2013 Bryan/College Station Commercial Vehicle Survey Technical Summary

Texas Department of Transportation

2013 Bryan/College Station Commercial Vehicle Survey

TECHNICAL SUMMARY

Texas Department of Transportation Travel Survey Program

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INTRODUCTION

In 2013, the Texas Department of Transportation (TxDOT) funded a commercial vehicle survey in the Bryan/College Station area. The purpose of this survey was to provide data that would enable TxDOT to forecast total commercial vehicle travel demand within the Bryan/College Station urban area. The study area is located in southeast Texas, as shown in Figure 1, and includes the entirety of Brazos County. The study area had a total population of approximately 195,000 people in 2010 (American Fact Finder).
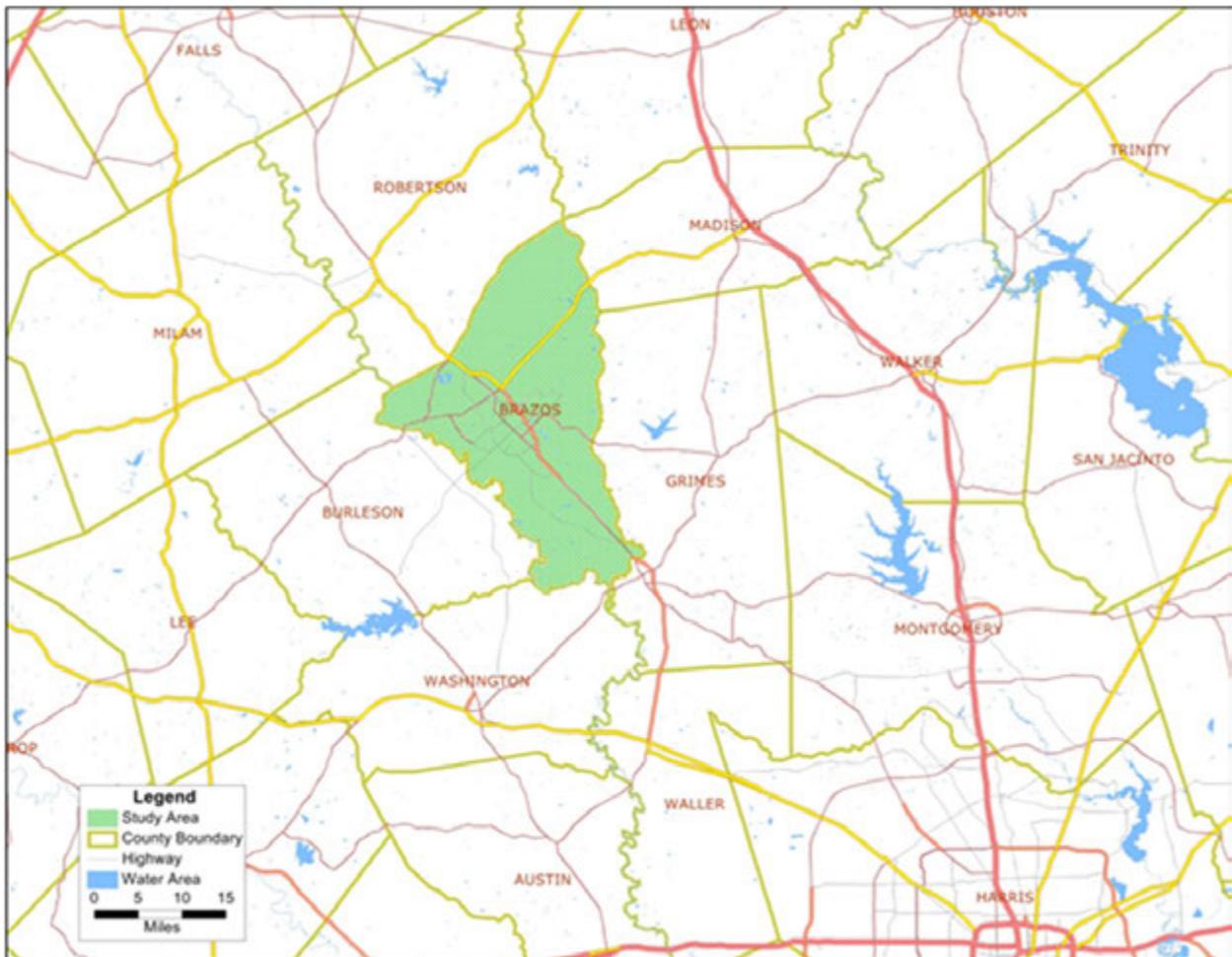
Figure 1. Bryan/College Station Study Area.

This report presents a technical summary of the commercial vehicle travel survey conducted in 2013 in the Bryan/College Station 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 surveys for the Bryan/College Station study area were conducted during the period between April 2013 and March 2014. ETC Institute was contracted by TxDOT to conduct the commercial vehicle surveys for the study area, with technical assistance from the Texas A&M Transportation Institute (TTI). Prior to these surveys, a pilot study was conducted, which consisted of 25 commercial vehicles.

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 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, 494 businesses were contacted during the recruitment process. Contacts were tracked based on the following categories.

- Agreed to Participate – The company or individual operated qualifying vehicles making trips within the study area, agreed to participate, 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.
- Ineligible Business – The company was no longer in business or did not have a working number.
- Unable to Contact – The company could not be contacted after eight call attempts.

Table 1. Survey Participation Rates.

Category	Contact Calls	
	Number	**Percent of Total**
Agreed to Participate	191	38.8
Refused to Participate	167	33.8
Ineligible Business	70	14.1
Unable to Contact	66	13.3
Total	**494**	**100.0**

Source: 2013-2014 Commercial Vehicle Survey – Final Summary Report, ETC Institute.

A total of 108 companies participated in the Bryan/College Station commercial vehicle survey, from which a total of 340 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 used 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 (ETC Institute). 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. Additionally, inconsistent trip records were dropped from the survey analysis.

The results presented in this technical summary are therefore based on data from 340 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 Bryan/College Station study area. Information on registered trucks includes the number of diesel-fueled, gasoline-fueled, and propane-fueled trucks by gross vehicle weight and by model

year. Information on surveyed commercial vehicles includes 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 approximately 3,800 trucks registered in the Bryan/College Station study area in 2014. Table 2 shows the distribution of registered diesel trucks and gasoline trucks by gross vehicle weight. Over 80 percent of all trucks registered in the Bryan/College Station study area are diesel-fueled vehicles. Sixty-five percent of all registered trucks had a gross vehicle weight of less than 10,000 pounds.

Table 2. Gross Vehicle Weight of Registered Trucks in Bryan/College Station 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	1,992	64.4	498	68.6	2,490	65.3
> 10000	338	11.0	105	14.5	443	11.6
> 14000	74	2.4	39	5.4	113	3.0
> 16000	101	3.3	24	3.3	125	3.3
> 19500	249	8.1	33	4.5	282	7.4
> 26000	83	2.7	13	1.8	96	2.5
> 33000	187	6.1	14	1.9	201	5.3
> 60000	62	2.0	0	0.0	62	1.6
Total	**3,086**	**100.0**	**726**	**100.0**	**3,812**	**100.0**

