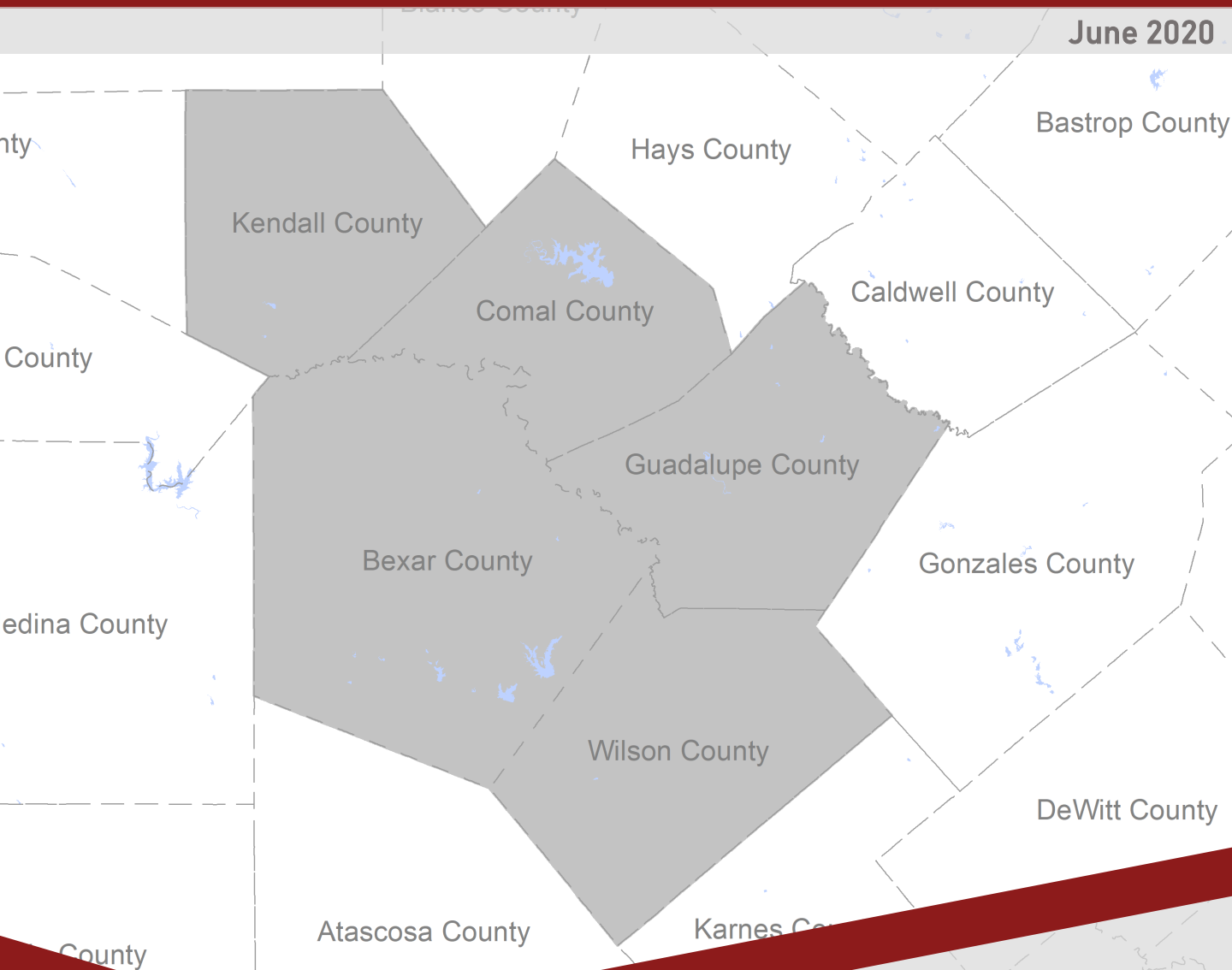


2018/2019 San Antonio COMMERCIAL VEHICLE SURVEY

Technical Summary



June 2020



Prepared by the
Texas A&M Transportation Institute



2018/2019 San Antonio Commercial Vehicle Travel Survey

TECHNICAL SUMMARY

Texas Department of Transportation Travel Survey Program

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INTRODUCTION

In 2017, the Texas Department of Transportation (TxDOT) funded a commercial vehicle survey in the San Antonio, TX area. The purpose of this survey was to provide data that would enable TxDOT to forecast total commercial vehicle travel demand within the San Antonio urban area. The study area is located in Central Texas, and, as shown in Figure 1, encompasses Bexar, Comal, Guadalupe, Kendall, and Wilson counties. Medina and Atascosa Counties were also included in the survey area but excluded from the analysis as they were located outside the Alamo Area Metropolitan Planning Organization (AAMPO) traffic analysis zone (TAZ) boundary. The San Antonio study area had a total population of approximately 2,031,106 people in the 2010 U.S. Census (American Fact Finder).

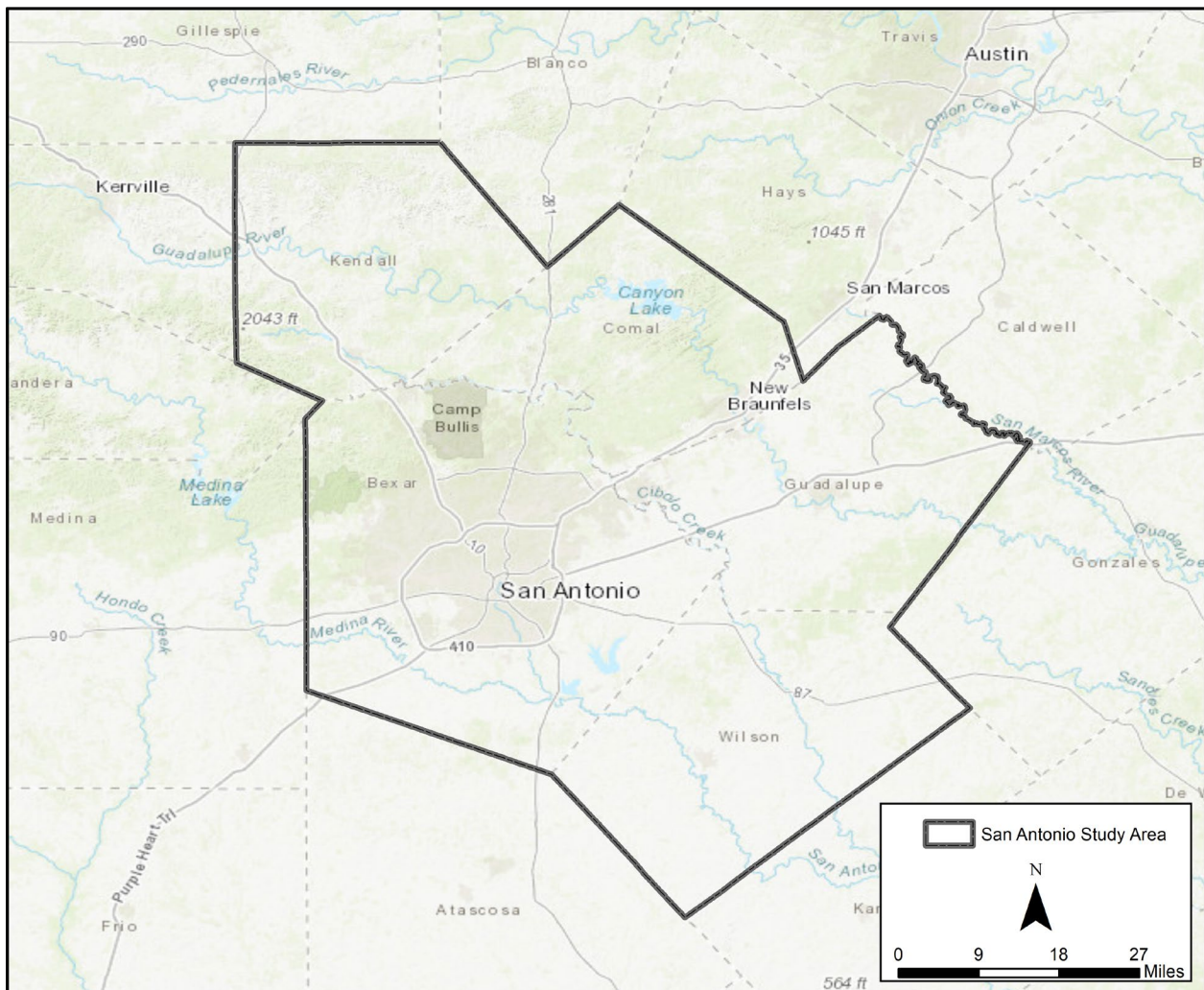


Figure 1. San Antonio Study Area.

Registered Commercial Vehicles

To provide background information about the potential for commercial vehicle travel in the study area, Table 1 shows the distribution of registered diesel trucks and gasoline trucks by gross vehicle weight for the San Antonio Study Area. Based on the Texas Department of Motor Vehicles (TxDMV) vehicle registration data, there were approximately 36,672 trucks registered in the San Antonio study area in 2014 (the most recent available registration data at the time of the analysis). Fifty-eight percent of all registered trucks had a gross vehicle weight of 8,500 pounds to 10,000 pounds. About 73 percent (26,588 vehicles) of all trucks registered in the San Antonio study area are diesel-fueled vehicles, while the remaining 27 percent (10,084) are gasoline-fueled vehicles.

Table 1. Gross Vehicle Weight of Registered Trucks in San Antonio (TX) Study Area.

Gross Vehicle Weight (lbs) ¹	Diesel Trucks		Gasoline Trucks		Total	
	Number of Vehicles	% of Diesel Trucks	Number of Vehicles	% of Gasoline Trucks	Number of Vehicles	% of Total Trucks
8,500 to 10,000	14,355	54.0	6,926	68.7	21,281	57.9
10,000 to 14,000	2,695	10.1	1,748	17.3	4,443	12.1
14,000 to 16,000	972	3.7	475	4.7	1,447	4.0
16,000, to 19,500	1,221	4.6	237	2.4	1,458	4.0
19,500 to 26,000	2,952	11.1	427	4.2	3,379	9.2
26,000 to 33,000	1,176	4.4	105	1.0	1,281	3.5
33,000 to 60,000	1,761	6.6	127	1.3	1,888	5.2
> 60,000	1,456	5.5	39	0.4	1,495	4.1
Total	26,588	100	10,084	100	36,672	100

¹ Upper bound included in gross vehicle weight categories (e.g., 10,000 lbs. falls into 8,500 to 10,000 lbs. category). Source: TxDMV 2014.

Figure 2 shows the distribution of registered diesel trucks and gasoline trucks by model year. Registered gasoline trucks were older relative to the diesel trucks. Approximately 70 percent (18,479 vehicles) of the total registered diesel trucks (26,252 vehicles) were less than 10 years old, while approximately 69 percent (6,879 vehicles) of the total registered gas trucks (10,001 vehicles) fell into the same category. Approximately 4 percent registered diesel trucks (993 vehicles) were 20 years or older, while 7 percent of the registered gasoline trucks (697 vehicles) were 20 years or older.

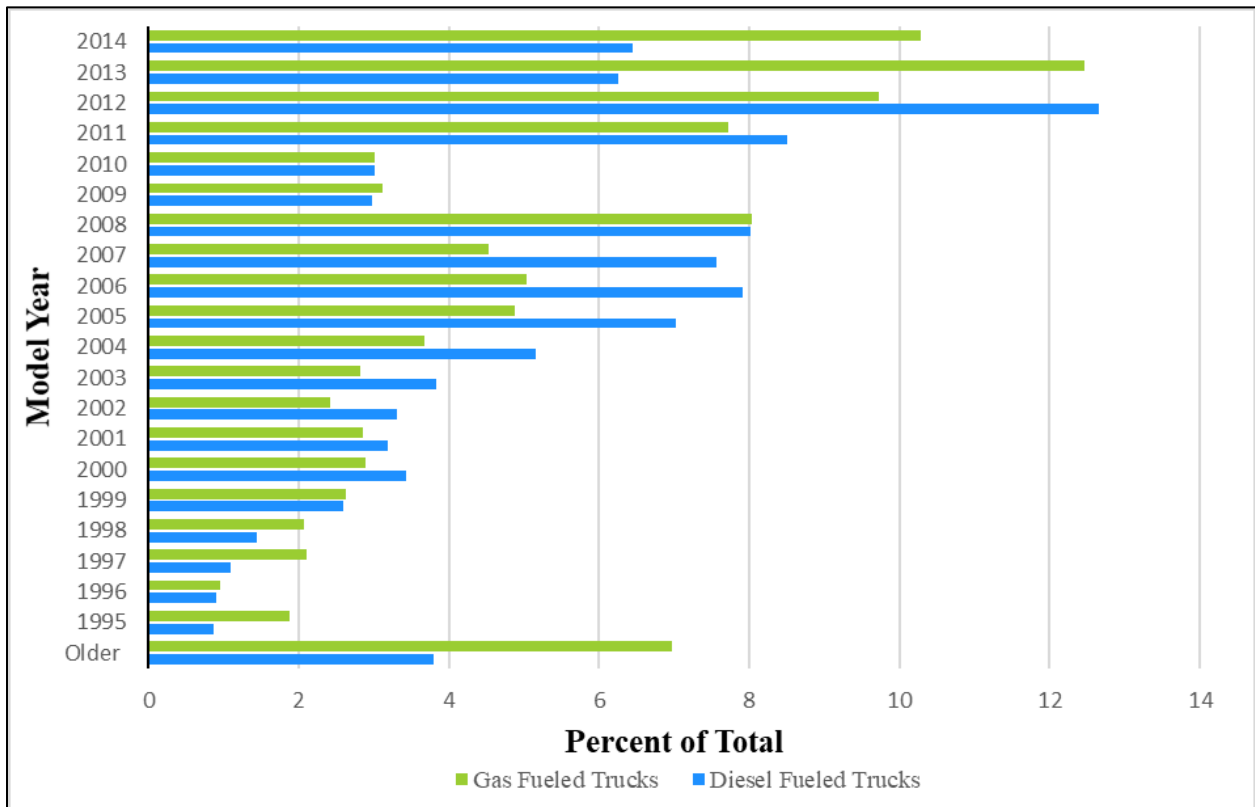


Figure 2. Model Year of Registered Trucks in the San Antonio Study Area.

This report presents a technical summary of the commercial vehicle travel survey conducted during 2018/2019 in the San Antonio region 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 survey for the San Antonio study area was conducted from March 2018 to May 2019. ETC Institute was contracted by TxDOT to conduct the commercial vehicle survey for the study area, with technical assistance from the Texas A&M Transportation Institute (TTI). Prior to this survey, a pilot study was conducted, which consisted of 26 commercial vehicles from 15 businesses. No changes were made to the survey instruments between the pilot survey and the primary survey.

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 area. This list was purchased from InfoUSA and provided to TTI for categorization and randomizing. 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.

For most commercial vehicle surveys, the stratification of the survey consists of cargo and service vehicles, typically evenly split between the two. These represent the target number of vehicles to be collected under each category. However, a more detailed stratification was implemented for this commercial vehicle survey, as shown below in Table 2.

Table 2. Survey Stratification.

