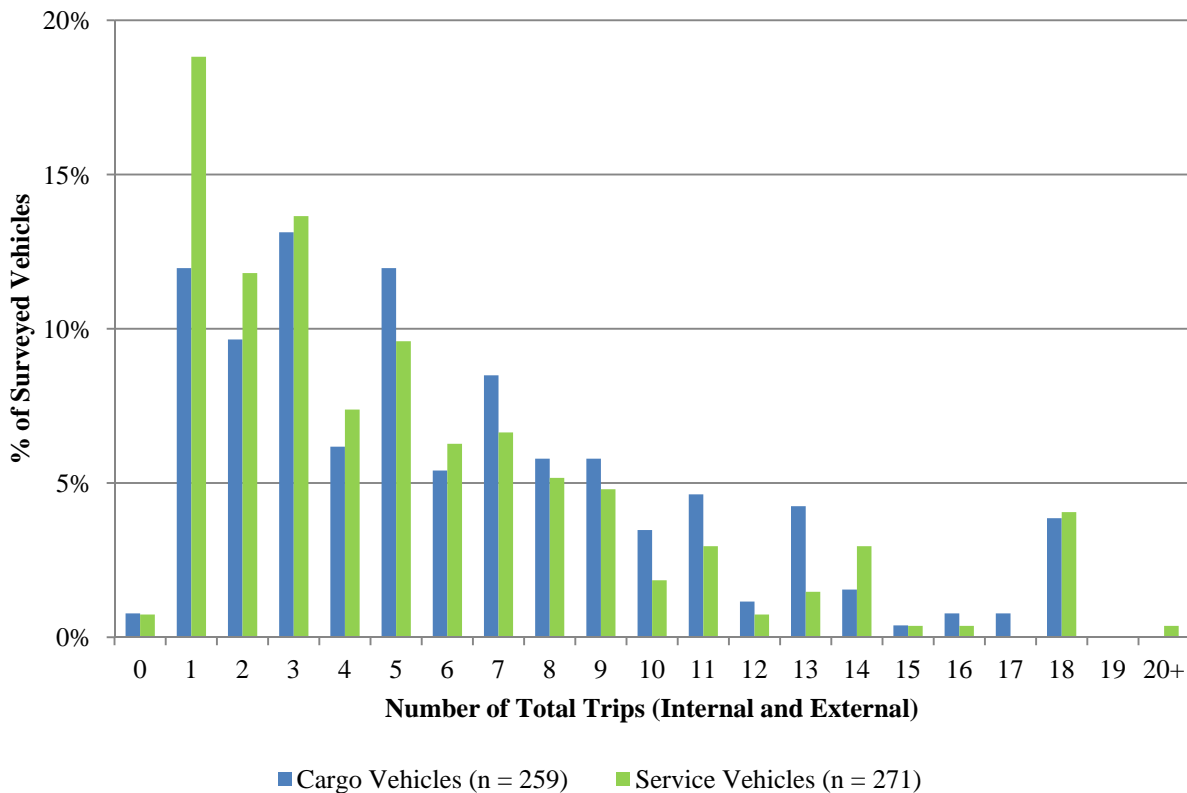


Figure 6. Total Trips per Vehicle.

Figure 7 shows the distribution of internal trips only. Approximately five percent of both cargo vehicles and service vehicles made one internal trip per day. In contrast, the total trips made by the surveyed vehicles indicated a minimum of two trips per day. The variation is attributed to the exclusion of external trips. The average number of internal trips per day was 6.9 trips for cargo vehicles and 6.3 trips for service vehicles.

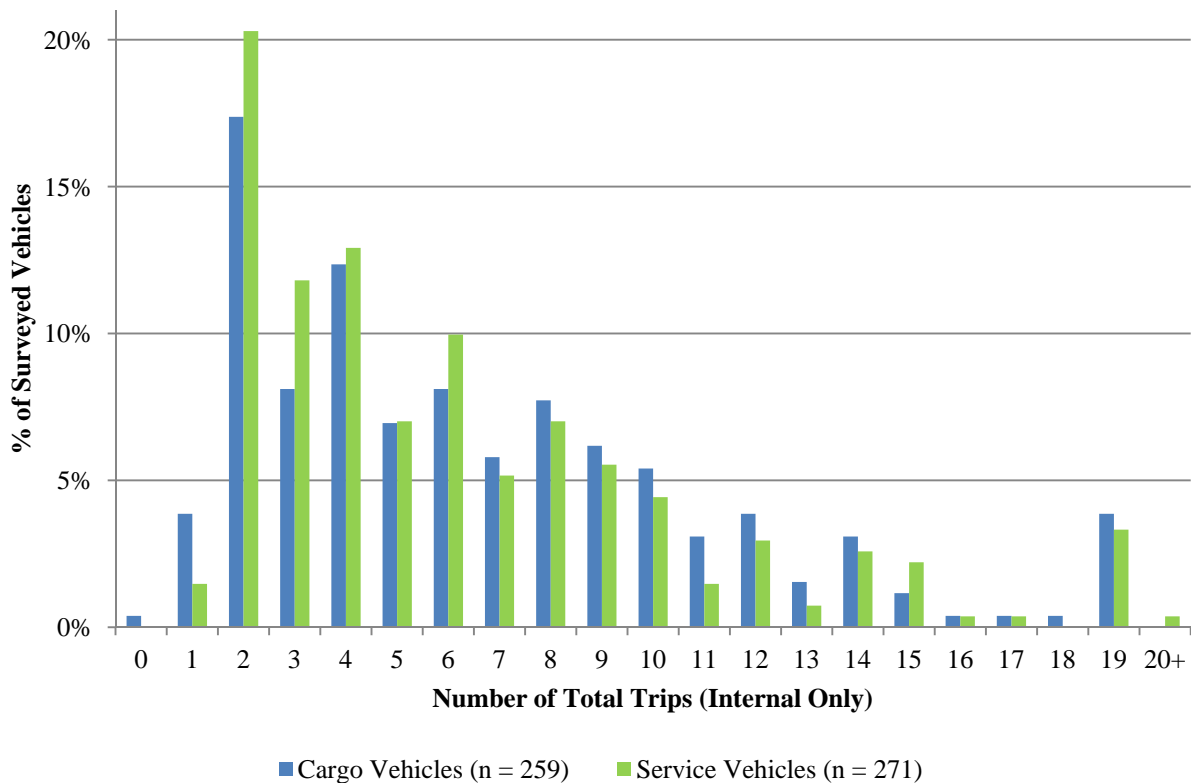


Figure 7. Total Internal Trips per Vehicle.

Trip Characteristics

Information on travel purpose and the type of land use activity where these trips occurred are important in estimating commercial vehicle trip patterns. The analysis of trips presented in this section is based solely on internal trips and does not include external trips.

Table 7 shows the distribution of internal trips by land use type at trip destinations. Approximately 22 percent of the trips made by cargo vehicles were to retail locations, followed by 19 percent to industrial sites, and 11 percent to residential locations. For service vehicles, nearly 25 percent of the trips took place at residential sites, followed by 15 percent at locations classified as “other”, and nearly 14 percent at non-government office buildings.

Table 7. Distribution of Internal Trips by Land Use Type at Trip Destinations.

Frequency	Cargo		Service	
	Number	Percent of Cargo	Number	Percent of Service
Office Building (Non-government)	94	5.7	236	14.2
Retail/Shopping	362	22.0	135	8.1
Industrial/Manufacturing	319	19.4	107	6.4
Medical/Hospital	22	1.3	65	3.9
Education (< 12th grade)	23	1.4	47	2.8
Education (College, Trade)	10	0.6	6	0.4
Government Office/Building	39	2.4	173	10.4
Residential	183	11.2	414	24.9
Airport	0	0.0	1	0.1
Intermodal Facility	2	0.1	0	0.0
Warehouse	158	9.6	27	1.6
Distribution Center	91	5.5	67	4.0
Construction Site	126	7.8	74	4.4
Other	146	8.9	249	15.0
Refused/Unknown	67	4.1	64	3.8
Total Trips	1,642	100.0	1,665	100.0

Table 8 shows the distribution of internal trips by trip purposes at trip destinations. Slightly over half (52 percent) of the cargo vehicle internal trips were delivery, 15 percent were picking up cargo, and 14 percent were unknown/refused. For trips made by service vehicles, approximately 53 percent were service-related, 16 percent were unknown/refused, and 7 percent were delivery.

Table 8. Trip Purposes at Destination Locations.

Trip Purpose	Cargo		Service	
	Number	Percent of Cargo	Number	Percent of Service
Return to Base Location	64	3.9	73	4.4
Delivery	859	52.3	115	6.9
Pick-Up	239	14.6	104	6.2
Pick-Up and Delivery	81	4.9	23	1.4
Maintenance (Fuel, oil, etc.)	22	1.3	35	2.1
Driver Needs (Lunch, etc.)	16	1.0	71	4.3
Service-Related	86	5.2	886	53.2
Other	39	2.4	88	5.3
Refused / Unknown	236	14.4	270	16.2
Total Trips	1,642	100.0	1,665	100.0

Cargo Characteristics

Information on the type of cargo being delivered or picked up at each stop, the weight of cargo, and the type of land use where the cargo trip occurred was collected in the JOHRTS commercial vehicle survey to examine the movement of commodities within and outside of the study area. The analyses presented in this section is for both internal and external trips made by surveyed cargo vehicles only, and do not include the trips made by service vehicles.

The analysis of cargo trip data examined the types of cargo being transported at trip destinations, the trip purpose and land use activity at each stop, and the estimated net weight of the cargo being picked up and/or delivered for each trip. Several inconsistencies were observed during the processing and analysis of cargo trip data. There were some trips with full or partial cargo loads that did not report cargo weights but actually reported the type of cargo being transported. There were some trips that indicated delivery trip purpose but did not report any cargo weights at drop-off. Also, there were some trips that reported cargo weights at pick-up but the weights that were reported were not consistent at drop-off. Such inconsistencies generated errors in the estimation of net weight of cargo for that particular trip. Therefore, it was necessary to manually process the cargo trip data and to make assumptions regarding cargo weights. The types of cargo in the survey were based on 22 classification types listed in Table 9.

Table 9. Cargo Classification Types.

Cargo Classifications	Cargo Descriptions
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, ores, etc.
5. Food, Health, and Beauty Products	Assorted food products, cosmetics, etc.
6. Tobacco Products	Cigarettes, cigars, and chewing tobacco
7. Textiles	Clothing, linens, 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, and 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/Equip.	Miscellaneous products (machinery, appliances, furniture, 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 and other transport vehicles
19. Unclassified Cargo	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 (including empty shipping containers)

The distribution of trips by cargo type is provided in Table 10. Approximately 40 percent of the total cargo vehicle trips were transporting unclassified or other cargo, followed by seven percent transporting food, health, and beauty products, and nearly seven percent carrying miscellaneous items. Approximately five percent of the cargo trips were reported as empty, including empty shipping containers.

Table 10. Distribution of Trips by Cargo Type at Destinations.