Source: TxDOT 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 74 percent of the diesel trucks were less than 10 years old, compared to 68 percent of the gasoline trucks within that age range. Approximately 3 percent of the over 3,000 registered diesel trucks were 20 years or older, while 5 percent of the registered gasoline trucks were 20 years or older.
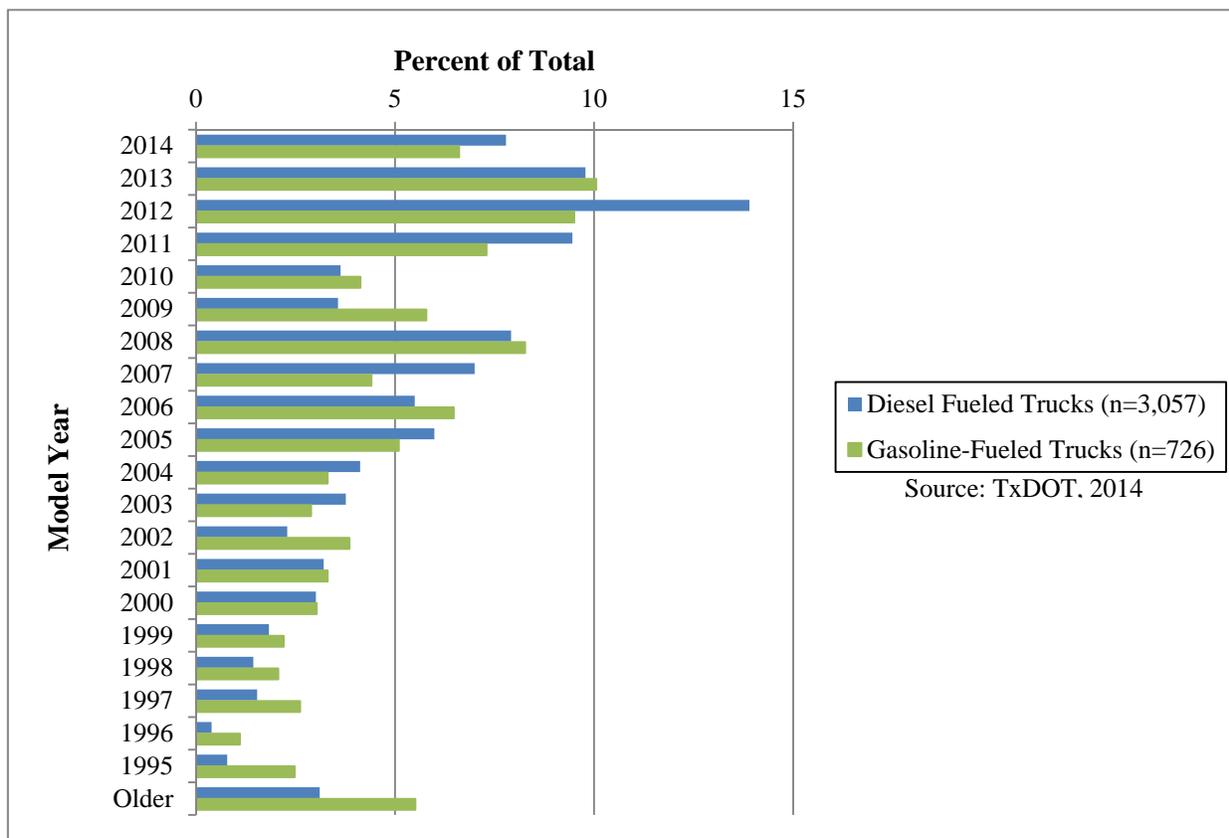
Figure 2. Model Year of Registered Trucks in the Bryan/College Station Study Area.

Surveyed Commercial Vehicles

Commercial vehicles that participated in the Bryan/College Station commercial vehicle survey were distinguished based on the nine 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, 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, city, county, or school districts.

Table 3 shows the distribution of surveyed vehicles by vehicle classification type and commercial type. Of the total 340 vehicles surveyed, 153 were cargo vehicles and 187 were service vehicles. Among cargo vehicles, approximately 28 percent were pick-up trucks, another 28 percent were semi (tractor-trailers), and 21 percent were single unit 2-axle (6 wheel) trucks. Among service vehicles, approximately 41 percent were pick-up trucks, 19 percent were sport utility vehicles, and 19 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	0	0.0	36	19.3	36	10.6
Pickup Truck	42	27.5	77	41.2	119	35.0
Van (passenger or mini)	24	15.7	30	16.0	54	15.9
Sport Utility Vehicle	4	2.6	36	19.2	40	11.8
Single Unit 2-axle (6 wheels)	32	20.8	8	4.3	40	11.7
Single Unit 3-axle (10 wheels)	9	5.9	0	0.0	9	2.6
Single Unit 4-axle (14 wheels)	0	0.0	0	0.0	0	0.0
Semi (tractor-trailer)	42	27.5	0	0.0	42	12.4
Other	0	0.0	0	0.0	0	0.0
Total	**153**	**100.0**	**187**	**100.0**	**340**	**100.0**

Figure 3 shows the distribution of surveyed vehicles by fuel type. Approximately 55 percent of the surveyed vehicles used diesel and 45 percent used unleaded gasoline. Among cargo vehicles, 44 percent used gasoline and 56 percent used diesel. Among service vehicles, 89 percent used gasoline and 11 percent used diesel. There were three service vehicles classified as passenger cars that were hybrid-fueled vehicles.
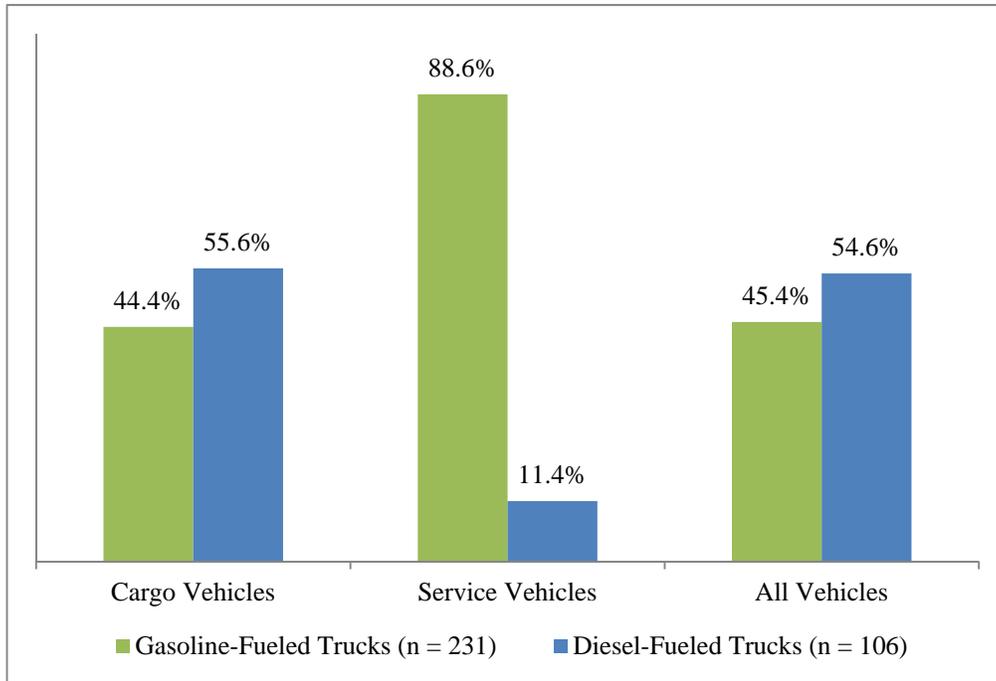
Figure 3. Type of Fuel Used by Surveyed Commercial Vehicles.

Table 4 shows the distribution of surveyed vehicles by gross vehicle weight. The survey included commercial vehicles with a gross vehicle weight of less than 10,000 pounds. Approximately 93 percent of the service vehicles belonged to this category, while approximately 46 percent of the cargo vehicles weighed more than 19,500 pounds.