Employment Size	Employment Type				
	Retail	Manufacturing and Construction	Transportation, Warehousing, Wholesale Trade	Service, Education	Other
< 10	100	70	65	175	20
10 - 49	40	15	20	35	5
50 +	10	5	5	30	5
Category Total	150	90	90	240	30
Overall Total	600				

A total of 137 companies participated in the San Antonio commercial vehicle survey, from which a total of 602 commercial vehicle surveys were obtained. This includes both the pilot data

and the data collected from outside the current five county area covered by the TAZ boundary (Atascosa and Medina Counties). Data editing and review processes were performed by TTI to ensure that the survey data collected were complete and followed the guidelines outlined in TxDOT's bid specification for the project. A data check program was also used to examine the accuracy of geocoding of locations and logic of survey responses.

SURVEY RESULTS

At the time of analysis, it was unclear how the more detailed stratification or survey data collected for outside the current TAZ structure would be used. Therefore, the stratification was condensed to the more traditional cargo/service vehicle categories for this analysis to retain consistency between other analyses. Also, the data collected from outside the current TAZ structure was maintained in the overall data set but not included in this analysis.

Surveyed Commercial Vehicle Characteristics

Commercial vehicles that participated in the San Antonio commercial vehicle survey were distinguished based on the nine classification types listed in Table 2. 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, respectively.

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, the city, county, or school districts.

Table 3 shows the distribution of surveyed vehicles by vehicle classification type and commercial type. Of the total 602 vehicles surveyed, 174 were cargo vehicles and 428 were service vehicles. Among cargo vehicles, approximately 29 percent were single unit 2-axle (6 wheel) trucks, 24 percent were pick-up trucks, and 18 percent were vans (Passenger or Mini). Among service vehicles, approximately 33 percent were pick-up trucks, 24 percent were SUV, and 21 percent were passenger cars.

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	12	6.9%	88	20.6%	100	16.6%
Pick-up	42	24.1%	140	32.7%	182	30.2%
Van (Cargo or Minivan)	20	11.5%	76	17.8%	96	15.9%
Sport Utility Vehicle (SUV)	9	5.2%	102	23.8%	111	18.4%
Single Unit 2-axle (6 wheels)	51	29.3%	20	4.7%	71	11.8%
Single Unit 3-axle (10 wheels)	8	4.6%	1	0.2%	9	1.5%
Semi (all Tractor-Trailer combinations)	32	18.4%	1	0.2%	33	5.6%
All Vehicles	174	100%	428	100%	602	100%

Figure 3 shows the distribution of surveyed vehicles by fuel type. Approximately 18 percent of the surveyed vehicles used diesel and 82 percent used gasoline. Among cargo vehicles, 51 percent used diesel and 49 percent used gasoline. Among service vehicles, 95 percent used gasoline and 5 percent used diesel.

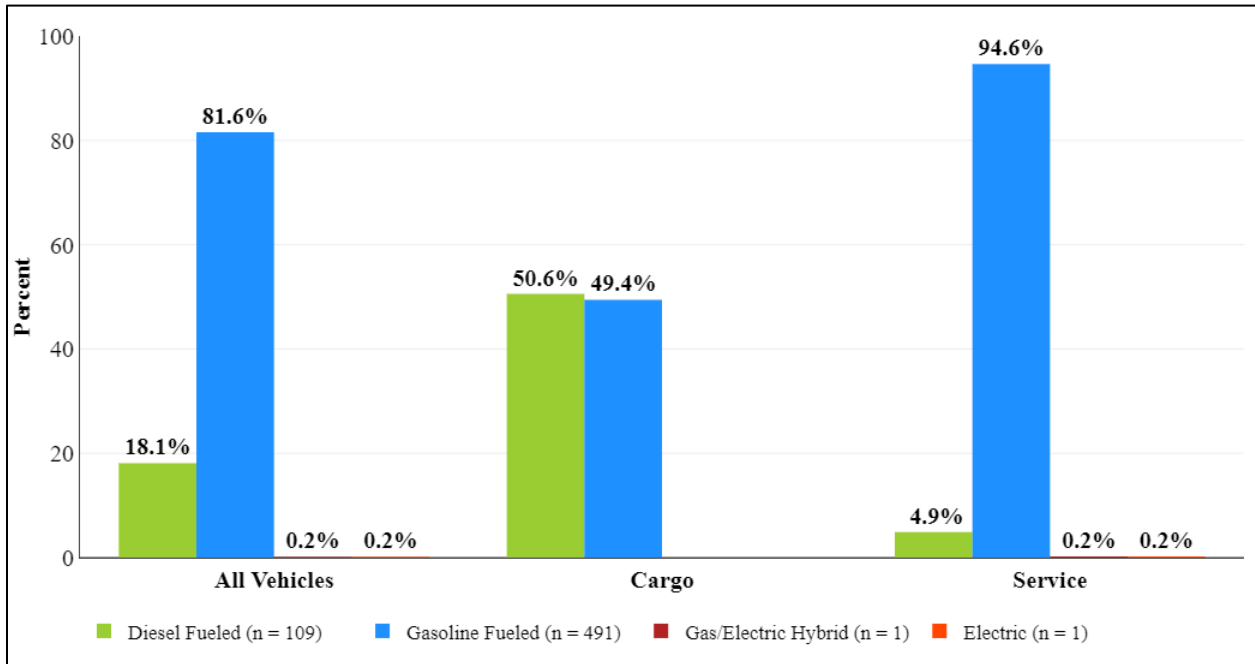


Figure 3. Type of Fuel Used by Surveyed Commercial Vehicles.

Table 4 shows the distribution of surveyed vehicles by gross vehicle weight. With approximately 93% of the service vehicles and 47% of the cargo vehicles having a gross vehicle weight less than 10,000 lbs., the service vehicles included in the survey had a lower average gross vehicle weight than cargo vehicles.

Table 4. Gross Vehicle Weight.

Gross Vehicle Weight (lbs.)	Cargo		Service		Total	
	Number of Vehicles	% of Cargo Vehicles	Number of Vehicles	% of Service Vehicles	Number of Vehicles	% of Total Vehicles
< 10,000	82	47.13	399	93.22	481	79.9
10,000 - 14,000	12	6.9	12	2.8	24	3.99
14,000 - 16,000	13	7.47	7	1.64	20	3.32
16,000 - 19,500	10	5.75	5	1.17	15	2.49
19,500 - 26,000	21	12.07	2	0.47	23	3.82
26,000 - 33,000	7	4.01	0	0	7	1.17
33,000 - 60,000	16	9.2	1	0.23	17	2.82
60,000+	13	7.47	2	0.47	15	2.49
Total	174	100	428	100	602	100

¹ Upper bound not included in gross vehicle weight categories (e.g., 10,000 lbs. is in 10,000 to 14,000 lbs. category).

Figure 4 shows the distribution of surveyed vehicles by model year. Approximately 65 percent of cargo vehicles and 77 percent of the service vehicles were less than 10 years old. The average age for both cargo and service vehicles was 8 years (assuming 2018 as the base year).

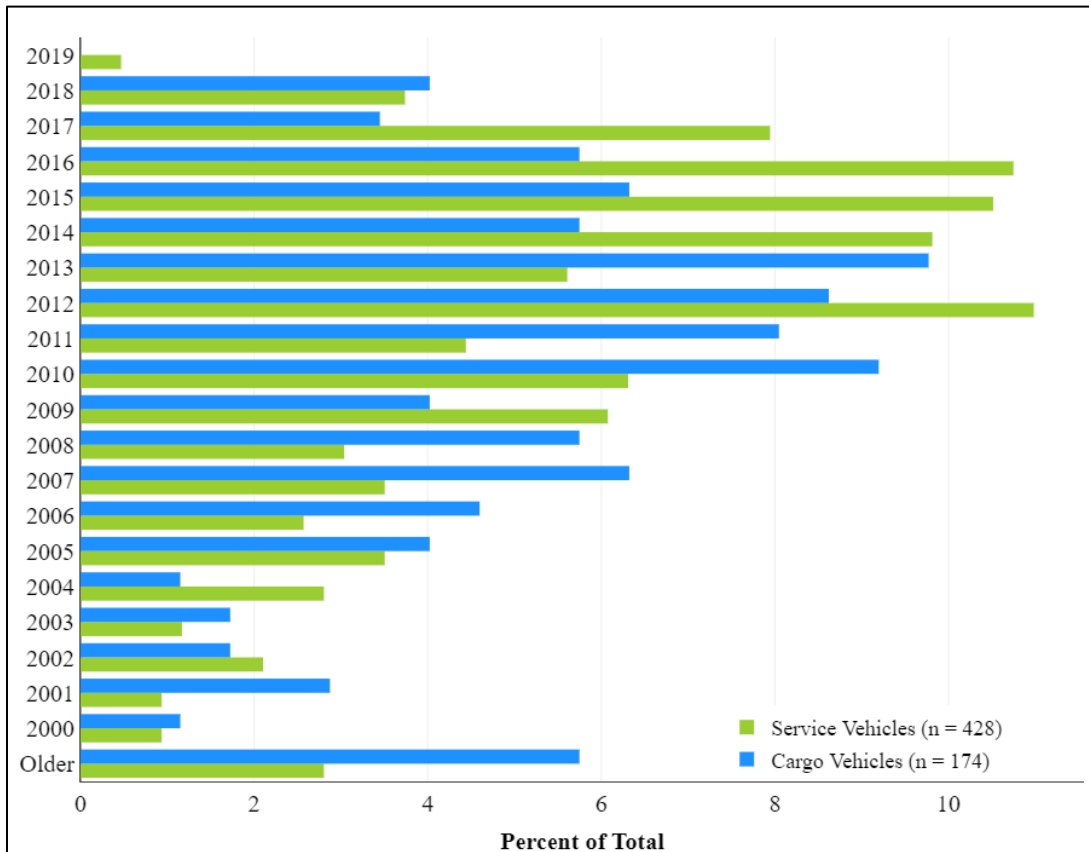


Figure 4. Vehicle Model Year.

Table 5 shows the average vehicle mileage by model year based on reported odometer readings for the 520 surveyed vehicles at the beginning of their survey travel day. Cargo vehicles reported higher average odometer readings of over 181,217 miles compared to just over 110,487 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
2019	0	0	2	1,333	2	1,333
2018	6	24,280	13	13,849	19	17,143
2017	6	79,583	25	31,988	31	41,200
2016	6	65,608	39	40,408	45	43,768
2015	7	132,639	37	66,702	44	77,192
2014	9	117,308	39	80,677	48	87,546
2013	16	157,717	24	196,357	40	180,901
2012	13	123,385	42	106,082	55	110,172
2011	7	103,728	18	111,682	25	109,455
2010	15	155,330	26	150,000	41	151,950
2009	6	185,433	23	140,132	29	149,505
2008	8	184,688	11	140,299	19	158,989
2007	9	300,482	10	176,793	19	235,382
2006	7	309,118	11	164,414	18	220,688
2005	7	239,426	15	149,893	22	178,381
2004	1	246,000	11	155,288	12	162,847
2003	2	571,800	5	167,726	7	283,175
2002	3	204,196	7	210,695	10	208,745
2001	4	220,469	3	188,075	7	206,586
2000	2	348,000	4	174,250	6	232,167
Older	10	319,635	11	219,818	21	267,350
Total	144	181,217	376	110,487	520	130,074

Trip Frequency

The surveyed vehicles generated a total of 2,285 trips, of which 2,012 were internal trips and 273 were external trips. Internal trips were defined as those trips made within the San Antonio area. These trips were further distinguished by travel within or between zones. Inter-zonal trips were those trips made from one zone to another, while intra-zonal trips were made within the same zone. External trips were those trips made outside of the study area.

Figure 5 shows the distribution of inter-zonal, intra-zonal, and external trips, while Table 6 provides the breakdown of these trips. Cargo vehicles generated 790 trips, of which approximately 75 percent were inter-zonal trips, 20 percent were external trips, and 5 percent were intra-zonal trips. Service vehicles generated 1,495 trips, of which 87 percent were inter-zonal trips, 8 percent were external trips, and 5 percent were intra-zonal trips.

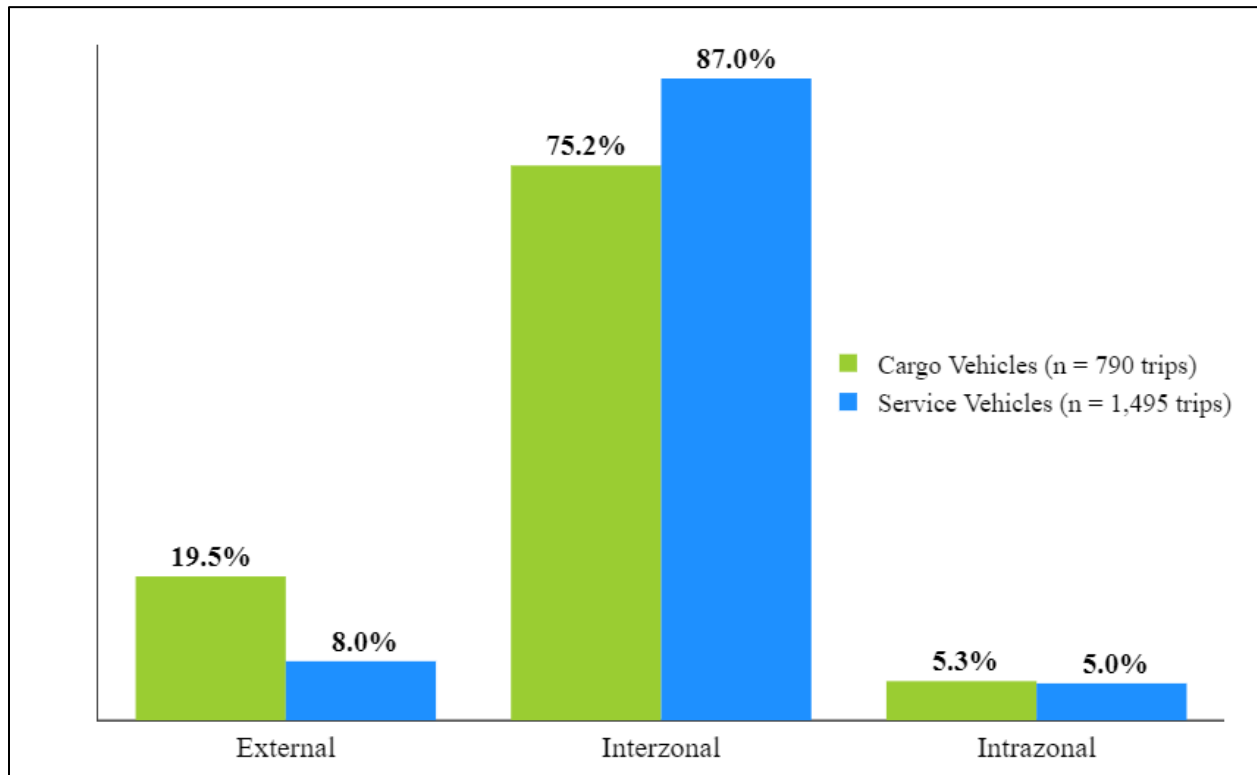


Figure 5. Inter-Zonal, Intra-Zonal, and External Trips.

Table 6. Total Internal and External Trips.