Cargo Type	Number of Trips	% of Total
Farm Products	12	0.6
Forest Products	12	0.6
Marine Products	5	0.3
Metals and Minerals	16	0.9
Food, Health, and Beauty Products	138	7.5
Tobacco Products	0	0.0
Textiles	0	0.0
Wood Products	13	0.7
Printed Matter	28	1.5
Chemical Products	30	1.6
Refined Petroleum or Coal Products	114	6.1
Rubber, Plastic, and Styrofoam Products	25	1.3
Clay, Concrete, Glass, or Stone	113	6.0
Manufactured Goods/Equipment.	82	4.4
Wastes	6	0.3
Miscellaneous Shipments	130	6.9
Hazardous Materials	0	0.0
Transportation	0	0.0
Unclassified/Other Cargo	751	40.2
Driver Refused to Answer	40	2.1
Unknown to Driver	263	14.0
Total Trips with Cargo	1,778	95.0
Empty	94	5.0
Total Cargo Vehicle Trips	1,872	100.0

The commodity grouping scheme used by TxDOT in the Texas Statewide Analysis Model (SAM) was used to simplify the cargo types into 10 commodity groups. The types of place option in the survey were categorized into seven land use categories.

Table 11 shows the equivalency between SAM commodity groups and cargo classifications from the survey, while Table 12 shows the land use categories and their corresponding equivalents in the type of place options from the survey. Those items (in italics) did not have equivalents but were added or grouped together so as not to exclude any trips in the analysis.

Table 11. Equivalency between SAM Commodity Groups and Survey Classifications.

Commodity Group	Survey Cargo Classification
1. Agriculture	Farm Products, Forest Products, Marine Products
2. Raw Materials	Metals and Minerals, Chemical Products, Refined Petroleum, or Coal Products
3. Food	Food, Health and Beauty Products, Tobacco Products
4. Textiles	Textiles, Rubber, Plastic, and Styrofoam Products
5. Wood	Wood Products, Printed Matter
6. Building Materials	Clay, Concrete, Glass, or Stone Products
7. Machinery	Manufactured Goods/Equipment
8. Miscellaneous	Wastes, Miscellaneous Shipments
9. Secondary	Unclassified Cargo
10. Hazardous Materials	Hazardous Materials
-- <i>Transportation</i>	<i>Transportation</i>
-- <i>Empty</i>	<i>Empty</i>
-- <i>Unknown</i>	<i>Unknown to Driver/ Driver Refused to Answer</i>

Table 12. Equivalency between Land Use Category and Survey Type of Place.

Land Use Category	Type of Place
1. Office	Office Building
2. Retail	Retail/Shopping
3. Industrial	Industrial/Manufacturing
4. Medical	Medical/Hospital
5. Education	Educational (12th grade or less and college, trade, etc.)
6. Government	Government Office/Building
7. Residential	Residential
-- Other	Airport, Intermodal Facility, Warehouse, Distribution Center, Construction Site, Other
-- Unknown	Land use category not provided, Omitted, Driver refused to answer

Table 13 shows the distribution of cargo trips by commodity group and land use type at trip destinations. Nearly 36 percent of the trips occurred at “Other” land use types, which were mainly warehouses, distribution centers and construction sites. Approximately 21 percent of the trips occurred at retail sites, and 20 percent occurred at industrial sites. By commodity group, approximately 40 percent of the trips were transporting secondary goods, and about nine percent were transporting raw materials. Around five percent were not transporting cargo.

Table 13. Cargo Trips by Commodity Group and Land Use Destinations.

Commodity Group	Land Use								Total Trips	% of Total
	Office	Retail	Ind'l	Med	Edu	Gov't	Res	Other		
Agriculture	2	1	10	1	0	1	2	12	29	1.5
Raw Materials	8	35	61	3	1	2	0	50	160	8.6
Food	0	100	0	0	0	6	4	28	138	7.4
Textiles	0	0	6	0	0	0	1	18	25	1.3
Wood	0	1	2	0	1	2	2	33	41	2.2
Building Materials	0	0	28	0	0	0	13	72	113	6.0
Machinery	13	23	22	1	1	0	29	47	136	7.3
Miscellaneous	3	11	27	10	2	5	7	17	82	4.4
Secondary	31	158	156	11	24	12	110	249	751	40.1
Hazardous Materials	0	0	0	0	0	0	0	0	0	0.0
Transportation	0	0	0	0	0	0	0	0	0	0.0
Empty	4	31	9	0	9	5	17	19	94	5.0
Unknown	43	44	57	0	0	6	23	130	303	16.2
Total	104	404	378	26	38	39	208	675	1,872	100.0
Percent of Total	5.6	21.5	20.2	1.4	2.0	2.1	11.1	36.1	100.0	--

Figure 8 shows the distribution of trips at destination locations by trip purpose, while Table 14 shows a detailed summary of trips by commodity group and trip purpose. Approximately 52 percent of the total cargo vehicle trips were delivery, with unclassified secondary cargo and raw materials as the most frequent delivered among the commodity groups. These same groups were also the two most frequently picked-up commodities. The trip purpose “pick-up” made up nearly 15 percent of the total cargo trips. However, these do not represent the actual portion of trips that

picked up cargo because some of the trips coded as “base location” trip purpose were also the pick-up location for cargo.

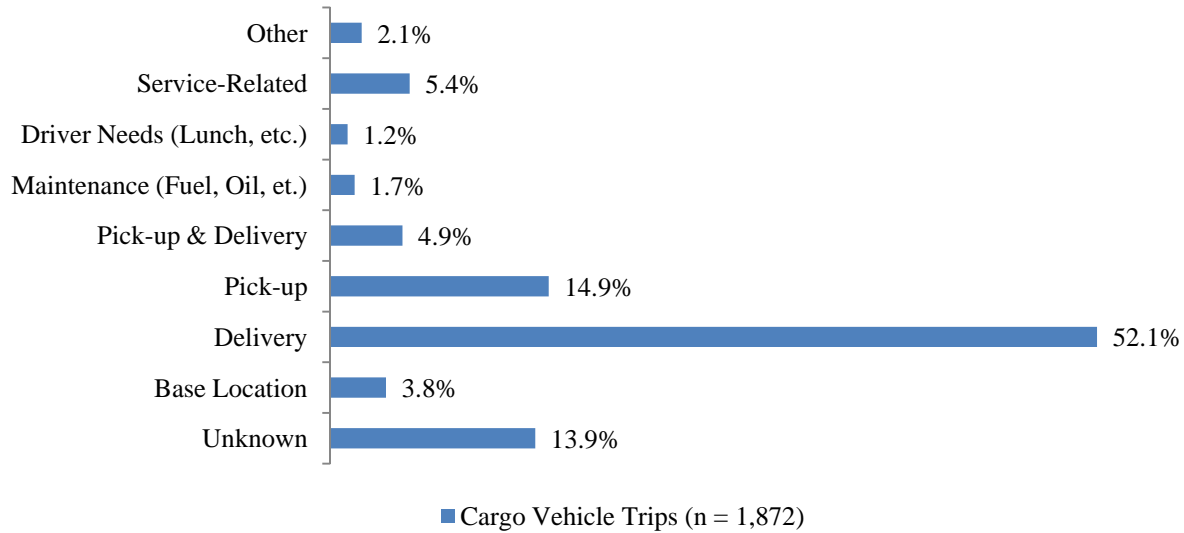


Figure 8. Cargo Trip Purposes at the Trip Destinations.

Table 14. Cargo Trips by Commodity Group and Trip Purpose at the Trip Destinations.

Commodity Group	Trip Purpose								Total Trips	% of Total
	Base Location	Delivery	Pick-Up	Pick-Up & Delivery	Main-tenance	Driver Needs	Service	Other		
Agriculture	3	15	8	1	0	2	0	0	29	1.5
Raw Materials	1	111	35	9	2	2	0	0	160	8.6
Food	0	136	0	2	0	0	0	0	138	7.4
Textiles	0	5	3	3	0	0	1	13	25	1.3
Wood	0	15	3	21	2	0	0	0	41	2.2
Building Materials	5	59	49	0	0	0	0	0	113	6.0
Machinery	11	77	28	5	4	0	10	1	136	7.3
Misc.	8	35	26	7	2	1	1	2	82	4.4
Secondary	11	515	123	44	2	6	39	11	751	40.1
Hazardous	0	0	0	0	0	0	0	0	0	0.0
Transport.	0	0	0	0	0	0	0	0	0	0.0
Empty	31	0	0	0	17	11	30	5	94	5.0
Unknown	1	8	3	0	2	0	20	269	303	16.2
Total	71	976	278	92	31	22	101	301	1,872	100.0
Percent of Total	3.8	52.1	14.9	4.8	1.7	1.2	5.4	16.1	100.0	--

The analysis of cargo weights by cargo type provides information on the volume and type of commodities being moved from the time the surveyed cargo vehicle left its base location, began its trip, continued making trips until it reached its destination(s), and returned to its base location. The net cargo weight for each trip was estimated based on the cargo weight being picked-up and/or being dropped-off, consistent with the reported trip purpose for each stop. There were several cases when cargo types were changed between trips (i.e. reported as empty cargo or food type), even if the same cargo was being transported either for delivery or pick-up. The driver of the surveyed cargo vehicle reported a different trip purpose during a particular stop (i.e. driver needs - lunch, etc.), which indicated that no cargo was either delivered and/or picked-up but the cargo remained in transit. In such cases, the cargo weight from the trip origin should be the net cargo weight at that particular stop or trip destination with its corresponding cargo type. If a delivery occurred during that particular stop, the cargo weight for that particular drop-off should be deducted from the current weight load, and if cargo was picked-up, the cargo weight should be added to the current weight load, thus resulting to an estimated net cargo weight for that particular trip.

Table 15 shows the distribution of average net cargo weight per trip by commodity group and land use type at destination locations and Table 16 shows the distribution by commodity group and trip purpose. Raw materials being transported to retail sites showed the highest average net cargo weight, followed by building materials being delivered to residential land use sites. Building materials and agriculture materials had the highest average net cargo weights for deliveries.

Table 15. Average Net Cargo Weight (lbs.) by Commodity Group and Land Use at Trip Destinations.

Commodity Group	Land Use							
	Office	Retail	Ind'l	Med	Edu	Gov't	Res	Other
Agriculture	0	0	15,570	0	0	59	5,000	521
Raw Materials	0	24,549	6,176	8,333	3,500	0	0	150
Food	0	0	0	0	0	67	0	1
Textiles	0	0	0	0	0	0	0	1,822
Wood	0	0	5,501	0	100	1	0	72
Building Materials	0	0	3,331	0	0	0	18,523	286
Machinery	17	26	70	0	300	0	10	13
Miscellaneous	67	0	3,133	0	20	12,000	214	16
Secondary	1,695	236	5,976	287	1,708	63	3,041	6
Hazardous Materials	0	0	0	0	0	0	0	0
Transportation	0	0	0	0	0	0	0	0
Empty	0	0	0	0	0	0	0	0
Unknown	0	1	53	0	0	0	0	0

Table 16. Average Net Cargo Weight (lbs.) by Commodity Group and Trip Purpose at Trip Destinations.