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	59	38.5	173	92.5	232	68.2
> 10,000	16	10.5	5	2.7	21	6.2
> 14,000	3	2.0	3	1.6	6	1.8
> 16,000	5	3.3	2	1.1	7	2.1
> 19,500	9	5.9	3	1.6	12	3.5
> 26,000	14	9.2	1	0.5	15	4.4
> 33,000	21	13.6	0	0.0	21	6.2
> 60,000	26	17.0	0	0.0	26	7.6
Total	**153**	**100.0**	**187**	**100.0**	**340**	**100.0**

Figure 4 shows the distribution of surveyed vehicles by model year. Approximately 69 percent of cargo vehicles and 78 percent of the service vehicles were less than 10 years old. The average age for cargo vehicles was 7.9 years, while the average age for service vehicles was 6.5 years (assuming 2014 as the base year).
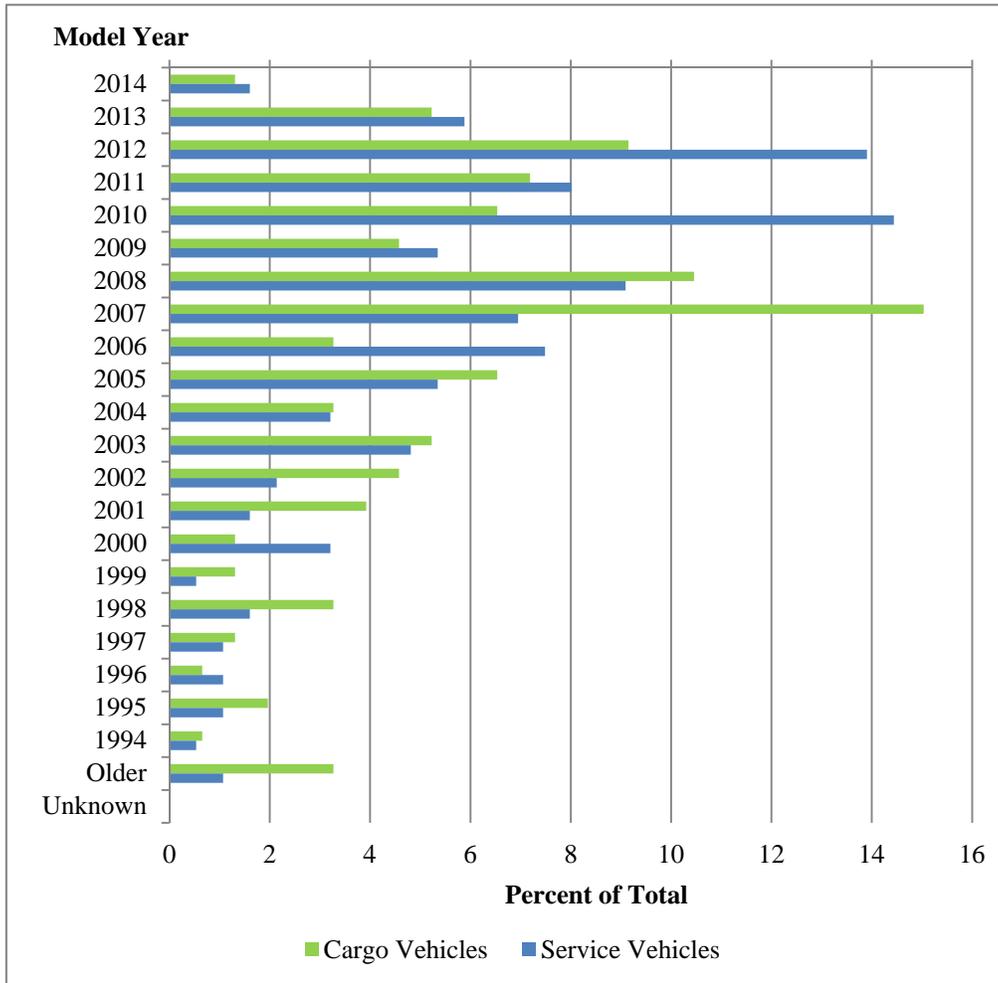
Figure 4. Vehicle Model Year.

Table 5 shows the average vehicle mileage by model year based on reported odometer readings from 340 surveyed vehicles at the beginning of their survey travel day. Cargo vehicles reported higher average odometer readings of over 188,000 miles compared to over 78,000 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
2014	2	12,187	3	3,606	5	7,038
2013	8	22,594	11	16,988	19	19,348
2012	14	89,891	26	27,101	40	49,077
2011	11	120,814	15	47,663	26	78,612
2010	10	76,275	27	64,071	37	67,369
2009	7	118,241	10	63,906	17	86,279
2008	16	109,514	17	71,586	33	89,976
2007	23	200,200	13	136,457	36	177,182
2006	5	281,954	14	119,351	19	162,141
2005	10	279,950	10	117,895	20	198,922
2004	5	206,152	6	109,861	11	153,630
2003	8	177,298	9	104,737	17	138,883
2002	7	334,367	4	125,802	11	258,525
2001	6	316,940	3	145,648	9	259,843
2000	2	293,477	6	137,701	8	176,645
1999	2	141,063	1	311,838	3	197,988
1998	5	398,583	3	130,174	8	297,930
1997	2	198,579	2	54,444	4	126,511
1996	1	121,673	2	101,909	3	108,497
1995	3	504,096	2	187,756	5	377,560
1994	1	775,852	1	129,051	2	452,452
Older	5	315,375	2	59,386	7	242,236
Total	**153**	**188,004**	**187**	**78,234**	**340**	**127,630**

Trip Frequency

The surveyed vehicles generated a total of 2,109 trips, of which 1,660 were internal trips and 449 were external trips. Internal trips were defined as those trips made within the Bryan/College Station 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 980 trips, of which approximately 64 percent were inter-zonal trips, 4 percent were intra-zonal trips, and 32 percent were external trips. Service vehicles generated 1,129 trips, of which 85 percent were inter-zonal trips, 3 percent were intra-zonal trips, and 12 percent were external trips.
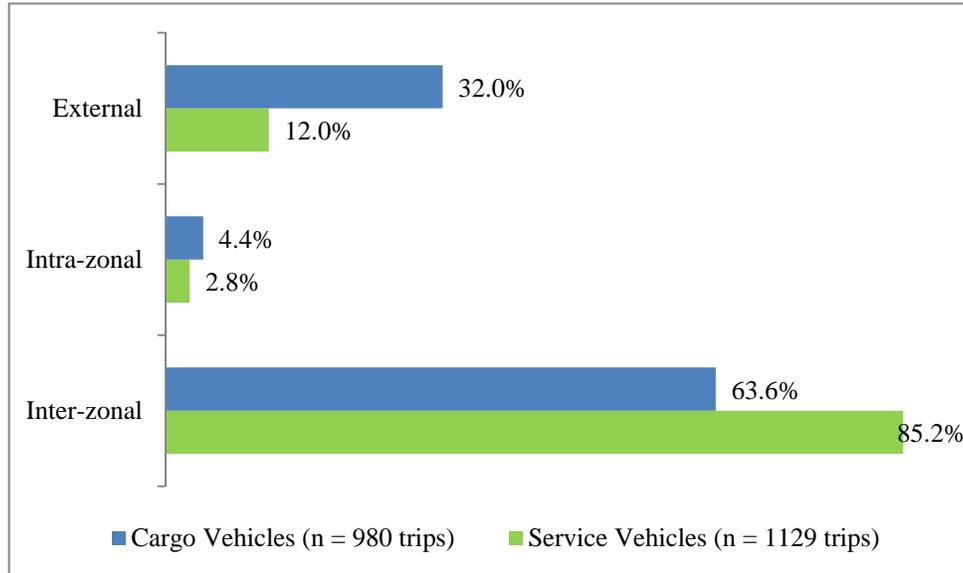
Figure 5. Inter-Zonal, Intra-Zonal, and External Trips.

Table 6. Total Internal and External Trips.

Vehicle Type	Cargo Vehicles		Service Vehicles		Total Vehicles	
Trip Type	**Number**	**% of Total**	**Number**	**% of Total**	**Number**	**% of Total**
Inter-zonal	623	63.6	962	85.2	1,585	75.1
Intra-zonal	43	4.4	32	2.8	75	3.6
Total Internal	**666**	**68.0**	**994**	**88.0**	**1,660**	**78.7**
External	314	32.0	135	12.0	449	21.3
Total	**980**	**100.0**	**1,129**	**100.0**	**2,109**	**100.0**