Trip Type	Cargo (174 Vehicles)			Service (428 Vehicles)			Total (602 Vehicles)		
	Number of Trips	% of Total	Trips per Veh.	Number of Trips	% of Total	Trips per Veh.	Number of Trips	% of Total	Trips per Veh.
Inter-zonal	594	75.2	3.4	1,301	87.0	3	1,895	82.9	3.1
Intra-zonal	42	5.3	0.2	75	5.0	0.2	117	5.1	0.2
Total Internal	636	80.5	3.7	1,376	92.0	3.2	2,012	88.1	3.3
External	154	19.5	0.9	119	8.0	0.3	273	11.9	0.5
Total	790	100.0	4.5	1,495	100.0	3.5	2,285	100.0	3.8

Figure 6 shows the distribution of total trips (internal and external trips), which varied from one to eighteen trips per vehicle on the survey day. The average number of total trips per day was 4.5 trips for cargo vehicles and 3.5 trips for service vehicles.

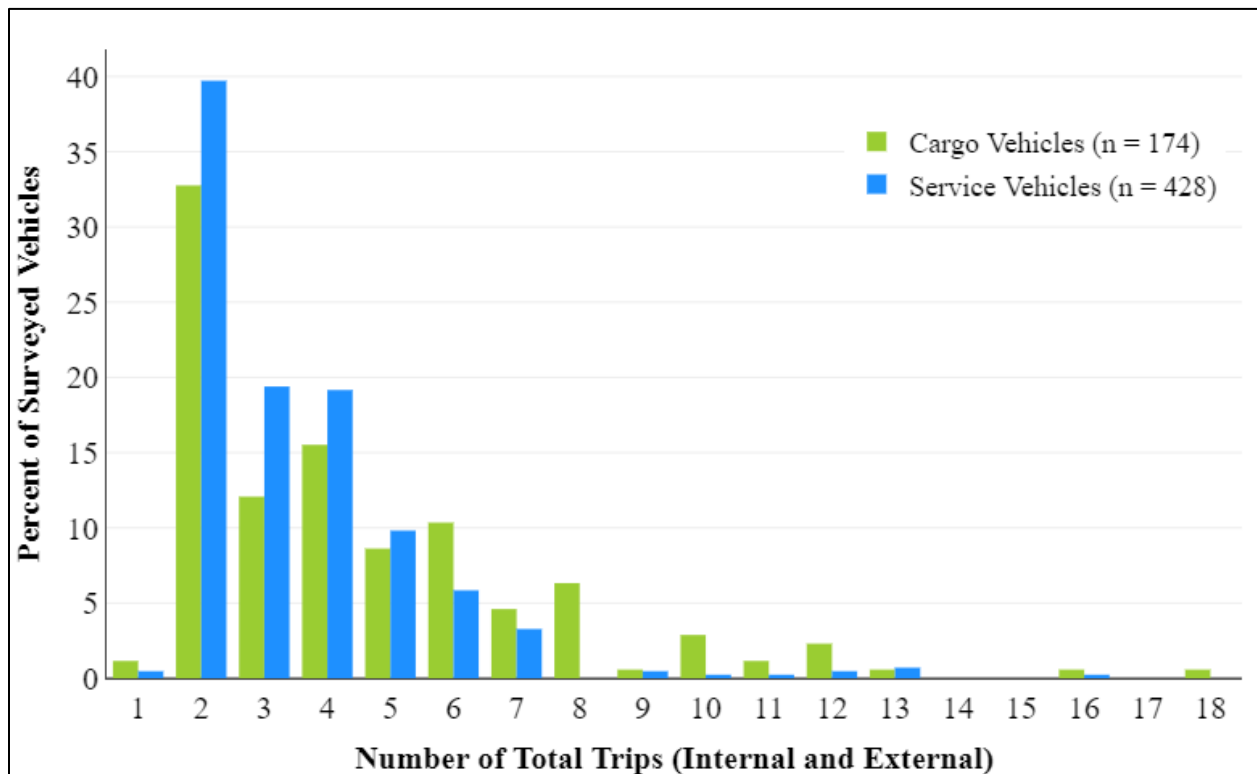


Figure 6. Total Trips per Vehicle.

Figure 7 shows the distribution of internal trips only by vehicle type. Approximately 10 percent of cargo vehicles and 8 percent of service vehicles made no internal trips on the survey day. Approximately 5 percent of cargo vehicles made only one internal trip; while 1 percent of service vehicles made only one internal trip. The average number of internal trips per day was 4.1 trips for cargo vehicles and 3.5 trips for service vehicles.

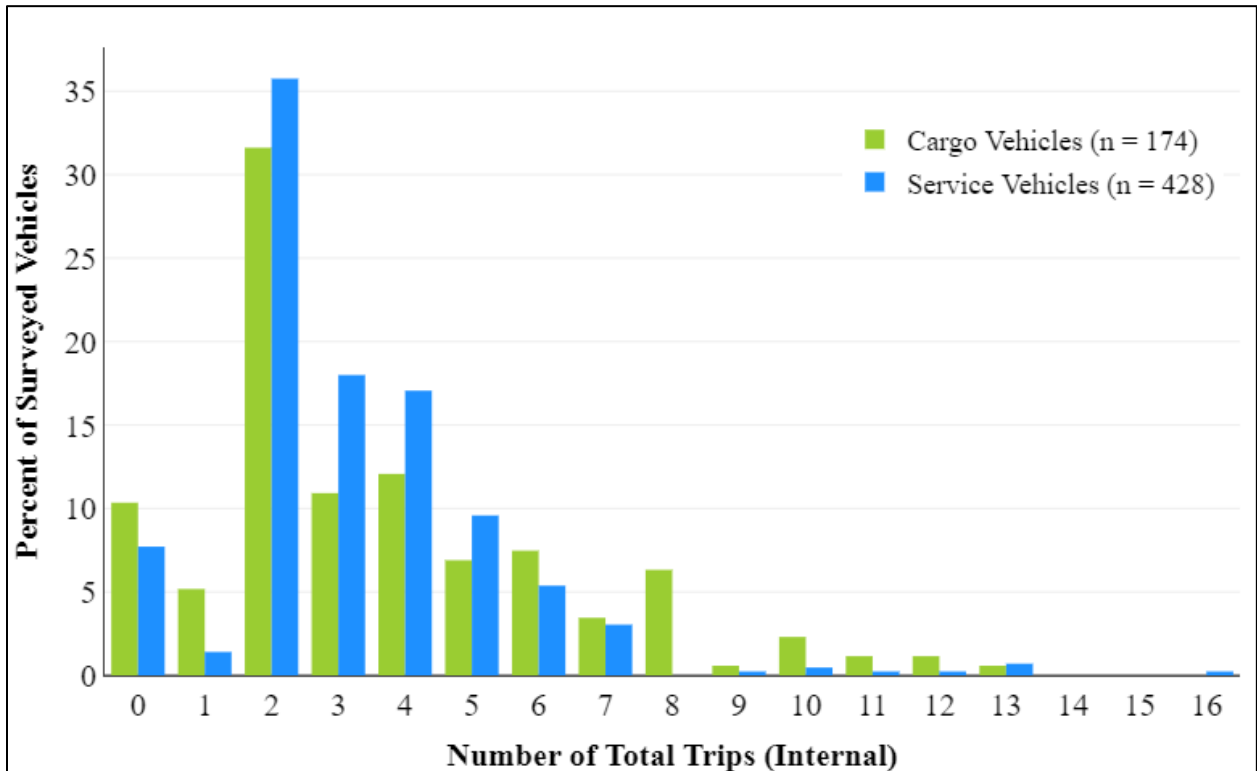


Figure 7. Total Internal Trips per Vehicle.

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 46 percent of the trips made by cargo vehicles traveled to retail locations, followed by 11 percent to residential locations, and 9 percent to warehouse locations. For service vehicles, nearly 23 percent of the trips traveled to retail locations, followed by nearly 20 percent to retail locations, and 20 percent to office buildings.

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

Land Use	Cargo		Service	
	Number	Percent of Cargo	Number	Percent of Service
Office Building (Non-Government)	43	6.8%	270	19.6%
Retail/Shopping	290	45.6%	315	22.9%
Industrial/Manufacturing	34	5.3%	38	2.8%
Medical/Hospital	33	5.2%	78	5.7%
Education (< 12th Grade)	15	2.4%	146	10.6%
Education (College, Trade)	6	0.9%	7	0.5%
Government Office/Building	4	0.6%	57	4.1%
Residential	72	11.3%	269	19.5%
Airport	7	1.1%	8	0.6%
Intermodal Facility	0	0.0%	0	0.0%
Warehouse	59	9.3%	45	3.3%
Distribution Center	17	2.7%	3	0.2%
Construction Site	27	4.2%	36	2.6%
Other	29	4.6%	104	7.6%
Refused/Unknown	0	0.0%	0	0.0%
Total	636	100.0%	1,376	100.0%

Table 8 shows the distribution of internal trips by trip purposes at trip destinations. Approximately 55 percent of the cargo vehicle internal trips were for delivery, 26 percent were base, and 14 percent were classified as pick-up. For trips made by service vehicles, approximately 39 percent were classified as sales, 34 percent were classified as base, and 9 percent were service.

Table 8. Trip Purposes at Destination Locations.

Trip Purpose	Cargo		Service	
	Number	Percent of Cargo	Number	Percent of Service
Base	165	25.9%	462	33.6%
Maintenance	5	0.8%	12	0.9%
Driver Needs	10	1.6%	68	4.9%
Delivery	348	54.8%	70	5.1%
Pick-up	88	13.8%	69	5.0%
Pick-up and Delivery	5	0.8%	1	0.1%
Government	0	0%	31	2.3%
Service	0	0%	125	9.1%
Sales	11	1.7%	531	38.6%
Other	4	0.6%	6	0.4%
Unknown	0	0%	0	0%
Total Trips	636	100%	1,375	100%

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 San Antonio commercial vehicle survey to examine the movement of commodities within and outside of the study area. The analyses presented in this section are for both internal and external trips made by surveyed cargo vehicles only, and do not include the trips made by service vehicles. The types of cargo in the survey were based on 23 classification types listed in Table 9.

The analysis of cargo trip data examined the types of cargo being transported at trip destinations, the trip purpose, the 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 reported the type of cargo being transported. There were some trips that indicated a delivery trip purpose but did not report any cargo weights at drop-off.

Table 9. Cargo Classification Types.

Cargo Type	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/Equipment	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. Empty	Empty (including empty shipping containers)
20. No Cargo Picked-Up or Delivered	
96. Other	
98. Unknown	
99. Driver Refused to Answer	

Table 10 shows the distribution of trips by cargo type. Approximately 12 percent of the total cargo vehicle trips cited “no cargo picked-up or delivered.” Additionally, 36 percent of the trips involved transporting manufactured goods and another 13 percent were transporting food, health and beauty products.

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

Cargo Type	Number of Trips	% of Total
Farm Products	29	4.6%
Forest Products	5	0.8%
Marine Products	0	0%
Metals and Minerals	5	0.8%
Food, Health, and Beauty Products	83	13.1%
Tobacco Products	0	0%
Textiles	1	0.2%
Wood Products	36	5.7%
Printed Matter	4	0.6%
Chemical Products	17	2.7%
Refined Petroleum or Coal Products	49	7.6%
Rubber, Plastic, and Styrofoam Products	30	4.7%
Clay, Concrete, Glass, or Stone	11	1.7%
Manufactured Goods/Equipment	230	36.1%
Wastes	1	0.2%
Miscellaneous Shipments	39	6.1%
Hazardous Materials	0	0%
Transportation	2	0.3%
No Cargo Picked-Up or Delivered	78	12.2%
Other	1	0.2%
Unknown	10	1.6%
Driver Refused to Answer	5	0.8%
Total Trips with Cargo	636	100%
Empty	0	0%
Total Cargo Vehicle Trips	636	100%

The commodity grouping scheme used by TxDOT in its Texas Statewide Analysis Model (SAM) was used to simplify the cargo types into 10 commodity groups. The type of place option in the survey was 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, and Marine Products
2. Raw Materials	Metals and Minerals, Chemical Products, Refined Petroleum, or Coal Products
3. Food	Food, Health and Beauty Products, and Tobacco Products
4. Textiles	Textiles, Rubber, Plastic, and Styrofoam Products
5. Wood	Wood Products and 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, Other</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	<i>Airport, Inter-Modal Facility, Warehouse, Distribution Center, Construction Site, Other</i>
-- Unknown	<i>Land Use Category not Provided, Omitted, Driver Refused to Answer</i>

Table 13 shows the distribution of cargo trips by commodity group and land use type at trip destinations. Nearly 46 percent of the trips traveled to “retail” land use types. By commodity group, approximately 36 percent of the trips were transporting machinery and 15 percent were transporting unknown cargo, meaning the land use category was not provided, was omitted, or the driver refused to answer.

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

Commodity Group	Land Use								Total Trips	% of Total
	Edu	Gov't	Ind'l	Med	Off	Othr	Res	Retail		
Agriculture	0	1	2	0	2	13	3	13	34	5.3%
Building Materials	0	0	0	0	1	6	2	2	11	1.7%
Food	0	1	2	0	2	13	3	13	34	5.3%
Machinery	5	1	6	19	14	48	25	112	230	36.2%
Miscellaneous	0	0	0	0	3	22	4	11	40	6.3%
Raw Materials	0	0	11	1	1	8	12	38	71	11.2%
Textiles	0	0	0	0	0	1	1	29	31	4.9%
Transportation	0	0	0	0	0	0	0	2	2	0.3%
Unknown	1	2	9	3	6	24	7	42	94	14.8%
Wood	1	0	6	0	1	10	9	13	40	6.3%
Total	21	4	34	33	43	139	72	290	636	100%
Percent of Total	3.3%	0.6%	5.3%	5.2%	6.8%	21.9%	11.3%	45.6%	100%	---

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 55 percent of the total cargo vehicle trips were delivery and 26 percent were base related. Approximately 2 percent of the total cargo vehicle trips were driver needs.

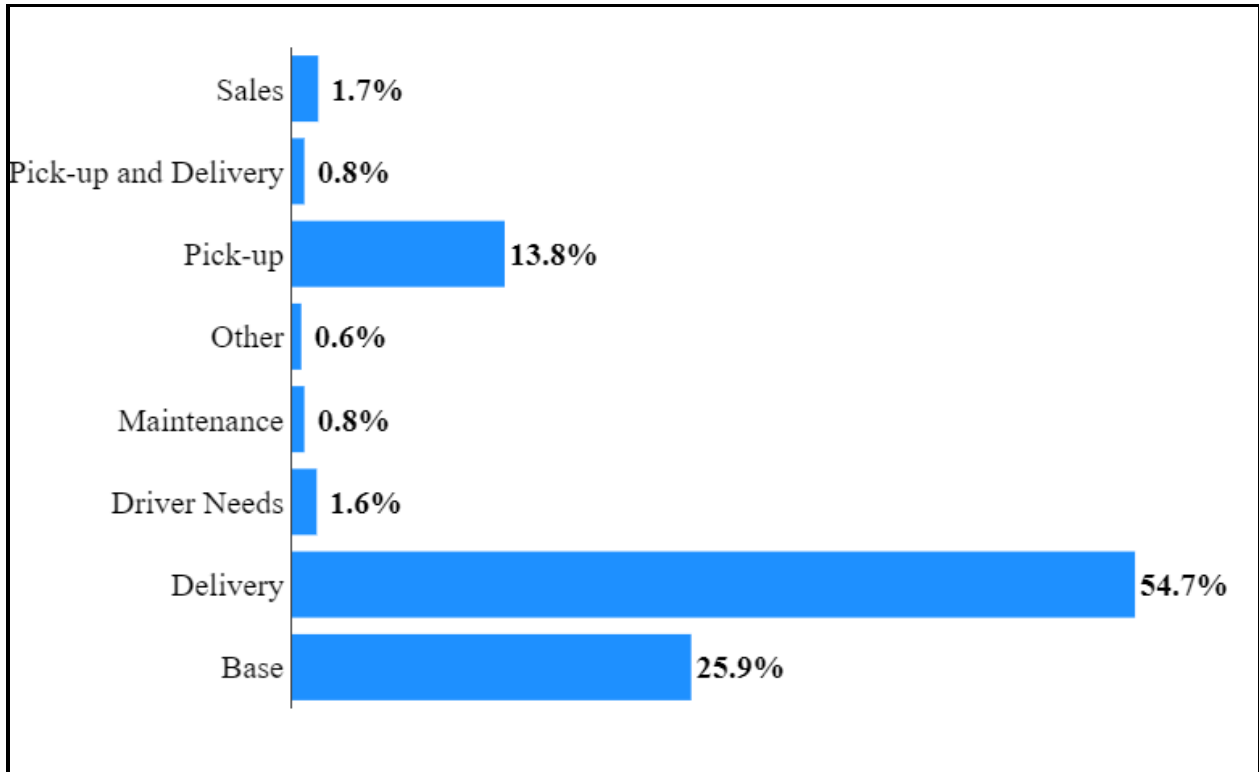


Figure 8. Cargo Trip Purposes at the Trip Destinations.