Commodity Group	Trip Purpose							
	Base Location	Delivery	Pick-Up	Pick-Up & Delivery	Maintenance	Driver Needs	Service	Other
Agriculture	0	16,051	0	0	0	0	0	0
Raw Materials	0	14,758	0	2	0	0	0	0
Food	0	7	0	0	0	0	0	0
Textiles	0	0	0	0	0	0	0	1,456
Wood	0	5,938	0	3	0	0	0	0
Building Materials	8,400	30,037	0	0	0	0	0	0
Machinery	0	386	0	0	0	0	0	0
Miscellaneous	7,508	1,796	0	4,000	0	0	0	0
Secondary	4,545	3,217	2	262	0	0	557	38
Hazardous Material	0	0	0	0	0	0	0	0
Transportation	0	0	0	0	0	0	0	0
Empty	0	0	0	0	0	0	0	0
Unknown	0	538	0	0	15	0	0	0

Table 17 shows the distribution of cargo trips and average net cargo weights at trip destinations by commodity group. Overall, the average net cargo weight per trip was about 3,300 lbs. Of the classified commodity groups, building materials showed the highest average net cargo weight at approximately 16,000 lbs. per trip. However, secondary and raw materials were the most frequently transported commodity groups, with average net cargo weights of about 2,300 lbs. and 10,200 lbs. per trip, respectively.

Table 17. Cargo Trips and Net Cargo Weight by Commodity Group at Trip Destinations.

Commodity Group	Total Cargo Trips	Total Net Cargo Weight (lbs.)	Number of Trips¹	Average Net Cargo Weight (lbs.)¹
Agriculture	29	240,761	29	8,302
Raw Materials	160	1,638,152	160	10,238
Food	138	900	138	7
Textiles	25	246,000	25	9,840
Wood	41	89,133	41	2,174
Building Materials	113	1,814,160	113	16,055
Machinery	136	29,735	136	219
Miscellaneous	82	150,912	82	1,840
Secondary	751	1,744,544	751	2,323
Hazardous Materials	0	0	0	0
Transportation	0	0	0	0
Empty	94	0	0	0
Unknown	303	4,331	303	14
Total	1,872	5,958,628	1,778	3,351

¹ Excluding trips with empty cargo.

Table 18 shows the number of trips and net cargo weights at trip destinations by land use type. Industrial land use sites showed the highest average net cargo weight of approximately 4,500 lbs. per trip. Cargo trips to “Other” locations showed the next highest average net cargo weight at nearly 4,400 lbs. per trip.

Table 18. Cargo Trips and Average Net Cargo Weights by Land Use at Trip Destinations.

Land Use	Total Cargo Trips	Total Net Cargo Weight (lbs.)	Number of Trips ¹	Average Net Cargo Weight (lbs.) ¹
Office	104	52,979	100	530
Retail	404	897,182	373	2,405
Industrial	378	1,658,130	369	4,494
Medical	26	28,152	26	1,083
Education	38	44,943	29	1,550
Government	39	61,218	34	1,801
Residential	208	587,043	191	3,074
Other	603	2,546,416	584	4,360
Refused/Unknown	72	82,565	72	1,147
Total	1,872	5,958,628	1,778	3,351

¹ Excluding trips with empty cargo.

Table 19 shows the distribution of cargo trips and net cargo weights by trip purpose. The trip purpose “Return to Base Location” had the highest average net weight at 7,200 lbs. per trip. However, there were more service-related trips, with an average net cargo weight of 5,600 lbs. per trip.

Table 19. Cargo Trips and Average Net Cargo Weights by Trip Purpose at Trip Destinations.

Trip Purpose	Total Cargo Trips	Total Net Cargo Weight (lbs.)	Number of Trips ¹	Average Net Cargo Weight (lbs.) ¹
Return to Base Location	40	250,560	35	7,159
Delivery	101	21,730	71	306
Pick-Up	22	0	11	0
Pick-Up and Delivery	31	30	14	2
Maintenance (fuel, oil, etc.)	92	39,601	92	430
Driver Needs (lunch, etc.)	278	200	278	1
Service-Related	976	5,494,447	976	5,630
Other	71	152,060	40	3,802
Unknown	261	0	261	0
Total	1,872	5,958,628	1,778	3,351

¹ Excluding trips with empty cargo.

Trip Length

Odometer readings at the beginning and end of the trip are useful in estimating travel distances for external and intra-zonal trips. The Jefferson-Orange-Hardin commercial vehicle survey, however, only provided odometer mileage on each vehicle for the beginning of the trip and not for the end of the trip. Because this incomplete information makes odometer readings not particularly useful for trip length measurement in the analysis, network matrices available for the study area were used to estimate trip lengths. The network matrices provide travel distance and time estimates from one zone to all other zones in the JOHRTS study area. Since each reported trip in the survey was coded with a traffic analysis zone (TAZ) number assigned to the study area, it was then possible to estimate the trip length based on the distance provided in the network matrix.

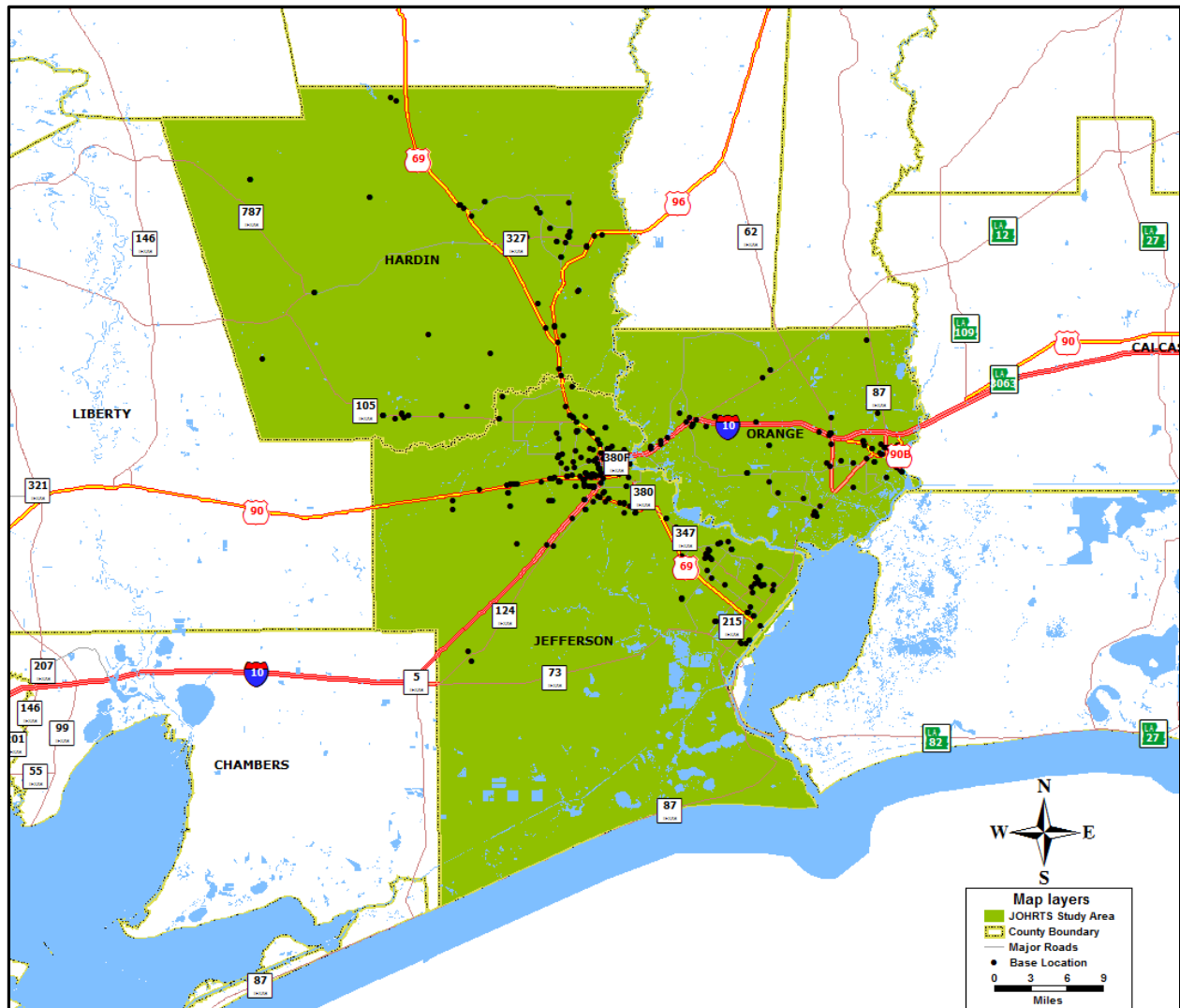


Figure 9. TAZ Boundary and Base Locations of Surveyed Commercial Vehicles.

Figure 9 shows the TAZ boundary and base locations of surveyed vehicles within the Jefferson-Orange-Hardin study area, while Figure 10 shows the origin and destination locations of trips made by the surveyed vehicles. Any trip that had at least one trip end outside of the JOHRTS study area was considered an external trip.