Figure 6 shows the distribution of total trips (internal and external trips), which varied from one trip to 21 trips per service vehicle and from one trip to 19 trips per cargo vehicle on their survey day. The average number of total trips per day was 6.4 trips for cargo vehicles and 6.0 trips for service vehicles.
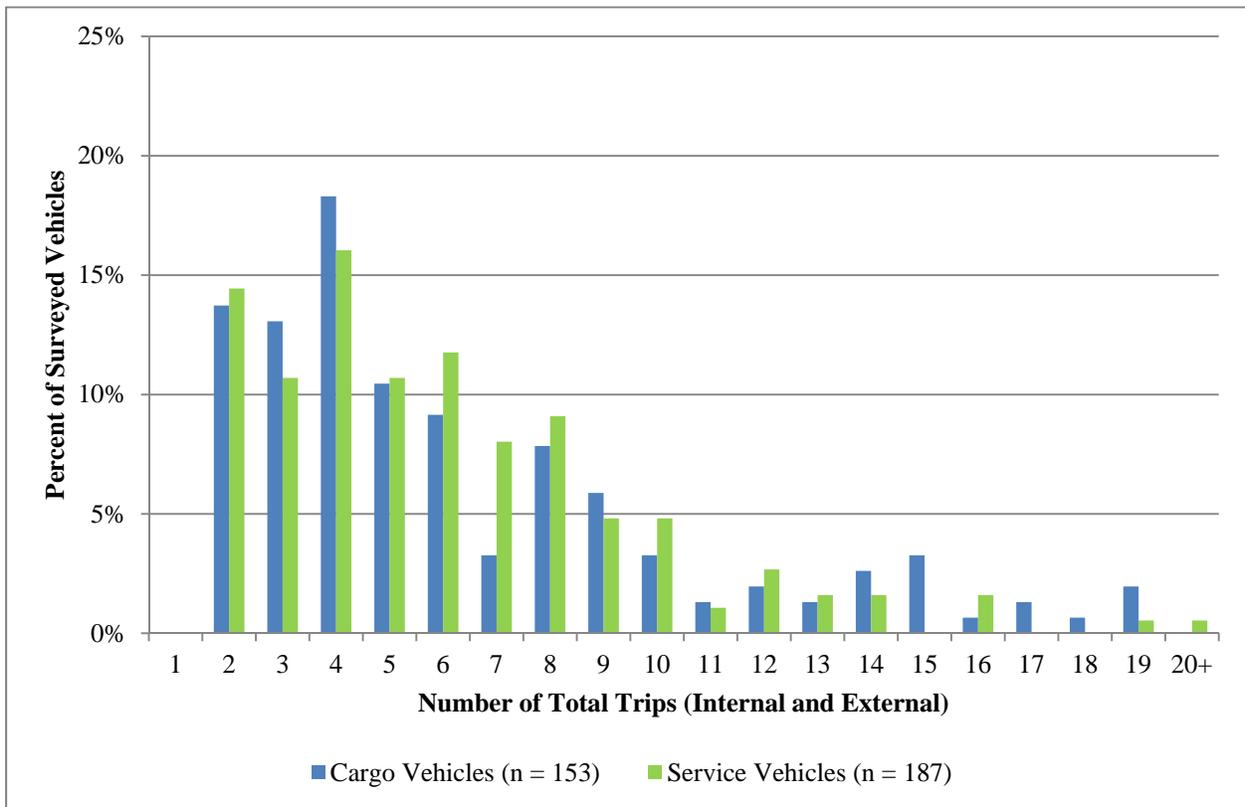
Figure 6. Total Trips per Vehicle.

Figure 7 shows the distribution of internal trips only by vehicle type. Approximately 28 percent of cargo vehicles and 12 percent of service vehicles made no internal trips per day. Approximately 8 percent of cargo vehicles made only one internal trip; while 3 percent of service vehicles made only one internal trip. The average number of internal trips per day was 4.4 trips for cargo vehicles and 5.3 trips for service vehicles.
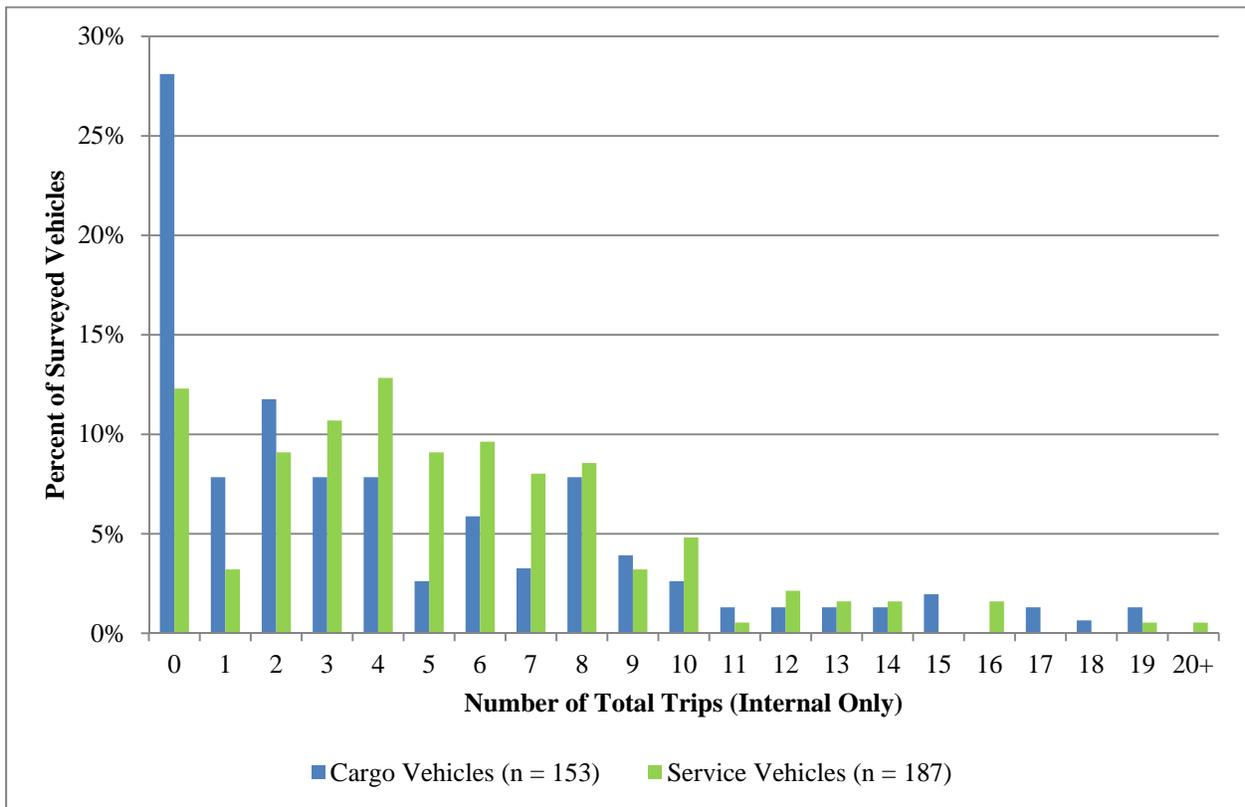
Figure 7. Total Internal Trips per Vehicle.

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 31 percent of the trips made by cargo vehicles traveled to retail locations, followed by 21 percent to residential locations, and 12 percent to industrial/manufacturing locations. For service vehicles, nearly 27 percent of the trips traveled to retail/shopping sites, followed by nearly 22 percent to residential locations, and 15 percent to office locations.

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)	48	7.2	148	14.9
Retail/Shopping	209	31.3	268	27.1
Industrial/Manufacturing	80	12.0	67	6.7
Medical/Hospital	8	1.2	43	4.3
Education (< 12th Grade)	1	0.2	47	4.7
Education (College, Trade)	13	2.0	10	1.0
Government Office/Building	19	2.9	93	9.4
Residential	138	20.6	216	21.7
Airport	1	0.2	10	1.0
Intermodal Facility	0	0.0	2	0.2
Warehouse	21	3.2	8	0.8
Distribution Center	28	4.2	5	0.5
Construction Site	72	10.8	4	0.4
Other	28	4.2	73	7.3
Refused/Unknown	0	0.0	0	0.0
Total Trips	**666**	**100.0**	**994**	**100.0**

Table 8 shows the distribution of internal trips by trip purposes at trip destinations. Approximately 48 percent of the cargo vehicle internal trips were for delivery, 21 percent were base, and 18 percent were classified as "pick-up." For trips made by service vehicles, approximately 27 percent were classified as base, 22 percent were classified as "other," and 18 percent were sales.

Table 8. Trip Purposes at Destination Locations.