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

Commodity Group	Trip Purpose								Total Trips	% of Total
	Base	Deliv	Driver Needs	Gov't	Maint	Pick-Up	Pick-Up and Delivery	Sales		
Agriculture	18	13	0	0	0	3	0	0	34	5.3%
Building Materials	5	4	1	0	0	1	0	0	11	1.7%
Food	5	4	1	0	0	1	0	0	11	1.7%
Machinery	67	136	2	1	1	17	3	3	230	36.2%
Miscellaneous	14	16	4	1	0	4	0	1	40	6.3%
Raw Materials	13	49	1	0	1	5	1	1	71	11.2%
Textiles	10	19	1	0	0	1	0	0	31	4.9%
Transportation	1	1	0	0	0	0	0	0	2	0.3%
Unknown	11	26	0	3	1	47	0	6	94	14.8%
Wood	8	21	1	0	0	9	1	0	40	6.3%
Total	165	348	10	5	4	88	5	11	636	100%
Percent of Total	25.9%	54.7%	1.6%	0.8%	0.6%	13.8%	0.8%	1.7%	100%	---

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. In some cases the driver of the surveyed cargo vehicle reported a different trip purpose during a particular stop (i.e., driver needs - lunch, etc.) that indicated no cargo was delivered and/or picked-up (i.e., the prior cargo remained in transit). In such cases, the net cargo weight at that particular stop should be the cargo weight from the trip origin and cargo type from the trip origin. If a delivery occurred during that particular stop, the cargo weight for that particular drop-off should be deducted from the current weight load. If cargo was picked-up, the cargo weight should be added to the current weight load, thus resulting in 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. Building materials being transported to office sites had the highest average net cargo weight by commodity group and land use at the trip destination. Raw materials being transported to delivery locations had the highest average net cargo weight by commodity group and trip purpose at the trip destination.

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

Commodity Group	Land Use							
	Edu	Gov't	Ind'l	Med	Office	Other	Res	Retail
Agriculture	0	0	0	0	0	200	6,855	0
Building Materials	0	0	0	5	23,000	0	0	0
Food	0	0	0	0	15,400	0	1,250	0
Machinery	0	0	1,167	2,538	2,863	1,800	271	1,167
Miscellaneous	0	0	0	350	2,809	350	570	0
Raw Materials	0	0	0	0	38,000	150	25,480	0
Textiles	0	0	0	0	0	300	1,010	0
Transportation	0	0	0	0	0	0	6,700	0
Unknown	0	0	0	50	0	0	0	0
Wood	10,327	0	0	10	10,221	150	306	0

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

Commodity Group	Trip Purpose						
	Base	Delivery	Driver Needs	Gov't	Maint	Pick-Up	Pick-Up & Delivery
Agriculture	6,340	8,332	0	0	567	0	0
Building Materials	5	23,000	0	0	0	0	0
Food	525	3,400	0	30,000	100	0	0
Machinery	1,932	877	0	0	618	1,167	0
Miscellaneous	2,686	1,028	1,000	0	0	0	75
Raw Materials	13,648	35,229	0	0	240	0	0
Textiles	1,150	900	0	0	100	0	0
Transportation	0	6,700	0	0	0	0	0
Unknown	50	0	0	0	0	0	0
Wood	5,000	4,637	0	0	122	0	0

Table 17 shows the distribution of cargo trips and net cargo weights at trip destinations by commodity group. Overall, the average net cargo weight (excluding trips with empty cargo) per trip was approximately 4,700 lbs. Of the classified commodity groups, raw materials showed the highest average net cargo weight of over 24,200 lbs. per trip. Machinery was the most frequently transported of the known commodity groups, with average net cargo weights of over 1,100 lbs. per trip.

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 Trips*	Average Net Cargo Weight (lbs.)*
Agriculture	34	41,732	9	4,637
Building Materials	11	46,005	3	15,335
Food	83	34,550	5	6,910
Machinery	230	53,462	47	1,137
Raw Materials	71	266,205	11	24,200
Textiles	31	5,350	6	892
Machinery	230	53,462	47	1,137
Transportation	2	6,700	1	6,700
Unknown	94	50	1	50
Wood	40	38,069	13	2,928
Total	636	517,138	110	4,701

* 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 10,500 lbs. per trip, followed by education sites with an average net cargo weight of approximately 10,300 lbs. per trip.

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

Land Use	Total Cargo Trips	Total Net Cargo Weight (lbs.)	Number of Trips*	Average Net Cargo Weight (lbs.)*
Education	21	10,327	1	10,327
Gov't	4	0	0	0
Industrial	34	42,375	4	10,594
Medical	33	3,500	3	1,167
Office	43	10,915	9	1,213
Other	139	224,349	26	8,629
Residential	72	5,300	9	589
Retail	290	220,372	58	3,800
Total	636	517,138	110	4,701

* Excluding trips with empty cargo.

Table 19 shows the distribution of cargo trips and net cargo weights by trip purpose. ‘Other’ trip purpose had the highest average net weight of approximately 30,000 lbs. per trip.

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

Trip Purpose	Total Cargo Trips	Total Net Cargo Weight (lbs.)	Number of Trips*	Average Net Cargo Weight (lbs.)*
Base	165	137,825	36	3,828
Delivery	348	338,898	52	6,517
Driver Needs	10	1,000	1	1,000
Maintenance	5	0	0	0
Other	4	30,000	1	30,000
Pick-up	88	5,840	16	365
Pick-up and Delivery	5	3,500	3	1,167
Sales	11	75	1	75
Total	636	517,138	110	4,701

* 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 San Antonio 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 San Antonio 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 shows the TAZ boundary and base locations of surveyed vehicles within the San Antonio study area.

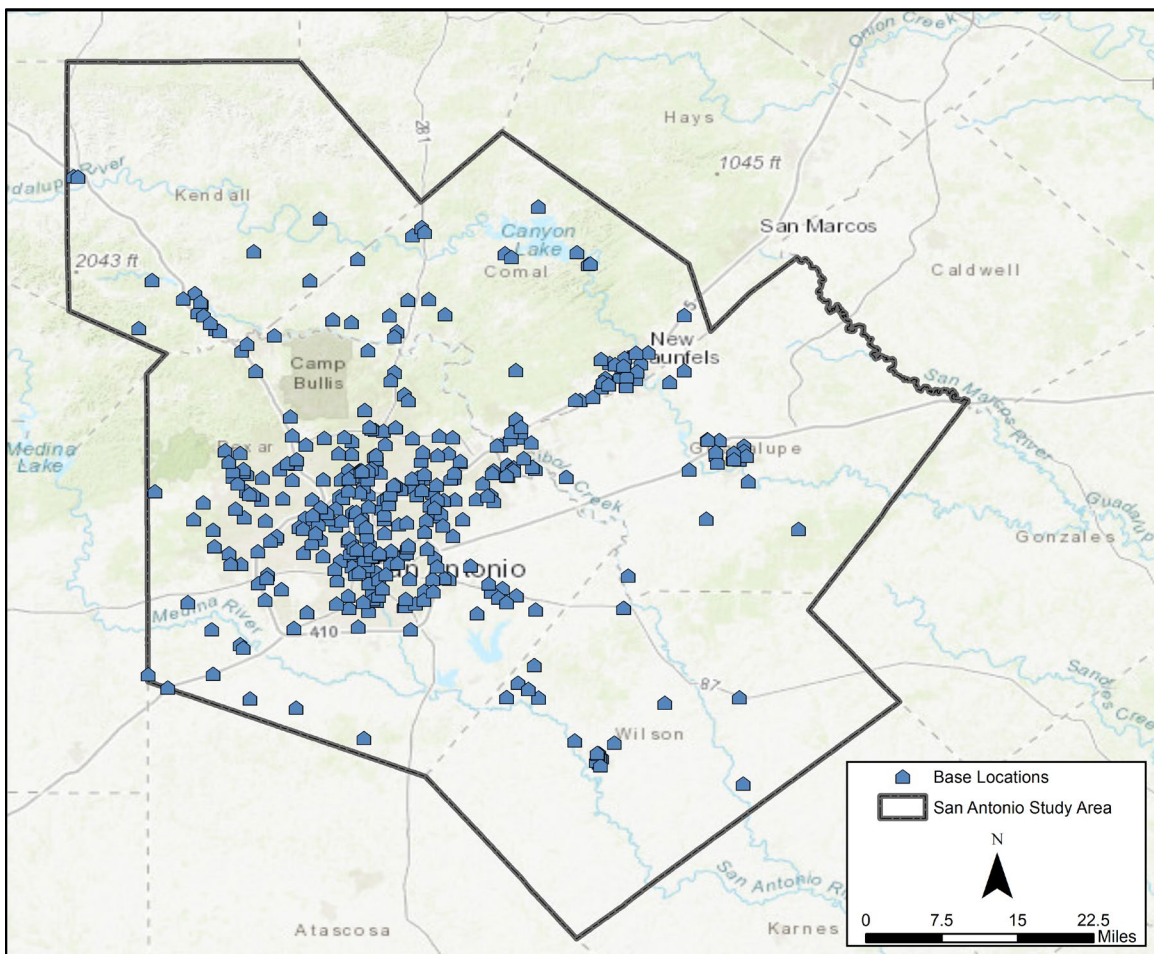


Figure 9. TAZ Boundary and Base Locations of Surveyed Commercial Vehicles.

Figure 10 shows the origin and destination locations of trips made by the surveyed vehicles. Trips that had an origin or a destination outside of the San Antonio study area were considered external trips and not included in the trip length analysis. Since commercial vehicles tend to complete tours throughout the day (vehicle returns to the original base location), the two maps in Figure 10 are very similar, with the main differences being where the complete tour did not occur.

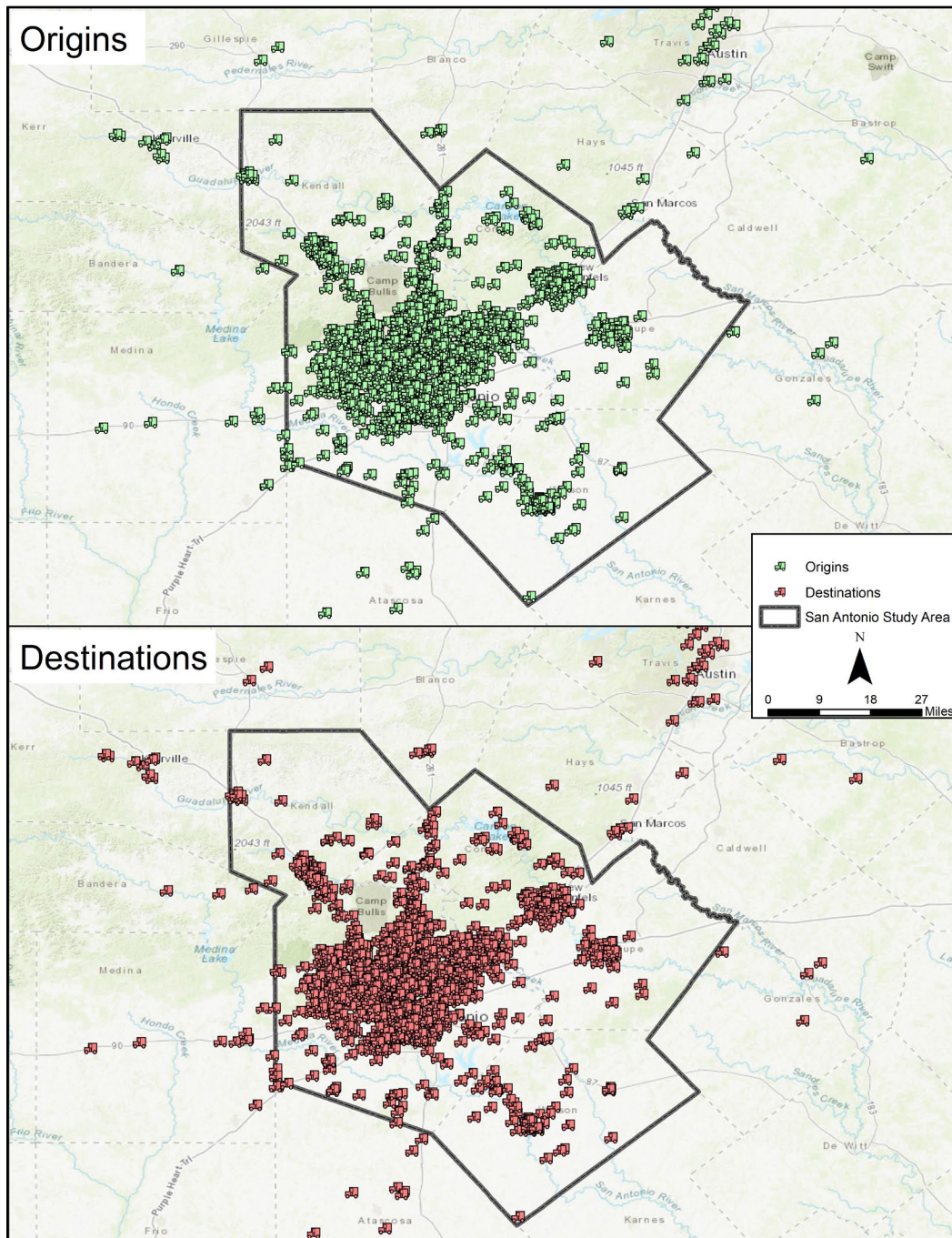


Figure 10. Trip Origins and Destinations of Surveyed Commercial Vehicles.

The results presented in this section pertain to trip length characteristics for 1,328 inter-zonal trips only. Table 20 shows the trip length frequency distribution (TLFD), grouped at five-mile intervals, while Figure 12 and Table 21 show the ungrouped TLFDs. Approximately 38 percent of the cargo vehicles and 37 percent of the service vehicle trips had trip lengths of less than five miles. Additionally, 25 percent of the cargo vehicle trips and 26 percent of the service vehicles had trip lengths between five miles and 10 miles. The longest trip lengths reported by cargo and service vehicles were 42 and 54 miles respectively.