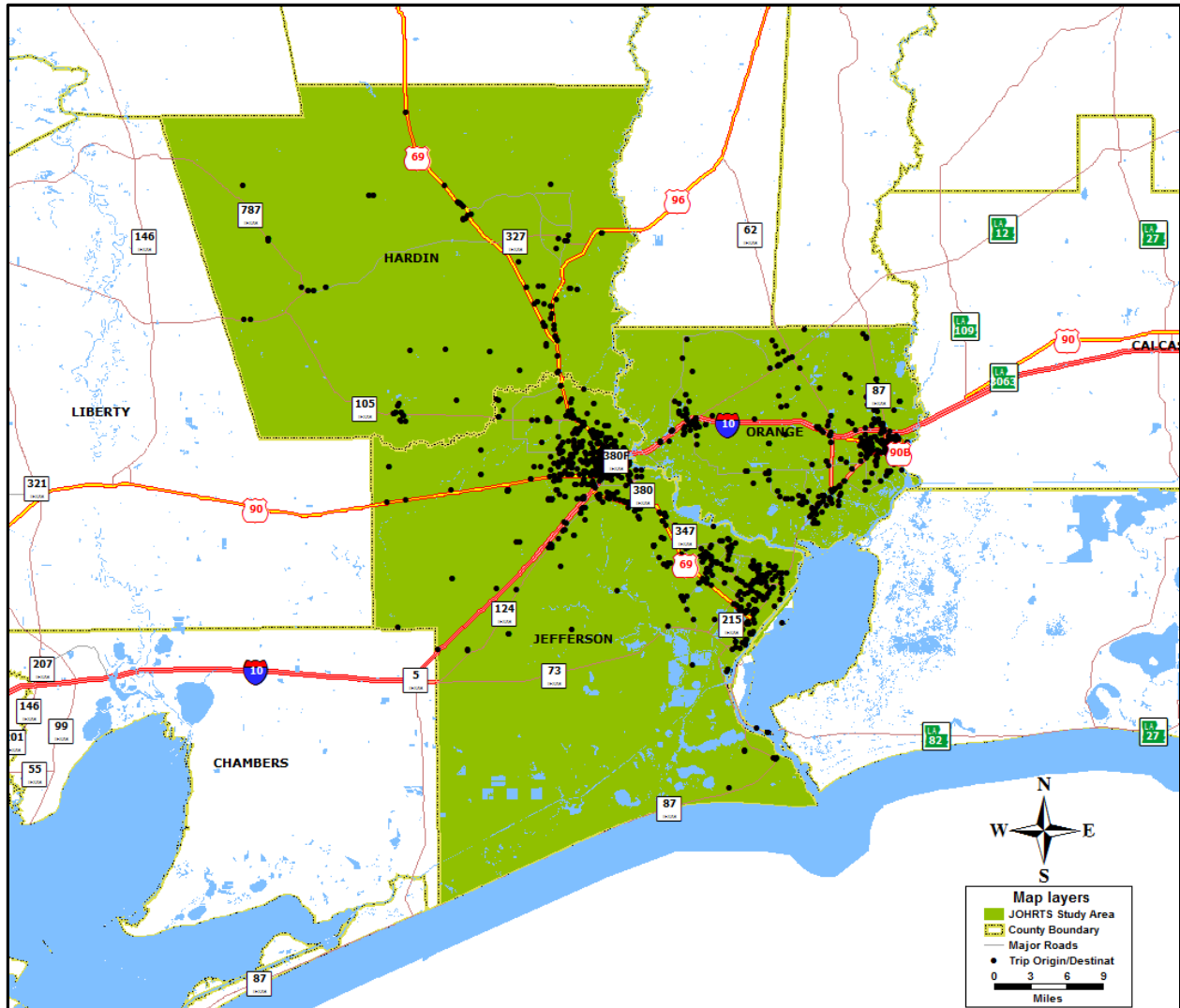


Figure 10. Trip Origins and Destinations of Surveyed Commercial Vehicles.

The results presented in this section pertain to trip length characteristics for 3,003 inter-zonal trips only. Table 20 shows the trip length frequency distribution (TLFD), grouped at five-mile intervals, while Figure 11 and Table 21 show the ungrouped TLFD. Approximately 41 percent of the cargo and 53 percent of the service vehicle trips had trip lengths less than five miles, and 22 percent of the cargo vehicle trips and 20 percent of the service vehicles had trip lengths between six miles and ten miles. The longest trip lengths reported by cargo and service vehicles were 62

and 51 miles, respectively. There were 30 reported inter-zonal trips with unknown origin/destination zones. These trips were not included in the analysis and estimation of average trip lengths.

Table 20. Trip Length Frequency Distribution (Grouped Interval).

Trip Length (miles)	Cargo		Service		All Vehicles	
	# of Trips	% of Total	# of Trips	% of Total	# of Trips	% of Total
Less than 5	626	40.7	780	53.3	1,406	46.8
6 to 10	335	21.7	296	20.3	631	21.1
11 to 15	163	10.6	162	11.1	325	10.8
16 to 20	166	10.8	108	7.5	274	9.1
21 to 25	118	7.7	60	4.1	178	5.9
26 to 30	72	4.7	43	2.9	115	3.8
31 to 35	26	1.7	6	0.4	32	1.1
36 to 40	16	1.0	5	0.3	21	0.7
41 to 45	14	0.9	0	0.0	14	0.5
Over 45	3	0.2	2	0.1	5	0.2
Total	1,539	100.0	1,462	100.0	3,001	100.0

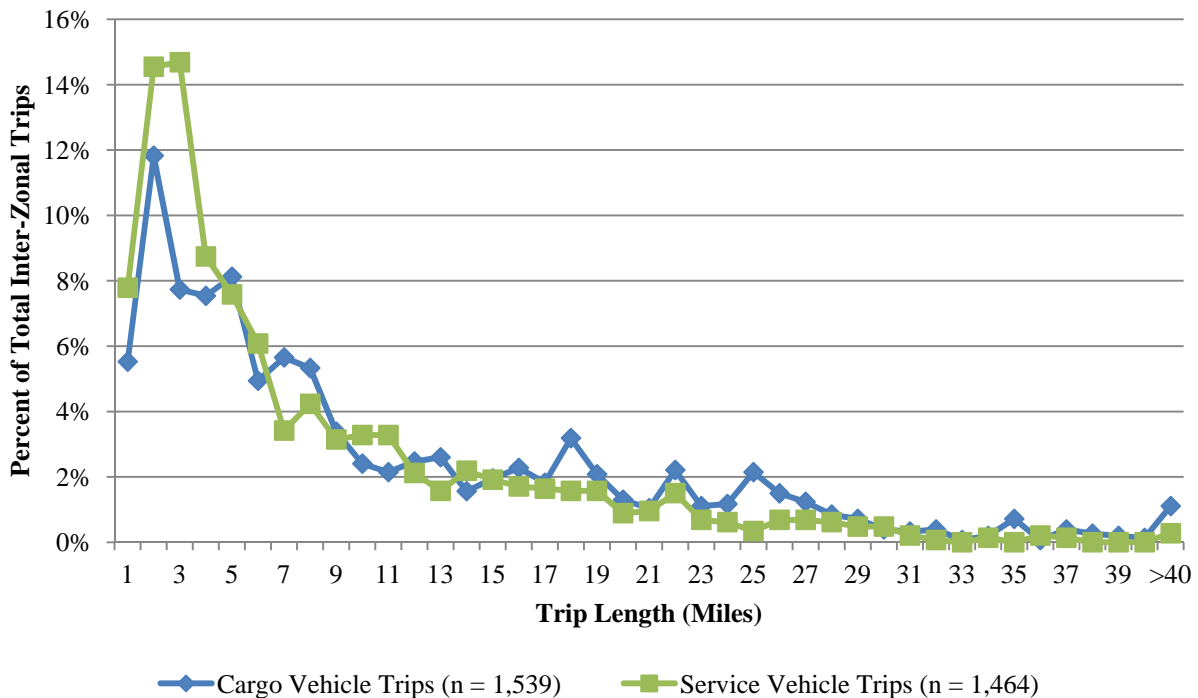


Figure 11. Surveyed Commercial Vehicle Trips TLFD.

Table 21. Trip Length Frequency Distribution (Ungrouped).

Trip Length (miles)	Cargo Vehicles		Service Vehicles		All Vehicles	
	# of Trips	% of Total	# of Trips	% of Total	# of Trips	% of Total
1	85	5.5	114	7.8	199	6.6
2	182	11.8	213	14.5	395	13.2
3	119	7.7	214	14.7	333	11.1
4	116	7.5	127	8.7	243	8.1
5	125	8.1	111	7.6	236	7.9
6	76	4.9	89	6.1	165	5.5
7	87	5.7	50	3.4	137	4.6
8	82	5.3	62	4.2	144	4.8
9	52	3.5	46	3.1	98	3.3
10	37	2.4	48	3.3	85	2.8
11	33	2.1	48	3.3	81	2.7
12	38	2.5	31	2.1	69	2.3
13	40	2.6	23	1.6	63	2.1
14	24	1.6	32	2.2	56	1.8
15	30	1.9	28	1.9	58	1.9
16	35	2.3	25	1.7	60	2.0
17	28	1.8	24	1.6	52	1.7
18	49	3.2	23	1.6	72	2.4
19	32	2.2	23	1.6	55	1.8
20	20	1.3	13	0.9	33	1.1
21	16	1.0	14	1.0	30	1.0
22	34	2.2	22	1.5	56	1.9
23	17	1.1	10	0.7	27	0.9
24	18	1.2	9	0.6	27	0.9
25	33	2.1	5	0.3	38	1.3
26	23	1.5	10	0.7	33	1.1
27	19	1.2	10	0.7	29	1.0
28	13	0.8	9	0.6	22	0.7
29	11	0.7	7	0.5	18	0.6
30	6	0.4	7	0.5	13	0.4
31	5	0.3	3	0.2	8	0.3
32	6	0.4	1	0.1	7	0.2
33	1	0.1	0	0.0	1	0.0
34	3	0.2	2	0.1	5	0.2
35	11	0.7	0	0.0	11	0.4
36	1	0.1	3	0.2	4	0.1
37	6	0.4	2	0.1	8	0.3
38	4	0.3	0	0.0	4	0.1
39	3	0.2	0	0.0	3	0.1
40	2	0.1	0	0.0	2	0.1
> 40	17	1.1	4	0.3	21	0.7
Total	1,539	100.0	1,462	100.0	3,001	100.0

Table 22 shows the average trip length to destinations by land use type for cargo and service vehicle trips. Overall, the average distance per trip traveled by the surveyed vehicles was 8.9 miles, with cargo vehicles averaging 10.2 miles and service vehicles averaging 7.5 miles. The most number of trips by cargo vehicles occurred at “other” land use types, with an average trip length of 11.1 miles, followed by retail and industrial sites with average trip lengths of 7.4 and 13.1 miles, respectively. For service vehicles, the highest frequency of trips occurred at “other” land use types, with an average trip length of 6.8 miles. Over half of the trips made by service vehicles (52 percent) occurred at residential and “other” land use sites.

Table 22. Average Trip Length to Destinations by Land Use Type.

Land Use	Cargo			Service			All Vehicles		
	Number of Trips	Total Trip Length (miles)	Average Trip Length (miles)	Number of Trips	Total Trip Length (miles)	Average Trip Length (miles)	Number of Trips	Total Trip Length (miles)	Average Trip Length (miles)
Office	90	874	9.7	223	1,829	8.2	313	2,703	8.6
Retail	337	2,488	7.4	126	1,005	8.0	463	3,493	7.5
Industrial	302	3,942	13.1	101	981	9.7	403	4,923	12.2
Medical	21	175	8.3	57	430	7.5	78	605	7.7
Education	30	282	9.4	47	380	8.1	77	662	8.6
Government	34	321	9.4	153	1,022	6.7	187	1,343	7.2
Residential	170	1,493	8.8	343	2,439	7.1	513	3,932	7.7
Other	555	6,148	11.1	414	2,834	6.8	969	8,982	9.3
Total	1,539	15,723	10.2	1,464	10,920	7.5	3,003	26,643	8.9

Table 23 shows the average trip length to destinations by commodity group for trips made by cargo vehicles only. Unclassified secondary cargo was the most frequently transported commodity group, with an average trip length of 9.8 miles per trip. Trips transporting building materials showed the longest average trip length of 14.9 miles per trip. The average trip length for trips with empty cargo was 11.1 miles.

Table 23. Average Trip Length to Destinations by Commodity Group.

Commodity Group	Cargo		
	Number of Trips	Total Trip Length (miles)	Average Trip Length (miles)
Agriculture	10	128	12.8
Raw Materials	130	1,756	13.5
Food	108	511	4.7
Textiles	24	104	4.3
Wood	29	349	12.0
Building Materials	106	1,578	14.9
Machinery	76	714	9.4
Miscellaneous	116	1,120	9.7
Transportation	0	0	0.0
Hazardous Materials	0	0	0.0
Secondary	603	5,933	9.8
Empty	265	2,940	11.1
Unknown	72	590	8.2
Total	1,539	15,723	10.2

Travel Time and Speed

The JOHRTS commercial vehicle survey provided travel logs on the arrival and departure times for each trip made by the surveyed commercial vehicles. The travel logs can be compared with the network travel time matrix table available for the study area. However, some of the reported travel logs had missing departure or arrival times, which rendered them unreliable in generating accurate estimate. Hence, as has been done in the estimation of trip lengths, travel time estimates were generated from the network travel time matrix table available for the JOHRTS study area, and travel speed estimates were derived from the estimated trip lengths.