Trip Purpose	Cargo		Service	
	Number	**Percent of Cargo**	**Number**	**Percent of Service**
Base	137	20.5	271	27.3
Maintenance	10	1.5	29	2.9
Driver Needs	23	3.5	91	9.2
Delivery	317	47.5	14	1.4
Pick-Up	117	17.5	1	0.1
Pick-Up and Delivery	20	3.0	2	0.2
Government	1	0.2	62	6.2
Service	17	2.6	129	13.0
Sales	3	0.5	180	18.1
Other	21	3.2	215	21.6
Unknown	0	0.0	0	0.0
Total Trips	**666**	**100.0**	**994**	**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 Bryan/College Station 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 actually 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 25 percent of the total cargo vehicle trips were transporting manufactured goods/equipment, followed by 13 percent transporting food, health, and beauty products, and about 9 percent transporting wood products. Approximately 18 percent of the cargo trips transported unknown commodities.

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

Cargo Type	Number of Trips	% of Total
Farm Products	89	9.1
Forest Products	16	1.6
Marine Products	0	0.0
Metals and Minerals	10	1.0
Food, Health, and Beauty Products	127	13.0
Tobacco Products	0	0.0
Textiles	30	3.1
Wood Products	35	3.6
Printed Matter	13	1.3
Chemical Products	1	0.1
Refined Petroleum or Coal Products	36	3.7
Rubber, Plastic, and Styrofoam Products	1	0.1
Clay, Concrete, Glass, or Stone	80	8.2
Manufactured Goods/Equipment	246	25.0
Wastes	1	0.1
Miscellaneous Shipments	2	0.2
Hazardous Materials	29	3.0
Transportation	13	1.3
No Cargo Picked Up or Delivered	71	7.2
Other	0	0.0
Unknown	0	0.0
Refused	178	18.2
Total Trips with Cargo	**978**	**99.8**
Empty	2	0.2
Total Cargo Vehicle Trips	**980**	**100.0**

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
--- *Transportation*	*Transportation*
--- *Empty*	*Empty*
--- *Unknown*	*Unknown to Driver, Driver Refused to Answer, Other*

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, Inter-Modal 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 26 percent of the trips traveled to "other" land use types, which were mainly warehouses, distribution centers, and construction sites. By commodity group, approximately 25

percent of the trips were transporting machinery, and about 13 percent were transporting food products. Roughly one-quarter (25 percent) were transporting "unknown" 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	Othr		
Agriculture	1	5	15	0	3	0	12	69	**105**	**10.7**
Raw Materials	0	16	6	0	0	0	0	25	**47**	**4.8**
Food	3	92	3	3	6	0	10	10	**127**	**13.0**
Textiles	5	11	0	0	0	0	15	0	**31**	**3.2**
Wood	19	3	14	2	1	6	2	1	**48**	**4.9**
Building Materials	3	4	24	1	1	4	3	40	**80**	**8.2**
Machinery	4	87	38	2	3	3	59	50	**246**	**25.1**
Miscellaneous	0	1	1	0	0	1	0	0	**3**	**0.3**
Hazardous	0	2	0	0	0	1	24	2	**29**	**3.0**
Transportation	0	0	0	0	0	0	5	8	**13**	**1.3**
Unknown	19	103	37	0	2	9	30	49	**249**	**25.3**
Empty	0	1	1	0	0	0	0	0	**2**	**0.2**
Total	**54**	**325**	**139**	**8**	**16**	**24**	**160**	**254**	**980**	**100.0**
Percent of Total	**5.5**	**33.3**	**14.2**	**0.8**	**1.6**	**2.4**	**16.3**	**25.9**	**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 48 percent of the total cargo vehicle trips were delivery and 20 percent were base related. Approximately 19 percent of the total cargo vehicle trips were driver needs.
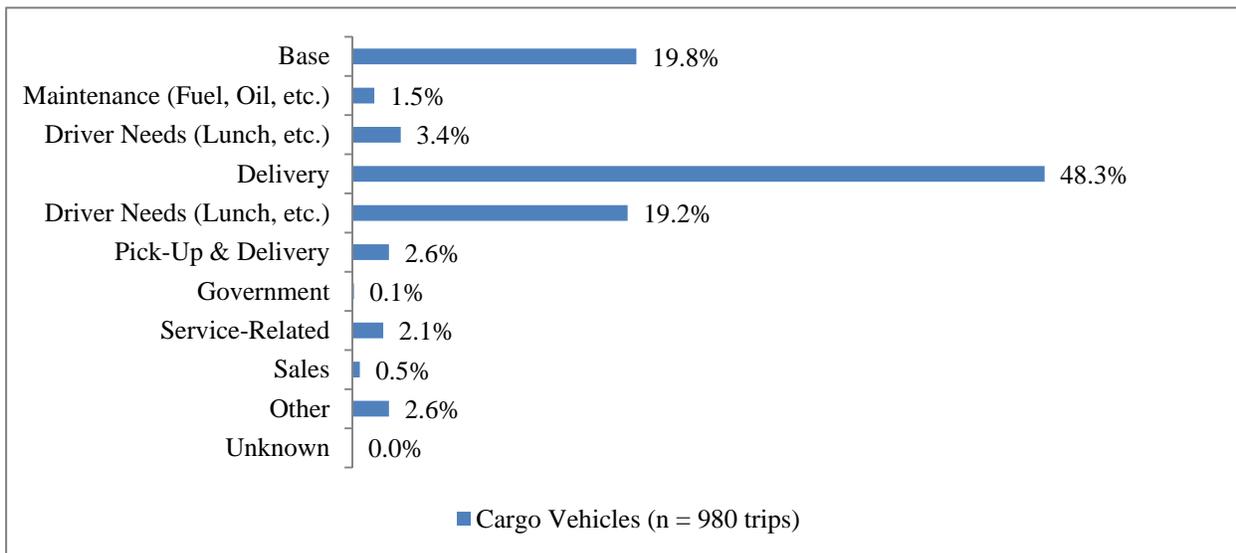
Figure 8. Cargo Trip Purposes at the Trip Destinations.

Chart data (Cargo Vehicles, n = 980 trips):
- Base: 19.8%
- Maintenance (Fuel, Oil, etc.): 1.5%
- Driver Needs (Lunch, etc.): 3.4%
- Delivery: 48.3%
- Driver Needs (Lunch, etc.): 19.2%
- Pick-Up & Delivery: 2.6%
- Government: 0.1%
- Service-Related: 2.1%
- Sales: 0.5%
- Other: 2.6%
- Unknown: 0.0%

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

Commodity Group	Trip Purpose										Total Trips	% of Total
	Base	Maint	Driver Need	Deliv	Pick-Up	Pick-Up & Deliv	Govt	Srvc	Sales	Oth		
Agriculture	3	0	0	55	43	3	0	1	0	0	**105**	**10.7**
Raw Materials	0	0	0	29	18	0	0	0	0	0	**47**	**4.8**
Food	5	0	0	111	10	1	0	0	0	0	**127**	**13.0**
Textiles	1	0	0	15	11	4	0	0	0	0	**31**	**3.2**
Wood	1	0	0	29	17	1	0	0	0	0	**48**	**4.9**
Building Materials	4	0	0	40	32	4	0	0	0	0	**80**	**8.2**
Machinery	25	1	0	161	46	11	0	2	0	0	**246**	**25.1**
Miscellaneous	1	0	0	0	1	1	0	0	0	0	**3**	**0.3**
Hazardous	0	0	0	27	2	0	0	0	0	0	**29**	**3.0**
Transportation	0	0	0	6	7	0	0	0	0	0	**13**	**1.3**
Unknown	153	13	33	0	1	0	1	18	5	25	**249**	**25.3**
Empty	1	1	0	0	0	0	0	0	0	0	**2**	**0.2**
Total	**194**	**15**	**33**	**473**	**188**	**25**	**1**	**21**	**5**	**25**	**980**	**100.0**
Percent of Total	**19.8**	**1.5**	**3.4**	**48.2**	**19.2**	**2.6**	**0.1**	**2.1**	**0.5**	**2.6**	**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. For example, 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.), which indicated that no cargo was 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 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. Raw materials being transported to retail sites had the highest average net cargo weight by commodity group and land use at the trip destination. Agriculture products being transported to pick-up and 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							
	Office	**Retail**	**Ind'l**	**Med**	**Edu**	**Gov't**	**Res**	**Other**
Agriculture	0	30	600	0	1,000	0	1,692	28,635
Raw Materials	0	35,722	21,183	0	0	0	0	3,328
Food	3	477	0	12	440	0	3	6,133
Textiles	510	324	0	0	0	0	8	0
Wood	153	0	13,429	0	15	50	160	300
Building Materials	3,370	85	24,502	70	75	0	73	2,910
Machinery	0	262	2,071	510	7,502	10,067	266	7,235
Miscellaneous	0	0	210	0	0	312	0	0
Hazardous	0	0	0	0	0	0	1,284	0
Transportation	0	0	0	0	0	0	300	2,765
Unknown	0	0	0	0	0	0	0	0