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

Trip Length (miles)	Cargo Vehicles		Service Vehicles		All Vehicles	
	# of Trips	% of Total	# of Trips	% of Total	# of Trips	% of Total
< 5	224	37.7	485	37.3	709	37.4
5 - 10	151	25.4	343	26.4	494	26.1
10 - 15	75	12.6	236	18.1	311	16.4
15 - 20	54	9.1	96	7.3	150	7.8
20 - 25	35	5.9	55	4.2	90	4.7
25 - 30	32	5.4	34	2.6	66	3.5
30 - 35	10	1.7	27	2.1	37	2.0
35 - 40	9	1.5	13	1.0	22	1.2
40 - 45	4	0.7	10	0.8	14	0.7
45 - 50	0	0	1	0.1	1	0.1
> 55	0	0	1	0.1	1	0.1
Total	594	100	1,301	100	1,895	100

¹ Upper bound not included in trip length categories (e.g., 10 miles is in 10 to 15 miles category).

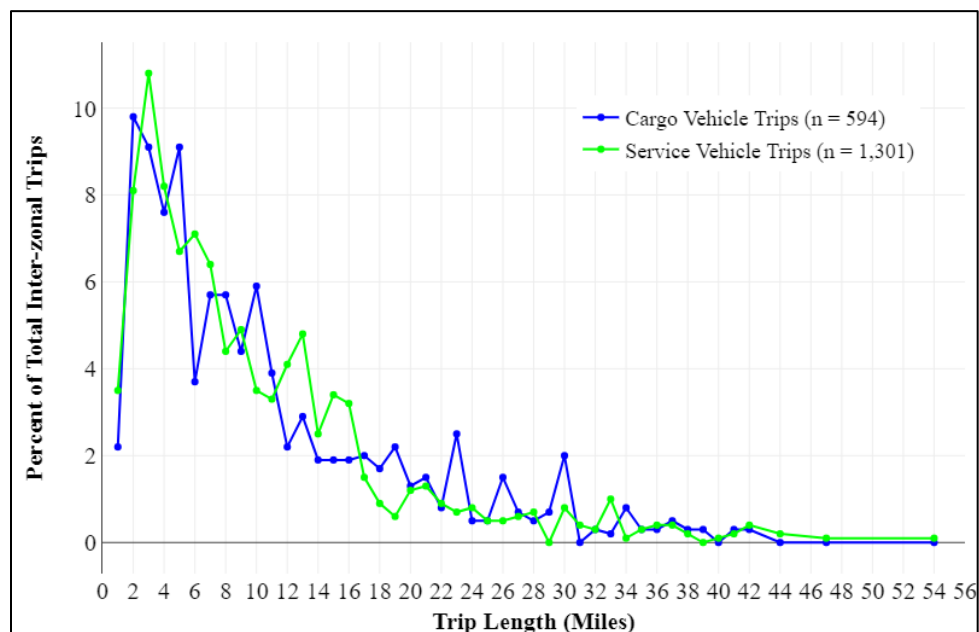


Figure 11. Surveyed Commercial Vehicle Trips TLFD.

Table 21. Trip Length Frequency Distributions (Ungrouped).

Trip Length (miles)	Cargo Vehicles		Service Vehicles		All Vehicles	
	# of Trips	% of Total	# of Trips	% of Total	# of Trips	% of Total
1	13	2.2	46	3.5	59	3.1
2	58	9.8	105	8.1	163	8.6
3	54	9.1	140	10.8	194	10.2
4	45	7.6	107	8.2	152	8.0
5	54	9.1	87	6.7	141	7.4
6	22	3.7	93	7.1	115	6.1
7	34	5.7	83	6.4	117	6.2
8	34	5.7	57	4.4	91	4.8
9	26	4.5	64	4.9	90	4.7
10	35	5.9	46	3.5	81	4.3
11	23	3.9	43	3.3	66	3.5
12	13	2.2	53	4.1	66	3.5
13	17	2.9	63	4.8	80	4.2
14	11	1.9	33	2.5	44	2.3
15	11	1.9	44	3.3	55	2.9
16	11	1.9	41	3.2	52	2.7
17	12	2.0	19	1.5	31	1.6
18	10	1.7	12	0.9	22	1.2
19	13	2.2	8	0.6	21	1.1
20	8	1.3	16	1.2	24	1.3
21	9	1.5	17	1.3	26	1.4
22	5	0.8	12	0.9	17	0.9
23	15	2.5	9	0.7	24	1.3
24	3	0.5	10	0.8	13	0.7
25	3	0.5	7	0.5	10	0.5
26	9	1.5	7	0.5	16	0.8
27	4	0.7	8	0.6	12	0.6
28	3	0.5	9	0.7	12	0.6
29	4	0.7	0	0.0	4	0.2
30	12	2.0	10	0.8	22	1.2
31	0	0.0	5	0.4	5	0.3
32	2	0.3	4	0.3	6	0.3
33	1	0.2	13	1.0	14	0.7
34	5	0.8	1	0.1	6	0.3
35+	15	2.3	24	2.4	39	2.5
Total	594	100	1,301	100	1,895	100

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 9.7 miles, with cargo vehicles and service vehicles averaging 10.3 miles and 9.5 miles, respectively. The highest number of trips by cargo vehicles occurred at retail land use types, with an average trip length of 8.5 miles, followed by “other” sites with average trip length of 12.7 miles. For service vehicles, the highest frequency of trips occurred at retail land use types, with an average trip length of 9.8 miles. More than half (62 percent) of the trips made by service vehicles occurred at either retail, residential, or office 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)	Avg. Trip Length (miles)	Number of Trips	Total Trip Length (miles)	Avg. Trip Length (miles)	Number of Trips	Total Trip Length (miles)	Avg. Trip Length (miles)
Education	19	173	9.1	143	778	5.4	162	951	5.9
Gov't	4	81	20.3	55	340	6.2	59	422	7.1
Industrial	34	499	14.7	38	525	13.8	72	1,023	14.2
Medical	31	254	8.2	75	728	9.7	106	982	9.3
Office	42	376	8.9	257	2,373	9.2	299	2,749	9.2
Other	132	1,677	12.7	184	1,905	10.4	316	3,582	11.3
Residential	62	767	12.4	256	2,826	11.0	318	3,593	11.3
Retail	270	2,289	8.5	293	2,862	9.8	563	5,151	9.1
Total	594	6,115	10.3	1,301	12,338	9.5	1,895	18,453	9.7

Table 23 shows the average trip length to destinations by commodity group for trips made by cargo vehicles only. Approximately 37 percent of the trips cited the commodity group “machinery” with an average trip length of 8.4 miles per trip. The “unknown” and “food” commodity groups were the next most frequently transported commodity groups, with an average trip length of 9.3 miles per trip and 6.8 miles per trip, respectively. The overall average trip length for cargo vehicles was 10.3 miles.

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

Commodity Group	Cargo Vehicles		
	Number of Trips	Total Trip Length (miles)	Average Trip Length (miles)
Agriculture	30	450	15.0
Building Materials	11	149	13.6
Food	74	504	6.8
Machinery	218	1,829	8.4
Miscellaneous	38	355	9.3
Raw Materials	66	822	12.5
Textiles	31	463	14.9
Transportation	2	22	10.8
Unknown	88	816	9.3
Wood	36	704	19.6
Total	594	6,115	10.3

Travel Time and Speed

The San Antonio 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 estimates. 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 San Antonio study area, and travel speed estimates were derived from the estimated trip lengths.

Table 24 shows the travel time frequency distributions of inter-zonal trips, grouped at five-mile intervals, while Figure 12 and Table 25 show the ungrouped TLFDs. Approximately 24 percent of the trips made by cargo vehicles were between 5 and 10 minutes, 15 percent were between both 15 and 20 minutes and 11 and 15 minutes. For service vehicles, approximately 25 percent of the trips were between 5 and 10 minutes, 17 percent were between 10 and 15 minutes, and 13 percent were less than 5 minutes. The longest duration of travel time for cargo vehicles was 69 minutes, while the longest travel time duration for service vehicles was 76 minutes.

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

Travel Time (minutes)	Cargo		Service		All Vehicles	
	# of Trips	% of Total	# of Trips	% of Total	# of Trips	% of Total
< 5	76	12.8%	167	12.8%	243	12.8%
5 - 10	143	24.1%	319	24.5%	462	24.4%
10 - 15	87	14.6%	226	17.4%	313	16.5%
15 - 20	88	14.8%	165	12.7%	253	13.4%
20 - 25	52	8.8%	174	13.4%	226	11.9%
25 - 30	34	5.7%	83	6.4%	117	6.2%
30 - 35	43	7.2%	51	3.9%	94	5.0%
35 - 40	23	3.9%	36	2.8%	59	3.1%
40 - 45	19	3.2%	24	1.8%	43	2.3%
45 - 50	8	1.3%	25	1.9%	33	1.7%
50 - 55	11	1.9%	16	1.2%	27	1.4%
55 - 60	4	0.7%	4	0.3%	8	0.4%
> 60	6	1.0%	11	0.9%	17	0.9%
Total	594	100%	1,301	100%	1,895	100%

¹ Upper bound not included in travel time categories (e.g., 10 minutes is in 10 to 15 minutes category).

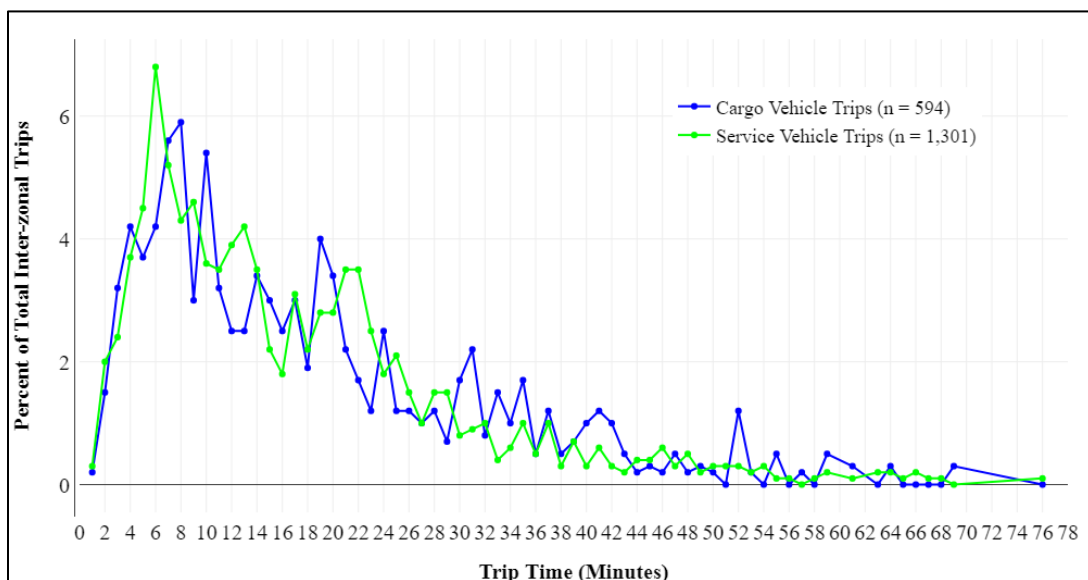


Figure 12. Surveyed Commercial Vehicle Trips Travel Time.

Table 25. Travel Time Frequency Distributions (Ungrouped).

Travel Time (minutes)	Cargo Vehicles		Service Vehicles		All Vehicles	
	# of Trips	% of Total	# of Trips	% of Total	# of Trips	% of Total
1	1	0.2	4	0.3	5	0.3
2	9	1.5	26	2.0	35	1.8
3	19	3.2	31	2.4	50	2.5
4	25	4.2	48	3.7	73	3.8
5	22	3.7	58	4.5	80	4.1
6	25	4.2	88	6.8	113	6.0
7	33	5.6	68	5.2	101	5.3
8	35	5.9	56	4.3	91	4.7
9	18	3.0	60	4.6	78	4.1
10	32	5.4	47	3.6	79	4.2
11	19	3.2	46	3.5	65	3.4
12	15	2.5	51	3.8	66	3.5
13	15	2.5	55	4.2	70	3.7
14	20	3.4	45	3.5	65	3.4
15	18	3.0	29	2.2	47	2.5
16	15	2.5	24	1.8	39	2.0
17	18	3.0	40	3.1	58	3.1
18	11	1.9	29	2.2	40	2.1
19	24	4.0	36	2.8	60	3.2
20	20	3.4	36	2.8	56	3.0
21	13	2.2	45	3.4	58	3.1
22	10	1.7	46	3.5	56	3.0
23	7	1.2	32	2.5	39	2.0
24	15	2.5	24	1.8	39	2.0
25	7	1.2	27	2.1	34	1.8
26	7	1.2	19	1.5	26	1.4
27	6	1.0	13	1.0	19	1.0
28	7	1.2	20	1.5	27	1.4
29	4	0.7	20	1.5	24	1.3
30	10	1.7	11	0.8	21	1.1
31	13	2.2	12	0.9	25	1.3
32	5	0.8	13	1.0	18	0.9
33	9	1.5	5	0.4	14	0.7
34	6	1.0	8	0.6	14	0.7
35 +	81	13.6	129	10.2	210	11.6
Total	594	100	1,301	100	1,895	100

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 17.1 minutes, with cargo vehicles averaging 18 minutes and service vehicles averaging 16.6 minutes. By land use types, trips made by cargo vehicles to government sites have the longest average travel duration of 31.6 minutes, with an average travel speed of 38.7 mph. For service vehicles, trips to industrial land use types also had the highest average travel time of 23 minutes and an average travel speed of 36 mph.

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

Land Use	Cargo			Service			All Vehicles		
	Number of Trips	Avg. Travel Time (min)	Avg. Travel Speed (mph)	Number of Trips	Avg. Travel Time (min)	Avg. Travel Speed (mph)	Number of Trips	Avg. Travel Time (min)	Avg. Travel Speed (mph)
Education	19	17.0	32.1	143	10.2	32.0	162	11.0	32.0
Gov't	4	31.6	38.7	55	11.6	32.1	59	12.9	33.2
Industrial	34	24.9	35.3	38	23.0	36.0	72	23.9	35.7
Medical	31	15.4	32.0	75	17.7	33.0	106	17.0	32.7
Office	42	15.6	34.3	257	16.4	33.8	299	16.3	33.9
Other	132	21.9	34.8	184	17.9	34.6	316	19.6	34.7
Residential	62	21.0	35.4	256	19.3	34.4	318	19.6	34.6
Retail	270	15.0	33.8	293	16.7	35.0	563	15.9	34.5
Total	594	18.0	34.3	1,301	16.6	34.2	1,895	17.1	34.2

Table 27 shows the average travel time and speed to destinations by commodity group for trips made by cargo vehicles only. Trips transporting wood had the longest average trip duration of 32 minutes, with an average travel speed of 36.7 mph. Of the known commodity groups, machinery products had the highest number of trips, with an average travel time of 15.3 minutes and an average travel speed of 32.9 mph.