Table 24 shows the travel time frequency distribution of inter-zonal trips, grouped at five-mile intervals, while Figure 12 and Table 25 show the ungrouped TLFD. Approximately 23 percent of the trips made by cargo vehicles were less than five minutes, 25 percent were between 6-and-10 minutes, and 15 percent were between 11-and-15 minutes. For service vehicles, approximately 33 percent of the trips were less than five minutes, 28 percent were between 6-and-10 minutes, and 12 percent were between 11-and-15 minutes. The longest duration of travel time for cargo vehicles was 83 minutes, while the longest travel duration for service vehicles was 59 minutes.

Table 24. Travel Time Frequency Distribution (Grouped Interval).

Travel Time (minutes)	Cargo		Service		All Vehicles	
	# of Trips	% of Total	# of Trips	% of Total	# of Trips	% of Total
Less than 5	360	23.4	484	33.1	844	28.1
6 to 10	381	24.8	414	28.3	795	26.5
11 to 15	226	14.7	180	12.3	406	13.4
16 to 20	140	9.1	141	9.5	281	9.4
21 to 25	122	7.9	93	6.4	215	7.2
26 to 30	128	8.3	63	4.3	191	6.4
31 to 35	93	6.0	47	3.2	140	4.7
36 to 40	38	2.5	19	1.3	57	1.8
41 to 45	16	1.0	14	1.0	30	1.0
Over 45	35	2.3	9	0.6	44	1.5
Total	1,539	100.0	1,464	100.0	3,003	100.0

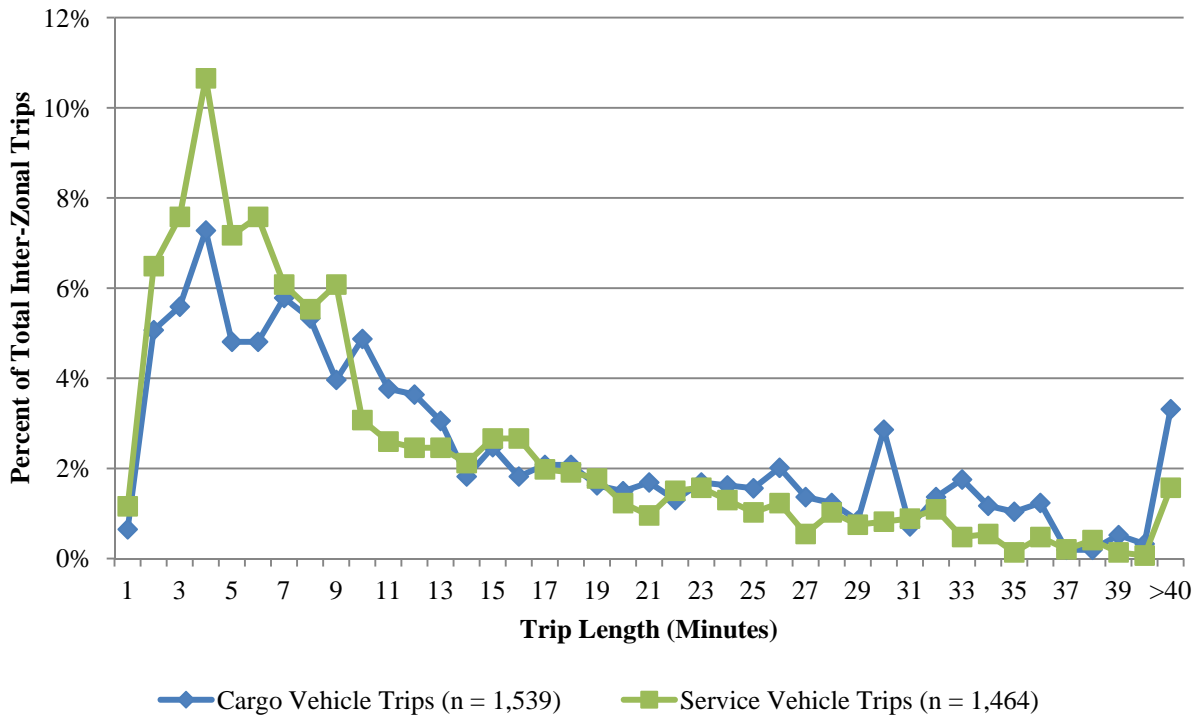


Figure 12. Surveyed Commercial Vehicle Trips Travel Time.

Table 25. Travel Time Frequency Distribution (Ungrouped).

Travel Time (minutes)	Cargo Vehicles		Service Vehicles		All Vehicles	
	# of Trips	% of Total	# of Trips	% of Total	# of Trips	% of Total
1	10	0.6	17	1.2	27	0.9
2	78	5.1	95	6.5	173	5.8
3	86	5.6	111	7.5	197	6.6
4	112	7.3	156	10.6	268	8.8
5	74	4.8	105	7.2	179	6.0
6	74	4.8	111	7.6	185	6.2
7	89	5.8	89	6.1	178	5.8
8	82	5.3	81	5.4	163	5.4
9	61	4.0	89	6.1	150	5.0
10	75	4.9	45	3.1	120	4.0
11	58	3.8	38	2.6	96	3.2
12	56	3.6	36	2.5	92	3.1
13	47	3.1	36	2.5	83	2.8
14	28	1.8	31	2.1	59	2.0
15	38	2.5	39	2.7	77	2.6
16	28	1.8	39	2.7	67	2.2
17	32	2.1	29	2.0	61	2.0
18	32	2.1	28	1.9	60	2.0
19	25	1.6	26	1.8	51	1.7
20	23	1.5	18	1.2	41	1.4
21	26	1.7	14	1.0	40	1.3
22	20	1.3	22	1.5	42	1.4
23	26	1.7	23	1.6	49	1.6
24	25	1.6	19	1.3	44	1.5
25	24	1.6	15	1.0	39	1.3
26	31	2.0	18	1.2	49	1.6
27	21	1.4	8	0.5	29	1.0
28	19	1.2	15	1.0	34	1.1
29	13	0.8	11	0.8	24	0.8
30	44	2.8	12	0.8	56	1.9
31	11	0.7	13	0.9	24	0.8
32	21	1.4	16	1.1	37	1.2
33	27	1.8	7	0.5	34	1.1
34	18	1.2	8	0.5	26	0.9
35	16	1.0	2	0.1	18	0.6
36	19	1.2	7	0.5	26	0.9
37	3	0.2	3	0.2	6	0.2
38	3	0.2	6	0.4	9	0.3
39	8	0.5	2	0.1	10	0.3
40	5	0.3	1	0.1	6	0.2
> 40	51	3.3	23	1.6	74	2.5
Total	1,539	100.0	1,464	100.0	3,003	100.0

Table 26 shows the average travel time and speed to destinations by land use for cargo and service vehicles. Overall, the average travel time for all surveyed vehicles was 12.8 minutes, with cargo vehicles averaging 14.5 minutes and service vehicles averaging 11.0 minutes. By land use types, trips made by cargo vehicles to industrial sites had the longest average travel duration of 18.3 minutes, with an average travel speed of 42.8 mph. For service vehicles, trips to industrial sites also had the highest average travel time at 14.2 minutes, with an average travel speed of 41.0 mph.

Table 26. Average Travel Time and Speed to Destinations by Land Use Type.

Land Use	Cargo			Service			All Vehicles		
	Number of Trips	Average Travel Time (minutes)	Average Travel Speed (mph)	Number of Trips	Average Travel Time (minutes)	Average Travel Speed (mph)	Number of Trips	Average Travel Time (minutes)	Average Travel Speed (mph)
Office	90	14.0	41.6	223	12.1	40.5	313	12.7	40.9
Retail	337	10.7	41.3	126	11.5	41.5	463	10.9	41.4
Industrial	302	18.3	42.8	101	14.2	41.0	403	17.3	42.4
Medical	21	12.0	41.6	57	11.1	40.9	78	11.3	41.1
Education	30	13.6	41.5	47	12.0	40.6	77	12.6	41.0
Government	34	12.8	44.1	153	10.1	39.8	187	10.6	40.8
Residential	170	12.7	41.5	343	10.6	40.4	513	11.3	40.8
Other	555	15.7	42.3	414	10.2	40.4	969	13.4	41.7
Total	1,539	14.5	42.2	1,464	11.0	40.5	3,003	12.8	41.5

Table 27 shows the average travel time and speed to destinations by commodity group for trips made by cargo vehicles only. Trips transporting building materials had the longest average trip duration of 20.6 minutes, with an average travel speed of 43.3 mph. Unclassified secondary materials had the highest number of trips, with an average travel time of 14.0 minutes and 42.1 mph.

Table 27. Average Travel Time and Speed to Destinations by Commodity Group.

Land Use	Cargo		
	Number of Trips	Average Travel Time (minutes)	Average Travel Speed (mph)
Agriculture	10	18.2	42.3
Raw Materials	130	18.6	43.5
Food	108	7.3	38.9
Textiles	24	7.0	37.1
Wood	29	17.0	42.4
Building Materials	106	20.6	43.3
Machinery	76	13.5	41.8
Miscellaneous	116	14.0	41.3
Transportation	0	0.0	0.0
Hazardous Materials	0	0.0	0.0
Secondary	603	14.0	42.1
Empty	265	15.7	42.3
Unknown	72	11.9	41.4
Total	1,539	14.5	42.2

Trip Tours

The analyses of trip tours show the amount of circuitous travel undertaken by commercial vehicles in the study area. Trip tours are defined as a combination (or chaining) of trips in which a vehicle leaves and returns to a common point, typically its base location. To accurately analyze trip tours, external trips had to be included in the analysis. This is done because it is possible for trip tours to begin within the study area, then travel outside the study area, and then end or return to the study area. Therefore, to exclude external trips in the analysis could result in not capturing those trips that occur outside the study area that take place within the trip tour.

There were 3,613 trips observed in the JOHRTS commercial vehicle survey. Each trip in the survey provided information on whether or not the origin of the trip was the vehicle's base location. This served as the basis for determining if the trip was a base trip or a non-base trip. A base trip was defined as when either trip ends (origin or destination) began or ended at the base location. If neither trip end was at the base location, then the trip was considered as a non-base trip.

As Table 28 shows, approximately 58 percent of the total trips generated by cargo vehicles were non-base trips and 42 percent were base trips. For trips made by service vehicles, 56 percent were non-base trips and 44 percent were base trips.

Table 28. Base and Non-Base Trips.