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

Commodity Group	Trip Purpose						
	Base Location	Maintenance	Driver Needs	Delivery	Pick-Up	Pick-Up & Delivery	Service
Agriculture	667	0	0	34,045	0	44,600	0
Raw Materials	0	0	0	26,960	0	0	0
Food	1,265	0	0	912	0	400	0
Textiles	135	0	0	230	0	663	0
Wood	200	0	0	6,574	0	1,000	0
Building Materials	7,350	0	0	16,890	0	2,563	0
Machinery	1,946	4,000	0	2,930	0	761	0
Miscellaneous	210	0	0	0	0	312	0
Hazardous	0	0	0	1,141	0	0	0
Transportation	0	0	0	3,937	0	0	0
Unknown	0	0	0	0	0	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 nearly 4,500 lbs. Of the classified commodity groups, agriculture showed the highest average net cargo weight of nearly 19,100 lbs. per trip. Machinery was the most frequently transported of the known commodity groups, with average net cargo weights of over 2,100 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	105	2,008,250	105	19,126
Raw Materials	47	781,836	47	16,635
Food	127	107,959	127	850
Textiles	31	6,235	31	201
Wood	48	191,840	48	3,997
Building Materials	80	715,265	80	8,941
Machinery	246	532,699	246	2,165
Miscellaneous	3	522	3	174
Hazardous	29	30,817	29	1,063
Transportation	13	23,620	13	1,817
Unknown	249	0	249	0
Empty	2	0	0	0
Total	**980**	**4,399,043**	**978**	**4,498**

* Excluding trips with empty cargo.

Table 18 shows the number of trips and net cargo weights at trip destinations by land use type. "Other" land use sites showed the highest average net cargo weight of over 10,300 lbs. per trip, followed by industrial sites with an average net cargo weight of over 7,100 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.)*
Office	54	15,574	54	288
Retail	325	642,325	324	1,976
Industrial	139	991,063	138	7,130
Medical	8	1,126	8	141
Education	16	28,236	16	1,765
Government	24	30,812	24	1,284
Residential	160	69,017	160	431
Other	254	2,620,890	254	10,318
Total	**980**	**4,399,043**	**978**	**4,498**

* Excluding trips with empty cargo.

Table 19 shows the distribution of cargo trips and net cargo weights by trip purpose. Delivery trip purposes had the highest average net weight of nearly 8,800 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	194	86,918	193	450
Maintenance	15	4,000	14	286
Driver Needs	33	0	33	0
Delivery	473	4,151,338	473	8,777
Pick-Up	188	0	188	0
Pick-Up & Delivery	25	156,787	25	6,271
Government	1	0	1	0
Service	21	0	21	0
Sales	5	0	5	0
Other	25	0	25	0
Unknown	0	0	0	0
Total	**980**	**4,399,043**	**978**	**4,498**

* 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 Bryan/College Station 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 Bryan/College Station 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 Bryan/College Station 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 outside of the Bryan/College Station study area was considered an external trip.
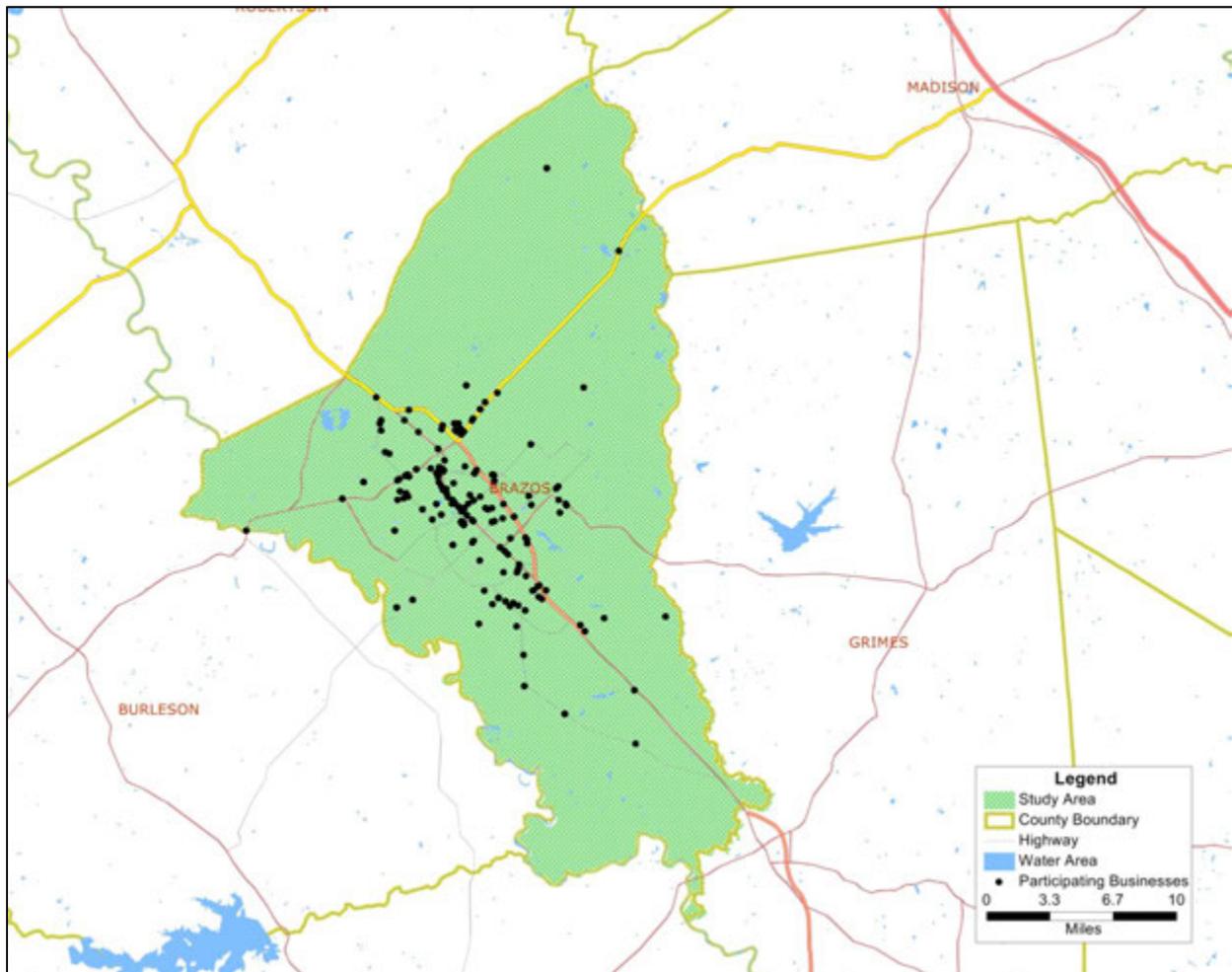