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

Commodity Group	Cargo Vehicles		
	Number of Trips	Average Travel Time (minutes)	Average Travel Speed (mph)
Agriculture	30	23.7	38.0
Building Materials	11	24.1	33.8
Food	74	12.9	31.6
Machinery	218	15.3	32.9
Miscellaneous	38	16.1	34.7
Raw Materials	66	21.1	35.5
Textiles	31	25.2	35.6
Transportation	2	18.5	35.1
Unknown	88	16.4	33.9
Wood	36	32.0	36.7
Total	594	18.0	34.3

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. However, those cases where a vehicle did not report a base location (i.e., all of the reported trips were non-base) were considered on a case-by-case basis. In cases where the beginning and ending non-base location were the same, a tour was considered to be made. In a handful of cases where only non-base trips were reported, the trip tour was determined to have an open start or end, with a trip tour occurring as well.

To accurately analyze trip tours, external trips had to be included in the analysis. This is performed 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 occur within the trip tour.

There were 2,285 trips observed in the San Antonio commercial vehicle survey area. 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) were located at the base location. If neither trip end was at the base location, then the trip was considered as a non-base trip. Such instances were treated separately from those vehicles with at least one trip involving a base, in determining whether the trip tour could be considered “all open,” “completely closed,” “before a closed tour,” or “after a closed tour.” Rather than simply labeling such trips as “all open,” each case was considered individually. If the trips began or ended in the same location, the trips for this vehicle were classified as “completely closed.” Similar logic was used in determining if a “trip before the tour” or a “trip after the tour” had occurred.

As Table 28 shows, approximately 53 percent of the total trips generated by cargo vehicles were non-base trips and 47 percent were base trips. For trips made by service vehicles, 54 percent were base trips and 46 percent were non-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	372	47.1	812	54.3	1,184	51.8
Not Base	418	52.9	683	45.7	1,101	48.2
Total	790	100.0	1,495	100.0	2,285	100.0

Table 29 shows the distribution of trip tours for cargo and service vehicles. There were 563 trip tours generated by 440 vehicles making at least one trip tour. Cargo vehicles made 179 tours and service vehicles produced 384 tours. The number of tours varied from 1 to 4 tours for cargo and 1 to 6 for service vehicles. Approximately 71 percent of the cargo vehicles and 81 percent of the service vehicles (that made trip tours) made only one trip tour. For those cargo and service vehicles making only one trip tour, they averaged 3.6 and 3 trips within the tour, respectively. For all vehicles combined, the average number of tours per vehicle was 1.3 and the average number of trips per tour was 2.9.

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	91	91	331	3.6
2	27	54	134	2.5
3	10	30	70	2.3
4	1	4	8	2.0
Cargo Total	129	179	543	3.0
Service Vehicles				
Total Number of Trip Tours	Number of Vehicles	Number of Tours	Number of Trips	Average Trips per Tour
1	251	251	749	3.0
2	52	104	245	2.4
3	6	18	44	2.4
5	1	5	13	2.6
6	1	6	12	2.0
Service Total	311	384	1,063	2.8
Grand Total	440	563	1,606	2.9

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 1,606 trips observed within the total 563 trip tours. For all vehicles, 191 were external trips (12 percent), 1,328 were inter-zonal trips (83 percent), and 87 were intra-zonal trips (5 percent). Table 30 shows the distribution of these trips for cargo and service vehicles.

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	87	73	222	637	22	39	331	749
2	11	8	119	229	4	8	134	245
3	12	0	52	40	6	4	70	44
4	0	0	8	0	0	0	8	0
5	0	0	0	13	0	0	0	13
6	0	0	0	8	0	4	0	12
Total	110	81	401	927	32	55	543	1,063

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 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	150	247	397	331	61.0	749	70.5	1,080	67.2
2	26	37	63	134	24.7	245	23.0	379	23.6
3	10	8	18	70	12.9	44	4.2	114	7.2
4	0	0	0	8	1.4	0	0.0	8	0.5
5	0	3	3	0	0.0	13	1.2	13	0.8
6	0	0	0	0	0.0	12	1.1	12	0.7
Total	186	295	481	543	100	1,063	100	1,606	100

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.

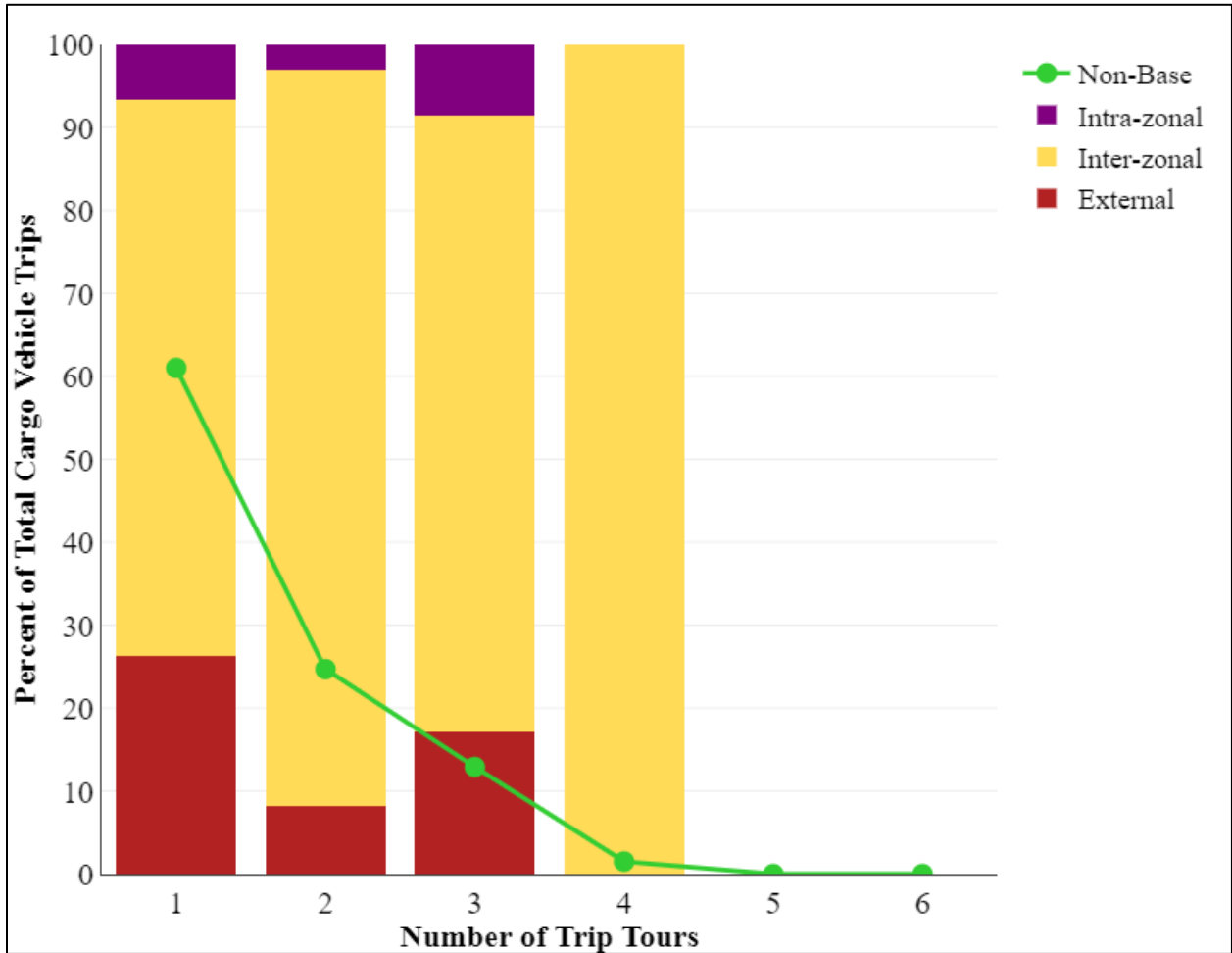


Figure 13. Cargo Vehicle Trips within Trip Tours by Trip Type.

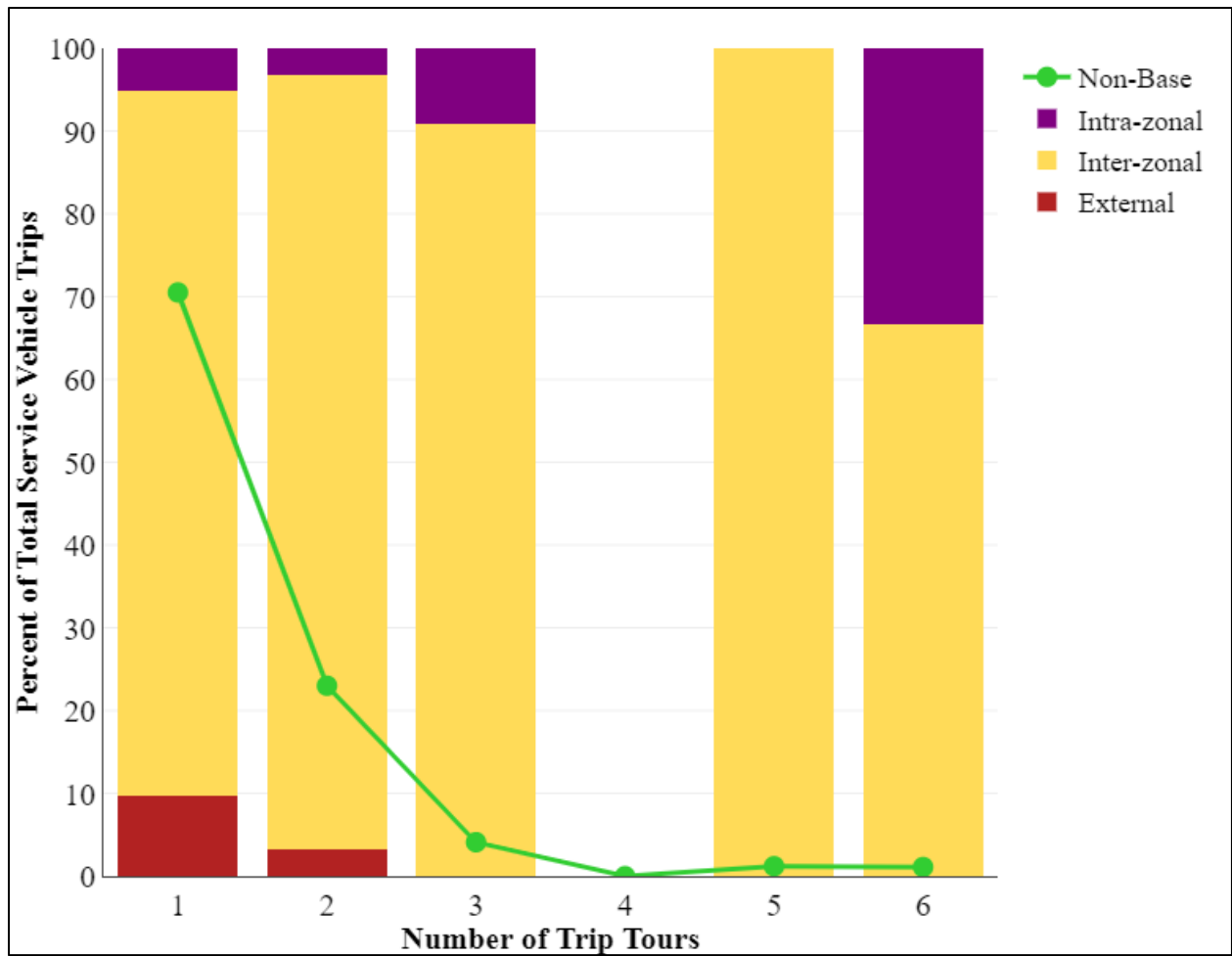


Figure 14. Service Vehicle Trips within Trip Tours by Trip Type.

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 begin 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 (except in the case of all non-base trips). In the case of non-base trips, if the trips were determined to contain completely closed tours under the criteria described previously, they were labeled as completely closed 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. For all vehicles surveyed, over 70 percent of the trips occurred within a closed tour, while almost 28 percent occurred in an open tour.

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
After End of Last Tour	0	0.0	19	1.3	19	0.8
Before Start of First Tour	3	0.4	14	0.9	17	0.7
Only Open	244	30.9	399	26.7	643	28.1
Within Closed	543	68.7	1,063	71.1	1,606	70.4
Total	790	100	1,495	100	2,285	100

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 San Antonio 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 contain 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, an adjustment factor is applied to the data to obtain average weekday VMT by functional classification. Table 33 provides the adjusted 2018 HPMS VMT estimates for the San Antonio study area.

Table 33. 2018 HPMS Estimates of Weekday VMT in the San Antonio Study Area.

Functional Classification	Total Weekday VMT
Freeway	29,258,557
Arterial	20,950,951
Collector	6,367,304
Local	3,979,952
Total	60,556,764

The percentages of commercial and non-commercial vehicles by functional classification were determined by using vehicle classification counts for the San Antonio area obtained from TxDOT (STARS II) and external station counts from the latest available external travel study. 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.

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		Weighted Average (%)	
	Internal Sites	External Sites	Internal Sites	External Sites	Commercial (18%)	Non-Commercial (82%)
Freeway	12	22	88	78	14	86
Arterial	5	14	95	86	7	93
Collector	6	12	94	88	7	93
Local	6	-	94	-	6	94

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

Functional Classification	Commercial VMT	Non-Commercial VMT	Total VMT
Freeway	4,003,238	25,255,319	29,258,557
Arterial	1,380,144	19,570,807	20,950,951
Collector	444,878	5,922,426	6,367,304
Local	242,554	3,737,398	3,979,952
Total	6,070,814	54,485,950	60,556,764

The total commercial VMT above in Table 35 represents all commercial vehicles that traveled within the study area, attributable to both internal and external travel. To properly expand the survey data and determine the total internal commercial vehicle trips generated in the study area, external VMT estimates had to be subtracted from the total commercial VMT. The estimates of study area VMT attributable to external travel (i.e., external through and external local), shown in Table 36, were calculated using the data and results from the most recent 2018 Alamo MPO External Study, which included a combination of INRIX and AirSage data. VMT for trips

traveling thru the region (i.e. external thru trips) is the distance traveled on the roadway network from where the trip entered the region to where the trip exited the region. VMT for trips that entered or exited the region (i.e. external local trips) is the from where the trip either entered or exited the region to its origin or from its destination. The total VMT for all trips is the summed trip VMT multiplied its trip weight, where the trip rate is the trips contribution to traffic counts. The external commercial vehicle VMT was then subtracted from the study area commercial vehicle VMT to reach only the internal commercial VMT estimates as shown in Table 37.

Table 36. Estimated External VMT for Commercial and Non-Commercial Vehicles

Vehicle Category	External Thru	External Local	Total External VMT
Non-Commercial	1,640,801	7,420,175	9,060,976
Commercial	460,807	1,338,062	1,798,869
Total	2,101,609	8,758,237	10,859,845

Table 37. External/Internal Study Area Commercial VMT

Type	Study Area Commercial VMT
Internal	4,271,945
External	1,798,869
Total*	6,070,814

* Slight difference in total may occur due to rounding.

The internal VMT for the vehicles included in the survey was estimated using the number of trips in the survey and the average trip length. These estimates, both for cargo and service vehicles separately, were calculated by multiplying the total number of inter-zonal trips by the average trip length. A summary of the surveyed trips and VMT is shown below in Table 38.

Table 38. Surveyed Trips and VMT Summary.