Trip Type	Cargo Vehicles		Service Vehicles		All Vehicles	
	Number of Trips	Percent of Total	Number of Trips	Percent of Total	Number of Trips	Percent of Total
Base	777	41.51	766	44.00	1,543	42.71
Non-Base	1,095	58.49	975	56.00	2,070	57.29
Total	1,872	100.00	1,741	100.00	3,613	100.00

Table 29 shows the distribution of trip tours for cargo and service vehicles. There were 693 trip tours generated by 453 vehicles making at least one trip tour. Cargo vehicles made 365 tours and service vehicles produced 328 tours. The number of tours varied from one-to-eight tours for cargo vehicles, and one-to-six tours for service vehicles. The majority of cargo and service vehicles made only one trip tour (69 percent and 72 percent, respectively). For those cargo and service vehicles making only one trip tour, they averaged 6.2 and 4.8 trips within the tour, respectively. For all vehicles combined, the average number of tours per vehicle was 1.5 and the average number of trips per tour was 4.6.

Table 29. Trip Tours per Vehicle.

Cargo Vehicles				
Total Number of Trip Tours	Number of Vehicles	Number of Tours	Number of Trips	Average Trips per Tour
1	152	152	945	6.2
2	32	64	226	3.5
3	18	54	144	2.7
4	8	32	86	2.7
5	6	30	60	2.0
6	3	18	43	2.4
7	1	7	14	2.0
8	1	8	19	2.4
Cargo Total	221	365	1,537	4.9
Service Vehicles				
Total Number of Trip Tours	Number of Vehicles	Number of Tours	Number of Trips	Average Trips per Tour
1	166	166	797	4.8
2	44	88	327	3.7
3	17	51	154	3.0
4	3	12	49	4.1
5	1	5	13	2.6
6	1	6	12	2.0
7	0	0	0	0.0
8	0	0	0	0.0
Service Total	232	328	1,352	4.3
Grand Total	453	693	2,889	4.6

The analyses of trip tours also involved counting the number of non-base trips, external trips, inter-zonal trips and intra-zonal trips within trip tours to determine the total amount and types of travel that occur during the course of the tour. There were 2,889 trips observed within the total 693 trip tours. For all vehicles, 140 were external trips (5 percent), 2,642 were inter-zonal trips (91 percent), and 107 were intra-zonal trips (4 percent).

Table 30 shows the distribution of these trips for cargo and service vehicles. Table 31 shows the number of non-base trips within trip tours separately since non-base trips are not mutually exclusive of the other trip types (i.e., a non-base trip may also be an inter-zonal or external trip).

Table 30. External, Inter-Zonal and Intra-Zonal Trips within Trip Tours.

No. of Trip Tours	External		Inter-Zonal		Intra-Zonal		Total Trips	
	Cargo Vehicles	Service Vehicles	Cargo Vehicles	Service Vehicles	Cargo Vehicles	Service Vehicles	Cargo Vehicles	Service Vehicles
1	78	22	851	741	16	34	945	797
2	12	14	210	291	4	22	226	327
3	6	8	125	137	13	9	144	154
4	0	0	77	49	9	0	86	49
5	0	0	60	13	0	0	60	13
6	0	0	43	12	0	0	43	12
7	0	0	14	0	0	0	14	0
8	0	0	19	0	0	0	19	0
Total	96	44	1,399	1,243	42	65	1,537	1,352

Table 31. Non-Base Trips within Trip Tours.

No. of Trip Tours	Non-Base Trips within Trip Tours			Total Trips within Trip Tours					
	Cargo Vehicles	Service Vehicles	All Vehicles	Cargo Vehicles	Percent of Total	Service Vehicles	Percent of Total	All Vehicles	Percent of Total
1	641	465	1,106	945	61.5	797	58.9	1,742	60.3
2	98	151	249	226	14.7	327	24.2	553	19.1
3	36	52	88	144	9.4	154	11.4	298	10.3
4	22	25	47	86	5.6	49	3.6	135	4.7
5	0	3	3	60	3.9	13	1.0	73	2.5
6	7	0	7	43	2.8	12	0.9	55	1.9
7	0	0	0	14	0.9	0	0.0	14	0.5
8	3	0	3	19	1.2	0	0.0	19	0.7
Total	807	696	1,503	1,537	100.0	1,352	100.0	2,889	100.0

Figure 13 and Figure 14 show the percentage distribution of non-base trips, external trips, inter-zonal trips and intra-zonal trips within trip tours for cargo vehicles and service vehicles, respectively. Those cargo vehicles that completed five or more tours made trips that were all inter-zonal trips. For service vehicles that completed four or more tours, all of the trips were inter-zonal trips.

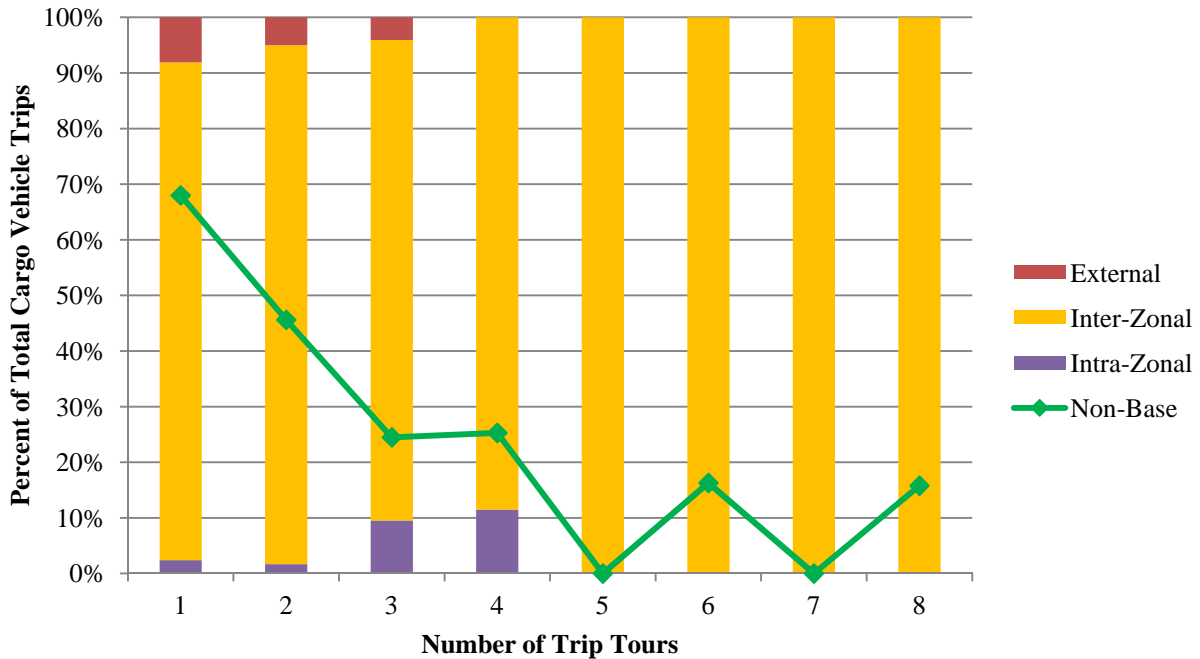


Figure 13. Cargo Vehicle Trips within Trip Tours by Trip Type.

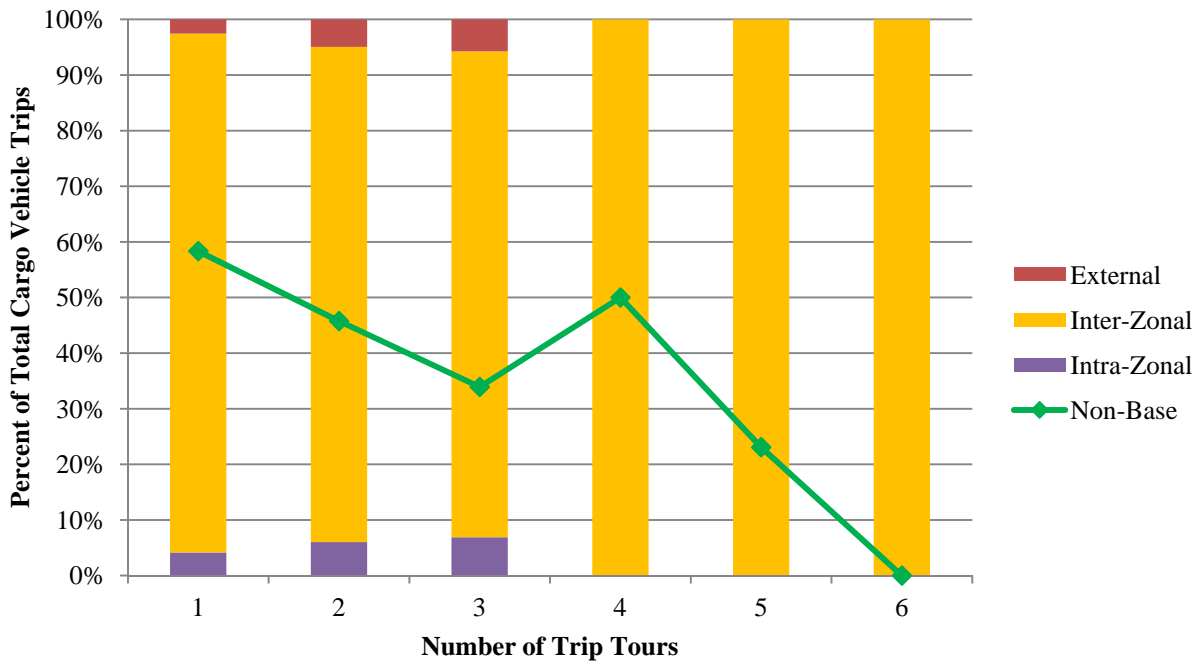


Figure 14. Service Vehicle Trips within Trip Tours by Trip Type.

The analyses of trip tours involved counting all the trips that began at the base location until the vehicle returned to its base location. Those trip chains that did not start and/or end at their base location, as well as those that only went to the base one time on the survey day, were considered

open tours. Due to the number of trips that were made in open tours, a review of when these trips occurred was performed. Table 32 provides an overview of when trips that are not part of tours were made relative to trip tours. Slightly over four percent of the trips made by cargo and service vehicles combined were before the first trip tour or after the last completed trip tours. However, nearly 16 percent of the trips made by surveyed vehicles that did not have any trip tours. A total of 77 vehicles (38 cargo and 39 service) did not make a trip tour on the survey day.

Table 32. Summary of Open Tour Trips.

Trip Type	Cargo		Service		All Vehicles	
	# of Trips	% of Total	# of Trips	% of Total	# of Trips	% of Total
Before start of first tour	1	0.05	30	1.72	31	0.86
After end of last tour	34	1.82	93	5.34	127	3.52
No tour (base only once)	300	16.03	266	15.28	566	15.66
Total (non-tour trips)	335	17.90	389	22.34	724	20.04
Within a tour	1,537	82.10	1,352	77.66	2,889	79.96
Total (all trips)	1,872	100.00	1,741	100.00	3,613	100.0

SURVEY EXPANSION

The expansion of commercial vehicle survey data is conducted in an indirect manner. In typical travel surveys, an estimate of the population being sampled is known and data are then expanded to represent that population. In the case of commercial vehicle surveys, the population of vehicles operating in the study area is unknown. Vehicle registration data are not considered a viable basis to estimate the number of commercial vehicles in the study area because other vehicles operating in the area may be registered in neighboring counties. However, in the JOHRTS commercial vehicle survey analysis, information on registered trucks has been included to show how the survey data compare with existing vehicle registration data.