Figure 9. TAZ Boundary and Base Locations of Surveyed Commercial Vehicles.
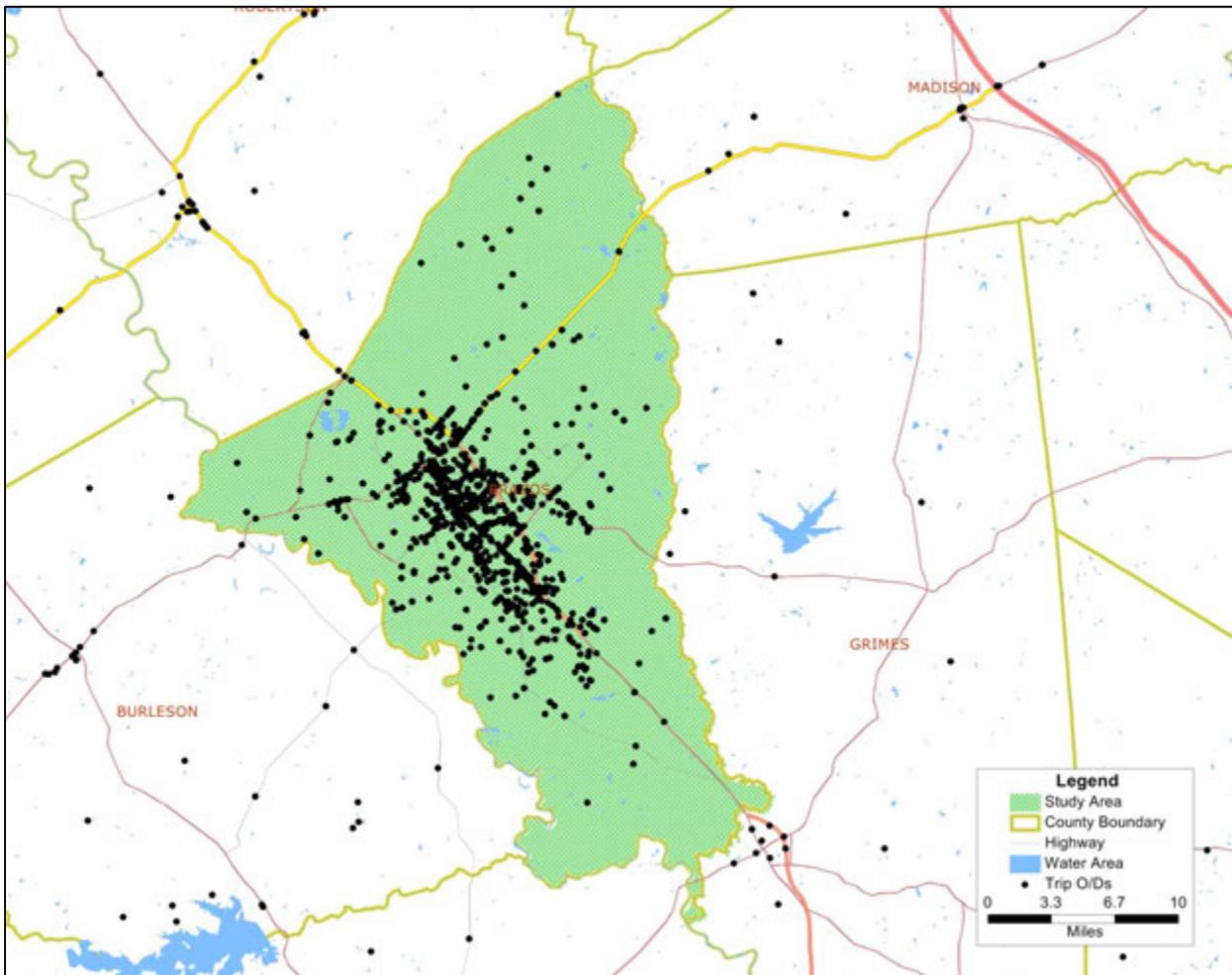
Figure 10. Trip Origins and Destinations of Surveyed Commercial Vehicles.

The results presented in this section pertain to trip length characteristics for 1,580 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 53 percent of the cargo vehicles and 65 percent of the service vehicle trips had trip lengths of less than five miles. Additionally, 34 percent of the cargo vehicle trips and 26 percent of the service vehicles had trip lengths between six miles and 10 miles. The longest trip lengths reported by cargo and service vehicles were 29 miles and 28 miles, respectively.

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

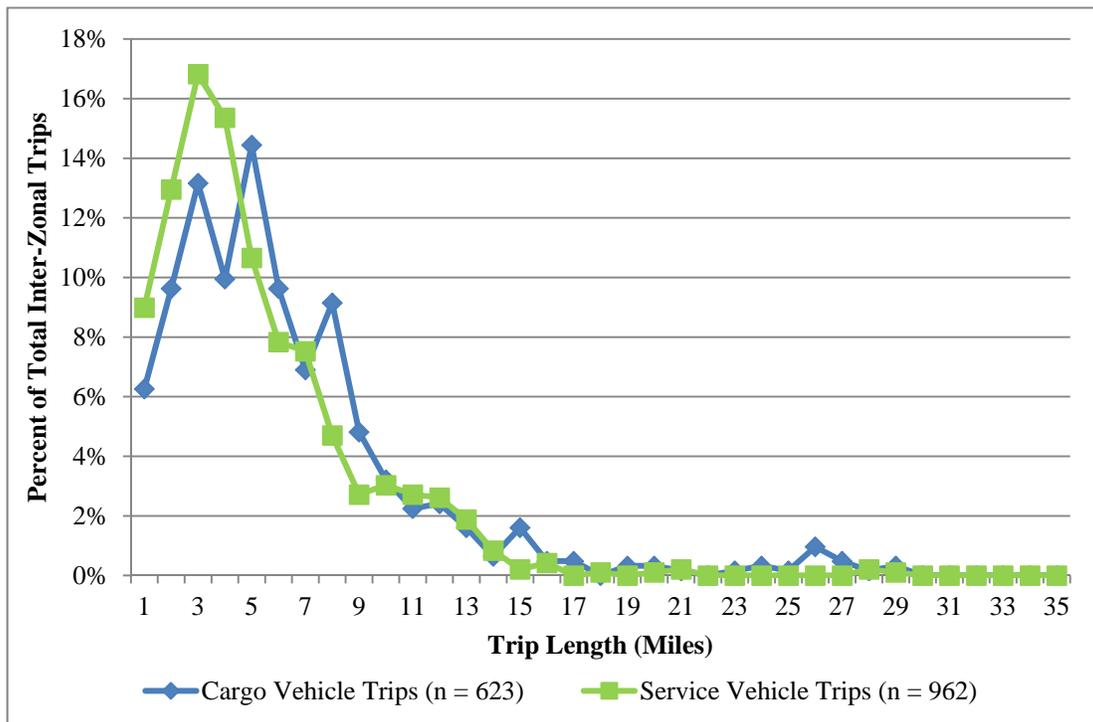| Trip Length (miles)	Cargo		Service		All Vehicles	
	# of Trips	% of Total	# of Trips	% of Total	# of Trips	% of Total
Less than 5	332	53.3	619	64.7	951	60.2
6 to 10	211	33.9	248	25.9	459	29.1
11 to 15	53	8.5	79	8.3	132	8.4
16 to 20	10	1.6	6	0.6	16	1.0
21 to 25	5	0.8	2	0.2	7	0.4
26 to 30	12	1.9	3	0.3	15	0.9
31 to 35	0	0.0	0	0.0	0	0.0
More than 35	0	0.0	0	0.0	0	0.0
Total	**623**	**100.0**	**957**	**100.0**	**1,580**	**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	39	6.3	86	9.0	125	7.9
2	60	9.6	124	13.0	184	11.6
3	82	13.2	161	16.8	243	15.4
4	62	10.0	147	15.4	209	13.2
5	90	14.4	102	10.7	192	12.2
6	60	9.6	75	7.8	135	8.4
7	43	6.9	72	7.6	115	7.3
8	57	9.1	45	4.7	102	6.5
9	30	4.8	26	2.7	56	3.5
10	20	3.2	29	3.0	49	3.1
11	14	2.2	26	2.7	40	2.5
12	15	2.4	25	2.6	40	2.5
13	10	1.6	18	1.9	28	1.8
14	4	0.6	8	0.8	12	0.8
15	10	1.6	2	0.2	12	0.8
16	3	0.5	4	0.4	7	0.4
17	3	0.5	0	0.0	3	0.2
18	0	0.0	1	0.1	1	0.1
19	2	0.3	0	0.0	2	0.1
20	2	0.3	1	0.1	3	0.2
21	1	0.2	2	0.2	3	0.2
22	0	0.0	0	0.0	0	0.0
23	1	0.2	0	0.0	1	0.1
24	2	0.3	0	0.0	2	0.1
25	1	0.2	0	0.0	1	0.1
26	6	1.0	0	0.0	6	0.4
27	3	0.5	0	0.0	3	0.2
28	1	0.2	2	0.2	3	0.2
29	2	0.3	1	0.1	3	0.2
30	0	0.0	0	0.0	0	0.0
31	0	0.0	0	0.0	0	0.0
32	0	0.0	0	0.0	0	0.0
33	0	0.0	0	0.0	0	0.0
34	0	0.0	0	0.0	0	0.0
35	0	0.0	0	0.0	0	0.0
>35	0	0.0	0	0.0	0	0.0
Total	**623**	**100.0**	**957**	**100.0**	**1,580**	**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 5.1 miles, with cargo vehicles and service vehicles averaging 5.9 miles and 4.7 miles, respectively. The most number of trips by cargo vehicles occurred at retail land use types, with an average trip