Vehicle Category	Number of Inter-zonal Trips	Average Trip Length (miles)	VMT
Cargo	594	10.3	6,118
Service	1,301	9.5	12,360
Total	1,895	---	18,478

The total internal commercial VMT (Table 37) represents all commercial vehicles and is not distinguished by cargo or service vehicles. This total internal commercial VMT was broken down in to cargo and service vehicles based on vehicle classification counts from within the study area. Vehicles in Class 5 (two-axle, six-tire, single unit trailers) through Class 13 (seven or more axle multi-trailers) and were assumed as cargo transport vehicles. Vehicles that belonged to Class 3 (pick-up, van, or two-axle, four-tire, single unit trailers) and Class 4 (buses) and were assumed to be 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 total internal commercial VMT is summarized below in Table 39.

Table 39. Total Internal VMT by Vehicle Category.

Vehicle Category	VCC %	VMT
Cargo	23%	983,891
Service	77%	3,288,055
Total	100%	4,271,945

Expansion factors were developed based on the quotient between total internal VMT and observed internal VMT (from the survey) for each commercial vehicle type. The expansion factors were then multiplied by the observed number of trips (both inter-zonal and intra-zonal) to estimate the total commercial vehicle trips. A summary of the expansion factors and the expanded trips are shown below in Table 40 and Table 41.

Table 40. Expansion Factors.

Vehicle Category	Total Internal VMT (miles)	Observed Internal VMT (miles)	Expansion Factor
Cargo	983,891	6,118	160.81
Service	3,288,055	12,360	266.03
Total	4,271,945	18,478	-

Table 41. Summary of Expanded Trips.

Trip Type	Inter-zonal Trips		Intra-zonal Trips		Total Trips	
	Observed	Expanded	Observed	Expanded	Observed	Expanded
Cargo	594	95,523	42	6,754	636	102,277
Service	1,301	346,111	75	19,953	1,376	366,064

Total	1,895	441,634	117	26,707	2,012	468,341
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Using the total number of commercial vehicle trips (expanded) for the study area, the number of commercial vehicles operating on a daily basis was estimated by dividing the total number of trips by the average number of trips per vehicle. Since the commercial vehicle categories (cargo and service) exhibit different trip characteristics, this calculation was done for each commercial vehicle category. Table 42 below provides a summary of the number of commercial vehicles operating on a daily basis within the study area.

Table 42. Number of Commercial Vehicles Operating on a Daily Basis.

Vehicle Category	Total Trips	Average Trips per Vehicle	Daily Traffic
Cargo	102,277	3.41	29,960
Service	366,064	3.04	120,427
Total	468,341	-	150,387

One final calculation was the determination of the commercial vehicle attraction rate to households. In the survey, approximately 17 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 79,376 trips to residential locations. The residential trip estimate was divided by the estimated number of households in the San Antonio area (887,482) to obtain an attraction rate of 0.089.

Table 43 provides a summary of key results from the San Antonio commercial vehicle survey and data expansion.

Table 43. Key Survey Results and Expanded Trip and VMT Data.

Indicator	Cargo Vehicles	Service Vehicles	All Vehicles
Sample Size	174	428	602
Total Inter-Zonal Trips	594	1,301	1,895
Total Intra-Zonal Trips	42	75	117
Total Internal Trips	636	1,376	2,012
Total External Trips	154	119	273
Total Internal and External Trips	790	1,495	2,285
Average Total Trips per Vehicle	4.5	3.5	3.8
Average Total Internal Trips per Vehicle*	3.7	3.2	3.3
Average Trip Length	10.30	9.50	9.70
Observed Internal VMT	6,118	12,360	18,478
Total Internal Commercial VMT	983,891	3,288,055	4,271,945
Survey Expansion Factor	161	266	--
Total Expanded Inter-Zonal Commercial Vehicle Trips	95,523	346,111	441,634
Total Expanded Intra-Zonal Commercial Vehicle Trips	6,754	19,953	26,707
Total Expanded Commercial Vehicle Trips	102,278	366,064	468,341
Number of Commercial Vehicles Operating on a Daily Basis	29,960	120,427	150,387
Attraction Rate to Households	--	--	0.089

*Based on internal trips of 602 surveyed commercial vehicles (174 cargo vehicles and 428 service vehicles).

SURVEY SUMMARY

This section provides a summary of vehicle and trip characteristics of 602 commercial vehicles that participated in the 2018/2019 San Antonio commercial vehicle survey. Based on the results from the survey, significant differences as well as similarities of travel characteristics were observed between cargo vehicles and service vehicles.

The average vehicle age for cargo and service vehicles was 8.4 years. The odometer readings reported by cargo vehicles indicated an average mileage of 181,217 miles, while service vehicles had a reported average mileage of 110,487 miles. In terms of fuel use, approximately 51 percent of cargo vehicles used diesel and 49 percent used unleaded gasoline, while 95 percent of service vehicles used gasoline and 5 percent used diesel with a small sample (one vehicle each) that used gas/electric hybrid and electric for a fuel source.

The analyses of trip characteristics included an 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 4.5 total trips per day, compared to 3.5 trips per day for service vehicles. Excluding the trips made outside of the study area (external trips), cargo vehicles produced 4.1 internal trips per day, with average travel distance of 10.3 miles, compared to service vehicles, which made 3.5 internal trips per day, with average trip length of 9.5 miles. The average travel time per trip for cargo vehicles was 18.0 minutes and for service vehicles the average travel time per trip was 16.6 minutes.

In terms of trip purpose at trip destinations, approximately 55 percent of the cargo vehicle internal trips were for delivery, 26 percent were base, and 14 percent were classified pick-up. For trips made by service vehicles, approximately 39 percent were classified as sales, 34 percent were classified as base, and 9 percent were service.

In terms of land use activity, approximately 46 percent of the trips made by cargo vehicles traveled to retail/shopping locations, followed by 11 percent to residential locations, and 9 percent to warehousing locations. For service vehicles, nearly 30 percent of the trips traveled to retail/shopping locations, followed by nearly 20 percent to office building (non-government) locations, and 20 percent to residential locations.

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, the 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 approximately 4,701 lbs. Raw materials products showed the highest average net cargo weight of approximately 4,701 lbs. per trip, but the most frequently transported commodity was machinery products with an average net cargo weight of nearly 1,137 lbs. per trip. The land use category “Industrial” showed the highest average net cargo weight of approximately 10,594 lbs. per trip. The delivery purpose had the highest average net cargo weight of nearly 6,517 lbs. 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 563 trip tours were generated by the surveyed vehicles, with cargo vehicles making 179 tours and service vehicles producing 384 tours. The number of trip tours per vehicle varied from 1 to 6 tours for cargo vehicles and 1 to 3 tours for service vehicles. The average number of trip tours for all vehicles was 1.3 and the average number of trips per tour was 2.9. Trips made as part of trip tours accounted for 1,606 trips (543 trips by cargo vehicles and 1,063 trips by service vehicles). Within the trip tours, approximately 83 percent were inter-zonal trips, 12 percent were external trips, and the remaining 5 percent were intra-zonal trips. Non-base trips (which were not mutually-exclusive of the other trip types) comprised approximately 30 percent of the trips within the tours.

Lastly, the expansion of commercial vehicle survey data were based on VMT estimates and vehicle classification counts for the San Antonio 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 150,387 commercial vehicles (29,960 cargo vehicles and 120,427 service vehicles) were estimated to be operating within the San Antonio study area on a daily basis.

APPENDIX

COMMERCIAL VEHICLE SURVEY

PART 1: VEHICLE INFORMATION

(Please fill out this form, even if the information requested has been provided elsewhere.)

Official Use Company ID #: _____ Vehicle ID #: _____ NAICS Code: _____

Travel Day: _____ Vehicle License Plate #: _____
Month / Day / Year

Company or Name of Owner (name on registration):

Company/Organization Address:

(Street Address or Names of Nearest Intersecting Streets)

City _____ State _____ Zip Code _____

Company/Organization - Type of Place/Industry (see options below):

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

- Vehicle Type (Primary Use) 1) Cargo / Freight Transport Vehicle
 2) Service Vehicle (vehicle used PRIMARILY for non-cargo transport purposes)
 3) Commercial Service Vehicle with Cargo Delivery

- Vehicle Fuel: 1) Unleaded Gas 2) Diesel 3) Propane 4) Natural Gas
 5) Electric 6) Gas/Electric Hybrid 96) 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 Minivan) | 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) |
| | 96) <input type="checkbox"/> Other (specify) |

Gross Vehicle Weight (including trailer): _____ pounds

Odometer Reading at beginning of travel day: _____ Total Number of Stops on travel day: _____

TYPE OF PLACE/INDUSTRY OPTIONS		
(1) Office Building (Non-Government)	(6) Education (college, trade, etc)	(11) Warehouse
(2) Retail / Shopping	(7) Government Office / Building	(12) Distribution Center
(3) Industrial / Manufacturing	(8) Residential	(13) Construction
(4) Medical / Hospital	(9) Airport	(96) Other (specify)
(5) Education (12 th grade or less)	(10) Intermodal Facility	

COMMERCIAL VEHICLE SURVEY

Vehicle Plate #: _____

PART 2: TRIP INFORMATION

The place my travel began today in this commercial vehicle was:

Work / Base Location (Address of Surveyed Organization) Other Location (Please describe): _____

Type of Place (Specify Type of Place 1-13 or 96 using the Place options below): _____

 (Street Address or Names of Nearest Intersecting Streets) TRAVEL DATE: _____

 Month / Day / Year DEPARTURE TIME: _____ am/pm

 (City, State, Zip Code)

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): _____ pounds

RECORD EVERY PLACE YOU GO, INCLUDING BRIEF STOPS

	Record the following information about each place. Location Name and Address including City, State, and Zip or Location Name and Nearest Intersecting Streets or Landmark	Is this the Work/Base Location for this vehicle? <input type="checkbox"/> - Yes <input type="checkbox"/> - No	What Type of Place is this? (See Place Options below)	What Time did you Arrive and Depart this location? (Record exact times)	What Activity are you doing at this location? (See Activity Options below)	If transporting cargo, what is the Cargo? (If HAZMAT also enter Placard #)	If transporting cargo, enter Cargo Weight (Pounds) _____ Delivered _____ Picked Up
PLACE 1		<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 2		<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 3		<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up

PLACE OPTIONS	ACTIVITY OPTIONS
(1) Office Building (Non-Government) (6) Education (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 (96) Other (specify) (5) Education (12 th grade or less) (10) Intermodal Facility	(1) Base Location / Return to Base Location (4) Deliver Cargo (7) Government Related Service (2) Vehicle Maintenance (fuel, oil, etc) (5) Pick up Cargo (8) Installation / Maintenance / Repair Service (3) Driver Needs (lunch, restroom, etc) (6) Deliver and Pick up Cargo (9) Sales / Professional Service (96) Other Activity (specify)

Commercial Vehicle Survey – Trip Information

Vehicle Plate #: _____

(continued)

	Record the following information about each place. Location Name and Address including City, State, and Zip or Location Name and Nearest Intersecting Streets or Landmark	Is this the Work/Base Location for this vehicle? <input type="checkbox"/> - Yes <input type="checkbox"/> - No	What Type of Place is this? (See Place Options below)	What Time did you Arrive and Depart this location? (Record exact times)	What Activity are you doing at this location? (See Activity Options below)	If transporting cargo, what is the Cargo? (If HAZMAT also enter Placard #)	If transporting cargo, enter Cargo Weight (Pounds)
PLACE 4		<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Arrive: _____ am/pm Depart: _____ am/pm			Delivered _____ Picked Up _____
PLACE 5		<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Arrive: _____ am/pm Depart: _____ am/pm			Delivered _____ Picked Up _____
PLACE 6		<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Arrive: _____ am/pm Depart: _____ am/pm			Delivered _____ Picked Up _____
PLACE 7		<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Arrive: _____ am/pm Depart: _____ am/pm			Delivered _____ Picked Up _____
PLACE 8		<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Arrive: _____ am/pm Depart: _____ am/pm			Delivered _____ Picked Up _____
PLACE 9		<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Arrive: _____ am/pm Depart: _____ am/pm			Delivered _____ Picked Up _____

PLACE OPTIONS			ACTIVITY OPTIONS		
(1) Office Building (Non-Government)	(6) Education (college, trade, etc)	(11) Warehouse	(1) Base Location / Return to Base Location	(4) Deliver Cargo	(7) Government Related Service
(2) Retail / Shopping	(7) Government Office / Building	(12) Distribution Center	(2) Vehicle Maintenance (fuel, oil, etc)	(5) Pick up Cargo	(8) Installation / Maintenance / Repair Service
(3) Industrial / Manufacturing	(8) Residential	(13) Construction Site	(3) Driver Needs (lunch, restroom, etc)	(6) Deliver and Pick up Cargo	(9) Sales / Professional Service
(4) Medical / Hospital	(9) Airport	(96) Other (specify)			(96) Other Activity (specify)
(5) Education (12 th grade or less)	(10) Intermodal Facility				

Commercial Vehicle Survey – Trip Information

Vehicle Plate #: _____

(continued)

	Record the following information about each place. Location Name and Address including City, State, and Zip or Location Name and Nearest Intersecting Streets or Landmark	Is this the Work/Base Location for this vehicle?	What Type of Place is this? (See Place Options below)	What Time did you Arrive and Depart this location? (Record exact times)	What Activity are you doing at this location? (See Activity Options below)	If transporting cargo, what is the Cargo? (If HAZMAT also enter Placard #)	If transporting cargo, enter Cargo Weight (Pounds)
PLACE 10		<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 11		<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 12		<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 13		<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 14		<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up

PLACE OPTIONS			ACTIVITY OPTIONS		
(1) Office Building (Non-Government)	(6) Education (college, trade, etc)	(11) Warehouse	(1) Base Location / Return to Base Location	(4) Deliver Cargo	(7) Government Related Service
(2) Retail / Shopping	(7) Government Office / Building	(12) Distribution Center	(2) Vehicle Maintenance (fuel, oil, etc)	(5) Pick up Cargo	(8) Installation / Maintenance / Repair Service
(3) Industrial / Manufacturing	(8) Residential	(13) Construction Site	(3) Driver Needs (lunch, restroom, etc)	(6) Deliver and Pick up Cargo	(9) Sales / Professional Service
(4) Medical / Hospital	(9) Airport	(96) Other (specify)			(96) Other Activity (specify)
(5) Education (12 th grade or less)	(10) Intermodal Facility				

Commercial Vehicle Survey – Trip Information

Vehicle Plate #: _____

(continued)

	Record the following information about each place. Location Name and Address including City, State, and Zip or Location Name and Nearest Intersecting Streets or Landmark	Is this the Work/Base Location for this vehicle?	What Type of Place is this? (See Place Options below)	What Time did you Arrive and Depart this location? (Record exact times)	What Activity are you doing at this location? (See Activity Options below)	If transporting cargo, what is the Cargo? (If HAZMAT also enter Placard #)	If transporting cargo, enter Cargo Weight (Pounds)
PLACE 15		<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Arrive: _____ am/pm Depart: _____ am/pm			Delivered Picked Up
PLACE 16		<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Arrive: _____ am/pm Depart: _____ am/pm			Delivered Picked Up
PLACE 17		<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Arrive: _____ am/pm Depart: _____ am/pm			Delivered Picked Up
PLACE 18		<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Arrive: _____ am/pm Depart: _____ am/pm			Delivered Picked Up
PLACE 19		<input type="checkbox"/> - Yes <input type="checkbox"/> - No		Arrive: _____ am/pm Depart: _____ am/pm			Delivered Picked Up

PLACE OPTIONS			ACTIVITY OPTIONS		
(1) Office Building (Non-Government)	(6) Education (college, trade, etc)	(11) Warehouse	(1) Base Location / Return to Base Location	(4) Deliver Cargo	(7) Government Related Service
(2) Retail / Shopping	(7) Government Office / Building	(12) Distribution Center	(2) Vehicle Maintenance (fuel, oil, etc)	(5) Pick up Cargo	(8) Installation / Maintenance / Repair Service
(3) Industrial / Manufacturing	(8) Residential	(13) Construction Site	(3) Driver Needs (lunch, restroom, etc)	(6) Deliver and Pick up Cargo	(9) Sales / Professional Service
(4) Medical / Hospital	(9) Airport	(96) Other (specify)			(96) Other Activity (specify)
(5) Education (12 th grade or less)	(10) Intermodal Facility				

ENCUESTA DE VEHICULOS COMERCIALES**PARTE 1: INFORMACION VEHICULAR**

(Favor de llenar esta planilla, aún si la información solicitada ha sido proporcionada en otro lugar.)