The methodology currently used to expand commercial vehicle survey data is based on vehicle miles of travel (VMT) estimates from the Highway Performance Monitoring System (HPMS), and vehicle classification counts by functional classification for the study area. In essence, an estimate of the commercial VMT is developed from the HPMS data and is then used to expand the VMT observed from sampled commercial vehicles. HPMS data contains annual average daily traffic (AADT) estimates of the total VMT by functionally classified facilities such as

freeways, arterials, collectors, and local roadways. Since AADT includes weekend traffic, a correction factor is applied to the data to obtain average weekday VMT by functional classification. Table 33 provides the adjusted 2008 HPMS VMT estimates for the JOHRTS study area.

Table 33. 2008 HPMS Estimates of Weekday VMT in the JOHRTS Study Area.

Functional Classification	Total Weekday VMT
Freeway	4,425,437
Arterial	5,720,062
Collector	1,658,347
Local	796,895
Total	12,600,741

The percentage of commercial and non-commercial vehicles by functional classification are generally determined by utilizing vehicle classification counts obtained during the conduct of an external survey and vehicle classification counts conducted at randomly selected locations within the study area. However, there has not been a recently conducted external survey in the JOHRTS area, so external count data from another study area was utilized for a portion of the expansion. After reviewing data from several study areas, it was determined that the Killeen/Temple (KTUT) study area had external count data that exhibited similar characteristics to the internal count data obtained for the JOHRTS area.

The percentage of commercial vehicles for internal sites for each functional classification were combined with the corresponding percentage for external sites based on the percentage of regional VMT estimated as external travel. As mentioned previously, there has been no recent external survey conducted for the JOHRTS area, so the percent of external related VMT (as derived from the total HPMS VMT) for the KTUT study area was utilized. Based on the 2006 KTUT external survey, external VMT for the study area amounted to 26 percent of the total VMT. Therefore, it was reasonable to assume that 74 percent of the total VMT was internal travel. These percentages were applied to obtain the weighted average for each functional classification.

Table 34 provides the internal, external, and weighted percentages of commercial and non-commercial vehicles by functional classification. The weighted percentages were applied to the HPMS estimated weekday VMT shown in Table 33 to estimate the total commercial and non-commercial VMT. Table 35 shows the estimated VMT for commercial and non-commercial vehicles.

Table 34. Percentage of Commercial and Non-Commercial Vehicles by Functional Classification.

Functional Classification	Percent of Commercial Vehicles			Percent of Non-Commercial Vehicles		
	Internal Sites (74%)	External Sites (26%)	Weighted Average	Internal Sites (74%)	External Sites (26%)	Weighted Average
Freeway	22	24	23	78	76	77
Arterial	11	12	11	89	88	89
Collector	8	7	7	92	93	93
Local	N/A	4	4	N/A	96	96

Table 35. Estimated VMT for Commercial and Non-Commercial Vehicles.

Functional Classification	Commercial VMT	Non-Commercial VMT	Total VMT
Freeway	999,897	3,425,540	4,425,437
Arterial	624,319	5,095,743	5,720,062
Collector	123,898	1,534,449	1,658,347
Local	31,876	765,019	796,895
Total	1,779,990	10,820,751	12,600,741

The total commercial VMT of 1,779,990 miles represented all commercial vehicles that traveled within and to the boundary of the JOHRTS study area. To properly expand the survey data and determine the total internal commercial vehicle trips generated in the study area, commercial external VMT estimates had to be subtracted from the total commercial VMT. Using the KTUT external VMT estimate of 20 percent that was derived from the external trip tables, the total internal commercial VMT was determined to be 1,426,371 miles.

The total internal VMT observed from the commercial vehicle survey was 26,971 miles, of which 15,841 miles were cargo VMT and 11,130 were service VMT. This estimate was based on 3,037 inter-zonal trips (1,553 cargo vehicle trips and 1,484 service vehicle trips), multiplied by the average trip length (10.2 miles for cargo and 7.5 miles for service vehicles).

The total internal commercial VMT (1,426,371 miles) represented all commercial vehicles and is not distinguished by cargo or service vehicles. It was assumed that the distribution of cargo and service vehicle types operating in the JOHRTS study area was consistent with the distribution observed in the survey sample. In the survey, 58.7 percent of the observed commercial vehicle VMT was attributable to cargo vehicles and 41.3 percent was attributable to service vehicles. Therefore, to establish the VMT estimates by commercial cargo and service types, it was deemed reasonable to apply these percentages to the total internal commercial VMT. The resulting VMT estimates were 837,748 miles for cargo vehicles and 588,623 miles for service vehicles.

Expansion factors were derived based on the quotient between total internal VMT and observed internal VMT (from the survey) for each commercial vehicle type. The expansion factor (52.89) was then multiplied by the observed number of inter-zonal and intra-zonal trips to estimate the total vehicle trips. The resulting trip estimates were approximately 86,839 cargo vehicle trips and 88,055 service vehicle trips. Based on the average number of internal trips per day of 6.9 trips for cargo vehicles and 6.3 trips for service vehicles, 26,562 commercial vehicles (12,585 cargo vehicles and 13,977 service vehicles) were estimated to be operating within the JOHRTS study area on a daily basis. This estimate is nearly four times the 7,169 trucks registered in the study area in 2010. Table 36 provides a summary of key results from the JOHRTS commercial vehicle survey and data expansion.

Table 36. Key Survey Results and Expanded Trip and VMT Data.

Indicator	Cargo Vehicles	Service Vehicles	All Vehicles
Sample Size	259	271	530
Total Inter-Zonal Trips ¹	1,553	1,484	3,037
Total Intra-Zonal Trips	89	181	270
Total Internal Trips	1,642	1,665	3,307
Total External Trips	230	76	306
Total Internal and External Trips	1,872	1,741	3,613
Average Total Trips per Vehicle	7.2	6.4	6.8
Average Total Internal Trips per Vehicle ²	6.9	6.3	6.6
Average Trip Length	10.2	7.5	8.9
Observed Internal VMT (miles)	15,841	11,130	26,971
Total Internal Commercial VMT (miles)	837,748	588,623	1,426,371
Survey Expansion Factor	52.89	52.89	52.89
Total Expanded Inter-Zonal Commercial Vehicle Trips	82,132	78,483	160,615
Total Expanded Intra-Zonal Commercial Vehicle Trips	4,707	9,572	14,279
Total Expanded Commercial Vehicle Trips	86,839	88,055	174,894
Number of Commercial Vehicles Operating on a Daily Basis	12,585	13,977	26,562
Attraction Rate to Households	--	--	0.220

¹ Includes 27 trips with unknown origin or destination zones.

² Based on internal trips of 530 surveyed commercial vehicles (259 cargo vehicles and 271 service vehicles).

One final calculation was the determination of the commercial vehicle attraction rate to households. In the survey, approximately 18 percent of the trips went to residential land use types. This percentage was applied to the total, expanded commercial vehicle trips within the study area to obtain an estimated 31,574 trips to residential locations. The residential trip estimate was divided by the estimated number of households in the JOHRTS area (143,406) to obtain an attraction rate of 0.220.

SURVEY SUMMARY

This section provides a summary of vehicle and trip characteristics of 530 commercial vehicles that participated in the 2010 JOHRTS commercial vehicle survey. Based on the results from the survey, significant differences as well as similarities on travel characteristics were observed between cargo vehicles and service vehicles.

The average vehicle age for cargo vehicles was 6.4 years compared to 6.5 years for service vehicles. The odometer readings reported by cargo vehicles indicated an average mileage of 183,400 miles, which was nearly double the reported average mileage of 99,000 miles by service vehicles. In terms of fuel use, around 65 percent of cargo vehicles used diesel and 35 percent used unleaded gasoline, while 79 percent of service vehicles used unleaded gasoline and 21 percent used diesel.

The analyses of trip characteristics included in-depth examination of trip frequency, trip type, average trip length, trip purpose, and land use activity at trip destinations by commercial vehicle type. Surveyed cargo vehicles made an average of 7.2 total trips per day, compared to 6.4 trips per day for service vehicles. Excluding the trips made outside of the study area (external trips), cargo vehicles produced 6.9 internal trips per day, with average travel distance of 10.2 miles, compared to service vehicles which made 6.3 internal trips per day, with average trip length of 7.5 miles. The average travel time per trip for cargo vehicles was 14.5 minutes and for service vehicles the average travel time per trip was 11.0 minutes.

In terms of trip purpose at trip destinations, approximately 52 percent of the cargo vehicle trips were delivery, 15 percent were pick-up, and 14 percent were unknown/refused. For trips made by service vehicles, approximately 53 percent were service-related trip purpose, 16 percent were unknown/refused, and seven percent were delivery.

In terms of land use activity, approximately 22 percent of the trips made by cargo vehicles occurred at retail/shopping places, 19 percent occurred at industrial sites, and 11 percent occurred at residential locations. For service vehicles, nearly 25 percent of the trips took place at residential sites, 15 percent occurred at “other” sites, and 14 percent occurred at office buildings.

The analyses of cargo characteristics were exclusive to trips made by cargo vehicles only and involved examining the types of cargo/commodities being transported at trip destinations, the trip purposes and land use activity at each stop, and the net weight of cargo being picked-up and/or dropped off for each trip. Overall, the average net cargo weight per trip was around 3,350 pounds. Building materials showed the highest average net cargo weight of around 16,050 pounds per trip, but the most frequently transported commodity was secondary materials with a net cargo weight of 2,300 pounds per trip. Industrial land use showed the highest average net

cargo weight of around 4,500 pounds per trip, but more trips occurred at “other” sites with net cargo weight averaging nearly 4,400 pounds per trip. Return to base trip purpose had the highest average net cargo weight of around 7,200 pounds per trip, but service-related had the highest number of trip occurrences with net cargo weight averaging 5,600 pounds per trip.

The analyses of trip tours involved examining the amount of circuitous travel performed by the commercial vehicles in the study area. It also involved counting the number of non-base trips, external trips, inter-zonal trips, and intra-zonal trips within trip tours to determine the total amount and types of travel that occur during the course of the tour. A total of 693 trip tours were generated by the surveyed vehicles, with cargo vehicles making 365 tours and service vehicles producing 328 tours. The number of trip tours per vehicle varied from one to eight tours for cargo vehicles, and one to six tours for service vehicles. The average number of trips tours for all vehicles was 1.5 and the average number of trips per tour was 4.6. Trips made as part of trip tours accounted for 2,889 trips (1,537 trips by cargo vehicles and 1,352 trips by service vehicles). Within the trip tours, approximately 91 percent were inter-zonal trips, five percent were external trips and the remaining four percent were intra-zonal trips. Non-base trips (which were not mutually-exclusive of the other trip types) made up approximately 52 percent of the trips within the tours.

Lastly, the expansion of commercial vehicle survey data were based on vehicle miles of travel (VMT) estimates and vehicle classification counts for the JOHRTS study area. The commercial VMT estimates represented all commercial vehicles and do not distinguish by cargo and service vehicle types. Therefore, the estimation of VMT and volume of cargo and service vehicles operating within the study area were mainly based on key findings from the survey, such as the total number of internal cargo and service vehicle trips, the average number of trips per cargo and service vehicle, and the average trip lengths per cargo and service vehicle. Based on these findings, approximately 26,500 commercial vehicles (12,500 cargo vehicles and 14,000 service vehicles) were estimated to be operating within the JOHRTS study area on a daily basis, roughly four times the volume of trucks registered in the study area in 2010.

APPENDIX

**COMMERCIAL VEHICLE SURVEY
PART 1: VEHICLE INFORMATION**

(If you have participated in prior surveys, please fill out this form anyway.)

Vehicle ID#: _____

Vehicle License # : _____

Survey Location (zone): _____

SIC Code: _____

Travel Day: _____
Month / Day

Company or Name of Owner (name on registration):

Address of location where vehicle was based at beginning of travel day:

(Street Address or Nearest Intersection)

City _____ State _____ ZIP _____

Type of Place vehicle was based at on beginning of travel day. (SEE BELOW) _____

Vehicle Info: Make _____ ; Model: _____ ; Year: _____

Vehicle Type 1) Cargo / Freight Transport Vehicle
 2) Service Vehicle (vehicle is not used to transport cargo or freight)

Vehicle Fuel: 1) Unleaded Gas 2) Diesel 3) Propane 4) Hybrid
 5) Other _____ (Specify)

Vehicle Classification:

1) <input type="checkbox"/> Passenger Car	5) <input type="checkbox"/> Single Unit 2-axle (6 wheels)
2) <input type="checkbox"/> Pick-up	6) <input type="checkbox"/> Single Unit 3-axle (10 wheels)
3) <input type="checkbox"/> Van (Cargo or Mini)	7) <input type="checkbox"/> Single Unit 4-axle (14 wheels)
4) <input type="checkbox"/> Sport Utility Vehicle (SUV)	8) <input type="checkbox"/> Semi (all Tractor-Trailer combinations)
	9) <input type="checkbox"/> Other _____

Gross Vehicle Weight: _____ pounds

Beginning Odometer Reading: _____ Number of Trips Total: _____

Type of Place Codes		
(1) Office Building	(6) Educational (college, trade, etc.)	(11) Warehouse
(2) Retail / Shopping	(7) Government Office / Building	(12) Distribution Center
(3) Industrial / Manufacturing	(8) Residential	(13) Construction Site
(4) Medical / Hospital	(9) Airport	(14) Other (specify)
(5) Educational (12 th grade or less)	(10) Intermodal Facility	(99) Refused / Unknown

Commercial Vehicle Survey PART 2: Travel Log

VEHICLE LICENSE #: _____

THE PLACE MY TRAVEL BEGAN TODAY WAS:

Work / Base Location Other Location (Please describe) _____

Type of Place (Specify Type of Place 1-14 or 99, see codes below) _____

(Street address or nearest intersection for place travel began)

TRAVEL DATE _____
Month / Day

(City, state, zip code)

DEPARTURE TIME: _____ am/pm

When you left the above location was your vehicle: Fully Loaded Partially Loaded Empty Not Applicable (Service Vehicle)

If loaded, what is the total weight in pounds of the cargo being transported? (Please provide an estimate if unsure of exact weight) _____

RECORD EVERY PLACE YOU GO, INCLUDING QUICK STOPS

RECORD the following information about each place		What time did you arrive and depart this location? (record exact times)	Activity What are you doing at this Location (See options below)	What type of place is this? (see options below)	Is this the work / base location for this vehicle? <input type="checkbox"/> - Yes <input type="checkbox"/> - No	Type of Cargo What is it?	Cargo Weight (in Pounds)
NAME of Place:	Address including city, state, and zip OR Nearest street intersection or Landmark						
PLACE 1		Arrive: _____ am/pm Depart: _____ am/pm			<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Delivery <hr/> Picked Up
PLACE 2		Arrive: _____ am/pm Depart: _____ am/pm			<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Delivery <hr/> Picked Up
PLACE 3		Arrive: _____ am/pm Depart: _____ am/pm			<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Delivery <hr/> Picked Up

ACTIVITY OPTIONS	TYPE OF PLACE OPTIONS
<p>(1) Base Location / Return to Base Location (5) Maintenance (fuel, oil, etc.) (2) Delivery (6) Driver Needs (lunch, etc.) (3) Pick-Up (7) Service-Related Business (4) Pick-Up and Delivery (8) Other (please specify)</p>	<p>(1) Office Building (non-government) (6) Education (college, trade (2) Retail / Shopping (7) Government Office / Building (3) Industrial / Manufacturing (8) Residential (4) Medical / Hospital (9) Airport (5) Education (12th grade or less) (10) Intermodal Facility</p>
	<p>(11) Warehouse (12) Distribution Center (13) Construction Site (14) Other (specify) (99) Refused / Unknown</p>

Commercial Vehicle Survey Travel (continued)

RECORD the following information about each place		What time did you arrive and depart this location? (record exact times)	Activity What are you doing at this location? (see options below)	What type of place is this? (see options below)	Is this the work / base location for this vehicle? <input type="checkbox"/> - Yes <input type="checkbox"/> - No	Type of Cargo What is it?	Cargo Weight (in Pounds)
<i>NAME of Place:</i>	<i>Address including city, state, and zip OR Nearest street intersection or Landmark</i>						
PLACE 4		Arrive: _____ am/pm Depart: _____ am/pm			<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Delivery <hr/> Picked Up
PLACE 5		Arrive: _____ am/pm Depart: _____ am/pm			<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Delivery <hr/> Picked Up
PLACE 6		Arrive: _____ am/pm Depart: _____ am/pm			<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Delivery <hr/> Picked Up
PLACE 7		Arrive: _____ am/pm Depart: _____ am/pm			<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Delivery <hr/> Picked Up
PLACE 8		Arrive: _____ am/pm Depart: _____ am/pm			<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Delivery <hr/> Picked Up
PLACE 9		Arrive: _____ am/pm Depart: _____ am/pm			<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Delivery <hr/> Picked Up

ACTIVITY OPTIONS	TYPE OF PLACE OPTIONS
<ul style="list-style-type: none"> (1) Base Location / Return to Base Location (2) Delivery (3) Pick-Up (4) Pick-Up and Delivery (5) Maintenance (fuel, oil, etc.) (6) Driver Needs (lunch, etc.) (7) Service-Related Business (8) Other (please specify) 	<ul style="list-style-type: none"> (1) Office Building (non-government) (2) Retail / Shopping (3) Industrial / Manufacturing (4) Medical / Hospital (5) Education (12th grade or less) (6) Education (college, trade) (7) Government Office / Building (8) Residential (9) Airport (10) Intermodal Facility (11) Warehouse (12) Distribution Center (13) Construction Site (14) Other (specify) (99) Refused / Unknown

Commercial Vehicle Survey Travel (continued)

	RECORD the following information about each place <i>NAME of Place:</i> _____ <i>Address including city, state, and zip</i> OR <i>Nearest street intersection or Landmark</i> _____	What time did you arrive and depart this location? (record exact times)	Activity What are you doing at this location? (see options below)	What type of place is this? (see options below)	Is this the work / base location for this vehicle? <input type="checkbox"/> - Yes <input type="checkbox"/> - No	Type of Cargo What is it?	Cargo Weight (in Pounds)
PLACE 10		Arrive: _____ am/pm Depart: _____ am/pm					Delivery <hr/> Picked Up
PLACE 11		Arrive: _____ am/pm Depart: _____ am/pm					Delivery <hr/> Picked Up
PLACE 12		Arrive: _____ am/pm Depart: _____ am/pm					Delivery <hr/> Picked Up
PLACE 13		Arrive: _____ am/pm Depart: _____ am/pm					Delivery <hr/> Picked Up
PLACE 14		Arrive: _____ am/pm Depart: _____ am/pm					Delivery <hr/> Picked Up

ACTIVITY OPTIONS	TYPE OF PLACE OPTIONS
(1) Base Location / Return to Base Location (2) Delivery (3) Pick-Up (4) Pick-Up and Delivery (5) Maintenance (fuel, oil, etc.) (6) Driver Needs (lunch, etc.) (7) Service-Related Business (8) Other (please specify)	(1) Office Building (non-government) (2) Retail / Shopping (3) Industrial / Manufacturing (4) Medical / Hospital (5) Education (12 th grade or less) (6) Education (college, trade) (7) Government Office / Building (8) Residential (9) Airport (10) Intermodal Facility (11) Warehouse (12) Distribution Center (13) Construction Site (14) Other (specify) (99) Refused / Unknown

Commercial Vehicle Survey (continued)

VEHICLE LICENSE #: _____

	RECORD the following information about each place <i>NAME of Place:</i> _____ <i>Address including city, state, and zip</i> OR <i>Nearest street intersection or Landmark</i> _____	What time did you arrive and depart this location? (record exact times)	Activity What are you doing at this location? (see options below)	What type of place is this? (see options below)	Is this the work / base location for this vehicle? <input type="checkbox"/> - Yes <input type="checkbox"/> - No	Type of Cargo What is it?	Cargo Weight (in Pounds)
PLACE 15		Arrive: _____ am/pm Depart: _____ am/pm			<input type="checkbox"/> - Yes <input type="checkbox"/> - No		_____ Delivery _____ Picked Up
PLACE 16		Arrive: _____ am/pm Depart: _____ am/pm			<input type="checkbox"/> - Yes <input type="checkbox"/> - No		_____ Delivery _____ Picked Up
PLACE 17		Arrive: _____ am/pm Depart: _____ am/pm			<input type="checkbox"/> - Yes <input type="checkbox"/> - No		_____ Delivery _____ Picked Up
PLACE 18		Arrive: _____ am/pm Depart: _____ am/pm			<input type="checkbox"/> - Yes <input type="checkbox"/> - No		_____ Delivery _____ Picked Up
PLACE 19		Arrive: _____ am/pm Depart: _____ am/pm			<input type="checkbox"/> - Yes <input type="checkbox"/> - No		_____ Delivery _____ Picked Up

ACTIVITY OPTIONS	TYPE OF PLACE OPTIONS
(1) Base Location / Return to Base Location (2) Delivery (3) Pick-Up (4) Pick-Up and Delivery (5) Maintenance (fuel, oil, etc.) (6) Driver Needs (lunch, etc.) (7) Service-Related Business (8) Other (please specify)	(1) Office Building (non-government) (2) Retail / Shopping (3) Industrial / Manufacturing (4) Medical / Hospital (5) Education (12 th grade or less) (6) Education (college, trade) (7) Government Office / Building (8) Residential (9) Airport (10) Intermodal Facility (11) Warehouse (12) Distribution Center (13) Construction Site (14) Other (specify) (99) Refused / Unknown