Uso Oficial	Company ID #: _____	Vehicle ID #: _____	NAICS Code: _____
--------------------	---------------------	---------------------	-------------------

Día de Viaje: _____
Mes / Día / Año

de Placa del Vehículo: _____

Empresa o Nombre del Dueño (nombre en el registro del vehículo):
_____Dirección de la Empresa/Organización:

(Dirección o Nombres de las Calles en la Intersección Más Cercana)

Ciudad _____ Estado _____ Código Postal _____

Empresa/Organización - Tipo de Lugar/Industria (ver opciones abajo) _____

Información del Vehículo: Marca: _____ Modelo: _____ Año: _____

Tipo de Vehículo (Uso Principal)

- 1) Carga / Vehículo de Transporte de Carga
 2) Vehículo de Servicio (vehículo que GENERALMENTE no se usa para el transporte de carga)
 3) Vehículo de Servicio con Transporte de Carga

Combustible del Vehículo: 1) Combustible Sin Plomo 2) Diesel 3) Propano 4) Gas Natural
 5) Electric 6) Híbrido Gas/Electric 96) Otro (especifique)

Clasificación del Vehículo:

- | | |
|--|--|
| 1) <input type="checkbox"/> Vehículo Pasajero | 5) <input type="checkbox"/> Unidad Singular 2-ejes (6 llantas) |
| 2) <input type="checkbox"/> Camioneta | 6) <input type="checkbox"/> Unidad Singular 3-ejes (10 llantas) |
| 3) <input type="checkbox"/> Van (Carga o Minivan) | 7) <input type="checkbox"/> Unidad Singular 4-ejes (14 llantas) |
| 4) <input type="checkbox"/> Vehículo Deportivo Todoterreno (SUV) | 8) <input type="checkbox"/> Semi (toda combinación de Camión y Remolque) |
| | 96) <input type="checkbox"/> Otro (especifique) |

Peso Bruto del Vehículo (incluyendo el remolque): _____ libras

Millaje del Odómetro al inicio del día de viaje: _____ Número Total de Paradas en el día de viaje: _____

OPCIONES DE LUGAR/INDUSTRIA

- | | | |
|----------------------------------|---|-----------------------------|
| (1) Oficina (No Gubernamental) | (6) Educación (universidad, técnico, etc) | (11) Almacén |
| (2) Por menor / Compras | (7) Oficina / Edificio Gubernamental | (12) Centro de Distribución |
| (3) Industrial / Fabricante | (8) Residencia | (13) Construcción |
| (4) Cuidado de Salud / Hospital | (9) Aeropuerto | (96) Otro (especifique) |
| (5) Educación (12 grado o menos) | (10) Instalación Intermodal | |

PARTE 2: INFORMACION DE VIAJES

El lugar donde empecé hoy en este vehículo comercial fue:

Trabajo / Lugar Base (Dirección de la Organización Encuestada) Otro Lugar (Describalo por favor): _____
 Tipo de Lugar (Especifique el Tipo de Lugar 1-13 o 96, usando los códigos de Opciones de Lugar abajo): _____

 (Dirección o Nombres de las Calles en la Intersección Más Cercana) FECHA DE VIAJE: _____

 (Ciudad, Estado, Código Postal) HORA DE SALIDA: _____ am/pm

Quando salió de la dirección arriba, su vehículo estaba: Completamente Cargado Parcialmente Cargado Vacío No Aplicable (Veh. de Servicio)

Si estaba cargado, ¿cuál fue el peso total de su carga en libras? (si no está seguro del peso exacto, escriba una aproximación): _____ libras

APUNTE CADA PARADA, INCLUYENDO PARADAS BREVES

	Apunte la siguiente información sobre cada lugar: Nombre del Lugar y Dirección incluyendo Ciudad, Estado y Código Postal o Nombre del Lugar y Nombres de las Calles en la Intersección Más Cercana	¿Es este lugar La Oficina o Base del vehículo?	¿Qué Tipo de Lugar es? (Ver Opciones de Lugar abajo)	¿A qué Hora Llegó y Salió de este lugar? (Apunte las horas exactas)	¿Qué Actividad realiza en este lugar? (Ver Opciones de Actividad abajo)	Si transporta carga, ¿Qué es la Carga? (Si es HAZMAT, también anote el # del cartel)	Si transporta carga, anote el Peso de la Carga (en Libras)
LUGAR 1		<input type="checkbox"/> - Sí <input type="checkbox"/> - No		Llegada: _____ am/pm Salida: _____ am/pm			_____ Entregado _____ Recogido
LUGAR 2		<input type="checkbox"/> - Sí <input type="checkbox"/> - No		Llegada: _____ am/pm Salida: _____ am/pm			_____ Entregado _____ Recogido
LUGAR 3		<input type="checkbox"/> - Sí <input type="checkbox"/> - No		Llegada: _____ am/pm Salida: _____ am/pm			_____ Entregado _____ Recogido

OPCIONES DE LUGAR			OPCIONES DE ACTIVIDAD			
(1) Oficina (No Gubernamental)	(6) Educación (universidad, técnico)	(11) Almacén	(1) Ubicación Base/ Regresar a la Ubicación Base	(4) Entregar Carga	(7) Servicio Relacionado con el Gobierno	
(2) Por Menor / Compras	(7) Oficina / Edificio Gubernamental	(12) Centro de Distribución	(2) Mantenimiento del Vehículo (cargar combustible, aceite, etc)	(5) Recoger Carga	(8) Servicio relacionado con Instalación / Reparación / Mantenimiento	
(3) Industrial / Fabricante	(8) Residencia	(13) Construcción	(3) Necesidades del chofer (comida, baño, etc)	(6) Entregar y Recoger Carga	(9) Servicios Profesionales o de Ventas	
(4) Cuidado de Salud / Hospital	(9) Aeropuerto	(96) Otro (especifique)			(96) Otra Actividad (especifique)	
(5) Educación (12 grado o menos)	(10) Instalación Intermodal					

Encuesta de Vehículos Comerciales – Información de Viajes

de Placa: _____

(continuación)

	Apunte la siguiente información sobre cada lugar: Nombre del Lugar y Dirección incluyendo Ciudad, Estado y Código Postal o Nombre del Lugar y Nombres de las Calles en la Intersección Más Cercana	¿Es este lugar la Oficina o Base del vehículo?	¿Qué Tipo de Lugar es? (Ver Opciones de Lugar abajo)	¿A qué Hora Llegó y Salió de este lugar? (Apunte las horas exactas)	¿Qué Actividad realiza en este lugar? (Ver Opciones de Actividad abajo)	Si transporta carga, ¿Qué es la Carga? (Si es HAZMAT, también anote el # del cartel)	Si transporta carga, anote el Peso de la Carga (en Libras)
LUGAR 4		<input type="checkbox"/> - Sí <input type="checkbox"/> - No		Llegada: _____ am/pm Salida: _____ am/pm			Entregado _____ Recogido _____
LUGAR 5		<input type="checkbox"/> - Sí <input type="checkbox"/> - No		Llegada: _____ am/pm Salida: _____ am/pm			Entregado _____ Recogido _____
LUGAR 6		<input type="checkbox"/> - Sí <input type="checkbox"/> - No		Llegada: _____ am/pm Salida: _____ am/pm			Entregado _____ Recogido _____
LUGAR 7		<input type="checkbox"/> - Sí <input type="checkbox"/> - No		Llegada: _____ am/pm Salida: _____ am/pm			Entregado _____ Recogido _____
LUGAR 8		<input type="checkbox"/> - Sí <input type="checkbox"/> - No		Llegada: _____ am/pm Salida: _____ am/pm			Entregado _____ Recogido _____
LUGAR 9		<input type="checkbox"/> - Sí <input type="checkbox"/> - No		Llegada: _____ am/pm Salida: _____ am/pm			Entregado _____ Recogido _____

OPCIONES DE LUGAR			OPCIONES DE ACTIVIDAD		
(1) Oficina (No Gubernamental)	(6) Educación (universidad, técnico)	(11) Almacén	(1) Ubicación Base/ Regresar a la Ubicación Base	(4) Entregar Carga	(7) Servicio Relacionado con el Gobierno
(2) Por Menor / Compras	(7) Oficina / Edificio Gubernamental	(12) Centro de Distribución	(2) Mantenimiento del Vehículo (cargar combustible, aceite, etc)	(5) Recoger Carga	(8) Servicio relacionado con Instalación / Reparación / Mantenimiento
(3) Industrial / Fabricante	(8) Residencia	(13) Construcción	(3) Necesidades del chofer (comida, baño, etc)	(6) Entregar y Recoger Carga	(9) Servicios Profesionales o de Ventas
(4) Cuidado de Salud / Hospital	(9) Aeropuerto	(96) Otro (especifique)			(96) Otra Actividad (especifique)
(5) Educación (12 grado o menos)	(10) Instalación Intermodal				

Encuesta de Vehículos Comerciales – Información de Viajes

de Placa: _____

(continuación)

	Apunte la siguiente información sobre cada lugar: Nombre del Lugar y Dirección incluyendo Ciudad, Estado y Código Postal o Nombre del Lugar y Nombres de las Calles en la Intersección Más Cercana	¿Es este lugar la Oficina o Base del vehículo?	¿Qué Tipo de Lugar es? (Ver Opciones de Lugar abajo)	¿A qué Hora Llegó y Salió de este lugar? (Apunte las horas exactas)	¿Qué Actividad realiza en este lugar? (Ver Opciones de Actividad abajo)	Si transporta carga, ¿Qué es la Carga? (Si es HAZMAT, también anote el # del cartel)	Si transporta carga, anote el Peso de la Carga (en Libras)
LUGAR 10		<input type="checkbox"/> - Sí <input type="checkbox"/> - No		Llegada: _____ am/pm Salida: _____ am/pm			Entregado _____ Recogido _____
LUGAR 11		<input type="checkbox"/> - Sí <input type="checkbox"/> - No		Llegada: _____ am/pm Salida: _____ am/pm			Entregado _____ Recogido _____
LUGAR 12		<input type="checkbox"/> - Sí <input type="checkbox"/> - No		Llegada: _____ am/pm Salida: _____ am/pm			Entregado _____ Recogido _____
LUGAR 13		<input type="checkbox"/> - Sí <input type="checkbox"/> - No		Llegada: _____ am/pm Salida: _____ am/pm			Entregado _____ Recogido _____
LUGAR 14		<input type="checkbox"/> - Sí <input type="checkbox"/> - No		Llegada: _____ am/pm Salida: _____ am/pm			Entregado _____ Recogido _____

OPCIONES DE LUGAR			OPCIONES DE ACTIVIDAD		
(1) Oficina (No Gubernamental)	(6) Educación (universidad, técnico)	(11) Almacén	(1) Ubicación Base/ Regresar a la Ubicación Base	(4) Entregar Carga	(7) Servicio Relacionado con el Gobierno
(2) Por Menor / Compras	(7) Oficina / Edificio Gubernamental	(12) Centro de Distribución	(2) Mantenimiento del Vehículo (cargar combustible, aceite, etc)	(5) Recoger Carga	(8) Servicio relacionado con Instalación / Reparación / Mantenimiento
(3) Industrial / Fabricante	(8) Residencia	(13) Construcción	(3) Necesidades del chofer (comida, baño, etc)	(6) Entregar y Recoger Carga	(9) Servicios Profesionales o de Ventas
(4) Cuidado de Salud / Hospital	(9) Aeropuerto	(96) Otro (especifique)			(96) Otra Actividad (especifique)
(5) Educación (12 grado o menos)	(10) Instalación Intermodal				

Encuesta de Vehículos Comerciales – Información de Viajes

de Placa: _____

(continuación)

	Apunte la siguiente información sobre cada lugar: Nombre del Lugar y Dirección incluyendo Ciudad, Estado y Código Postal o Nombre del Lugar y Nombres de las Calles en la Intersección Más Cercana	¿Es este lugar la Oficina o Base del vehículo?	¿Qué Tipo de Lugares? (Ver Opciones de Lugar abajo)	¿A qué Hora Llegó y Salió de este lugar? (Apunte las horas exactas)	¿Qué Actividad realiza en este lugar? (Ver Opciones de Actividad abajo)	Si transporta carga, ¿Qué es la Carga? (Si es HAZMAT, también anote el # del cartel)	Si transporta carga, anote el Peso de la Carga (en Libras)
LUGAR 15		<input type="checkbox"/> - Sí <input type="checkbox"/> - No		Llegada: _____ am/pm Salida: _____ am/pm			Entregado _____ Recogido _____
LUGAR 16		<input type="checkbox"/> - Sí <input type="checkbox"/> - No		Llegada: _____ am/pm Salida: _____ am/pm			Entregado _____ Recogido _____
LUGAR 17		<input type="checkbox"/> - Sí <input type="checkbox"/> - No		Llegada: _____ am/pm Salida: _____ am/pm			Entregado _____ Recogido _____
LUGAR 18		<input type="checkbox"/> - Sí <input type="checkbox"/> - No		Llegada: _____ am/pm Salida: _____ am/pm			Entregado _____ Recogido _____
LUGAR 19		<input type="checkbox"/> - Sí <input type="checkbox"/> - No		Llegada: _____ am/pm Salida: _____ am/pm			Entregado _____ Recogido _____

OPCIONES DE LUGAR

- | | | |
|-----------------------------------|--------------------------------------|-----------------------------|
| (1) Oficina
(No Gubernamental) | (6) Educación (universidad, técnico) | (11) Almacén |
| (2) Por Menor / Compras | (7) Oficina / Edificio Gubernamental | (12) Centro de Distribución |
| (3) Industrial / Fabricante | (8) Residencia | (13) Construcción |
| (4) Cuidado de Salud / Hospital | (9) Aeropuerto | (96) Otro (especifique) |
| (5) Educación (12 grado o menos) | (10) Instalación Intermodal | |

OPCIONES DE ACTIVIDAD

- | | | |
|---|---------------------------------|--|
| (1) Ubicación Base/
Regresar a la Ubicación Base | (4) Entregar Carga | (7) Servicio Relacionado con el Gobierno |
| (2) Mantenimiento del Vehículo
(cargar combustible, aceite, etc) | (5) Recoger Carga | (8) Servicio relacionado con Instalación /
Reparación / Mantenimiento |
| (3) Necesidades del chofer
(comida, baño, etc) | (6) Entregar y
Recoger Carga | (9) Servicios Profesionales o de Ventas |
| | | (96) Otra Actividad (especifique) |