length of 5.6 miles, followed by residential sites with average trip length of 5.4 miles. For service vehicles, the highest frequency of trips occurred at retail land use types, with an average trip length of 4.7 miles. Almost half (45 percent) of the trips made by service vehicles occurred at either retail or residential 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)
Office	64	378	5.9	124	639	5.2	188	1,017	5.4
Retail	169	951	5.6	251	1,188	4.7	420	2,138	5.1
Industrial	83	456	5.5	128	597	4.7	211	1,054	5.0
Medical	24	143	6.0	33	149	4.5	57	292	5.1
Education	6	34	5.6	22	85	3.9	28	119	4.2
Government	48	305	6.4	60	287	4.8	108	592	5.5
Residential	131	701	5.4	182	790	4.3	313	1,492	4.8
Other	98	701	7.2	157	724	4.6	255	1,425	5.6
Total	**623**	**3,669**	**5.9**	**957**	**4,459**	**4.7**	**1,580**	**8,129**	**5.1**

Table 23 shows the average trip length to destinations by commodity group for trips made by cargo vehicles only. Approximately 70 percent of the trips cited the commodity group "unknown," with an average trip length of 5.6 miles per trip. The commodity group machinery was the next most frequently transported commodity group, with an average trip length of 5.8 miles per trip. The overall average trip length for cargo vehicles was 5.9 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	21	144	6.9
Raw Materials	18	106	5.9
Food	4	14	3.6
Textiles	7	25	3.6
Wood	27	180	6.7
Building Materials	18	210	11.6
Machinery	80	463	5.8
Miscellaneous	0	0	0.0
Hazardous	1	17	17.0
Transportation	0	0	0.0
Unknown	440	2,457	5.6
Empty	7	53	7.5
Total	**623**	**3,669**	**5.9**

Travel Time and Speed

The Bryan/College Station 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 Bryan/College Station 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 27 percent of the trips made by cargo vehicles were less than five minutes, 41 percent were between 6-and-10 minutes, and 21 percent were between 11-and-15 minutes. For service vehicles, approximately 36 percent of the trips were less than five minutes, 39 percent were between 6-and-10 minutes, and 17 percent were between 11-and-15 minutes. The longest duration of travel time for cargo vehicles was 40 minutes, while the longest travel duration for service vehicles was 38 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	166	26.6	349	36.5	515	32.6
6 to 10	254	40.8	371	38.8	625	39.5
11 to 15	130	20.8	158	16.5	288	18.2
16 to 20	36	5.8	66	6.9	102	6.5
21 to 25	16	2.6	6	0.6	22	1.4
26 to 30	5	0.8	4	0.4	9	0.6
31 to 35	10	1.6	0	0.0	10	0.6
36 to 40	6	1.0	3	0.3	9	0.6
More than 40	0	0.0	0	0.0	0	0.0
Total	**623**	**100.0**	**957**	**100.0**	**1,580**	**100.0**
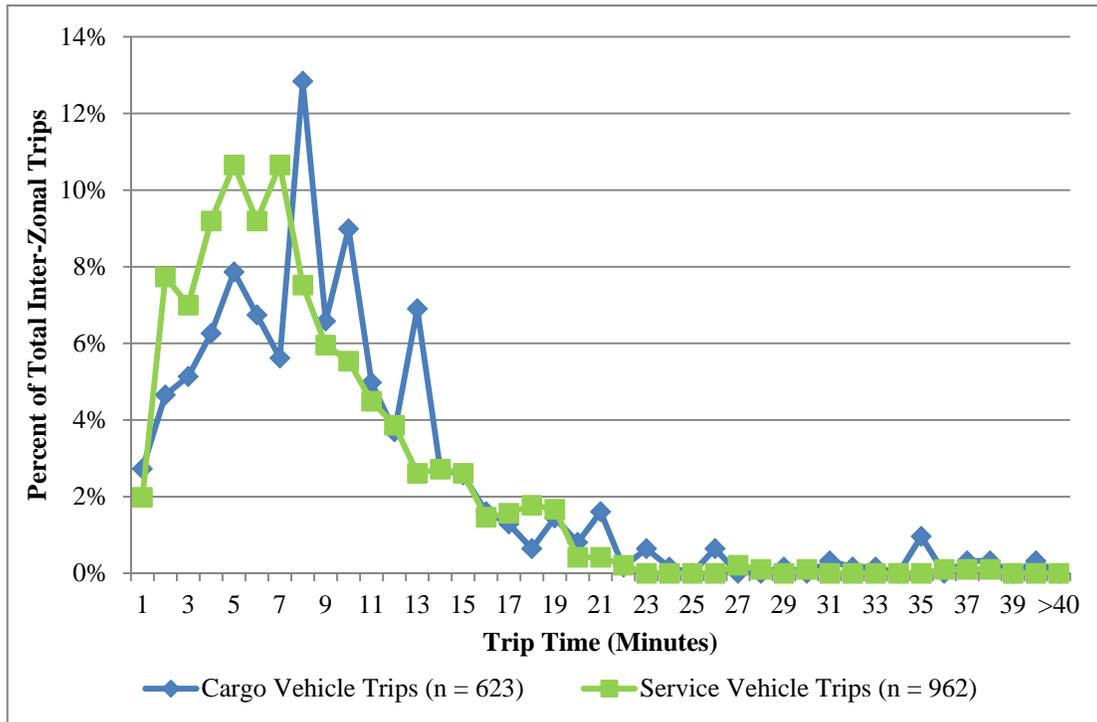
Figure 12. Surveyed Commercial Vehicle Trips Travel Time.

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	17	2.7	19	2.0	36	2.3
2	29	4.7	74	7.7	103	6.5
3	32	5.1	67	7.0	99	6.3
4	39	6.3	88	9.2	127	8.0
5	49	7.9	102	10.7	151	9.5
6	42	6.7	88	9.2	130	8.2
7	35	5.6	102	10.7	137	8.6
8	80	12.8	72	7.5	152	9.5
9	41	6.6	57	6.0	98	6.2
10	56	9.0	53	5.5	109	6.8
11	31	5.0	43	4.5	74	4.7
12	23	3.7	37	3.9	60	3.8
13	43	6.9	25	2.6	68	4.3
14	17	2.7	26	2.7	43	2.7
15	16	2.6	25	2.6	41	2.6
16	10	1.6	14	1.5	24	1.5
17	8	1.3	15	1.6	23	1.5
18	4	0.6	17	1.8	21	1.3
19	9	1.4	16	1.7	25	1.6
20	5	0.8	4	0.4	9	0.6
21	10	1.6	4	0.4	14	0.9
22	1	0.2	2	0.2	3	0.2
23	4	0.6	0	0.0	4	0.3
24	1	0.2	0	0.0	1	0.1
25	0	0.0	0	0.0	0	0.0
26	4	0.6	0	0.0	4	0.3
27	0	0.0	2	0.2	2	0.1
28	0	0.0	1	0.1	1	0.1
29	1	0.2	0	0.0	1	0.1
30	0	0.0	1	0.1	1	0.1
31	2	0.3	0	0.0	2	0.1
32	1	0.2	0	0.0	1	0.1
33	1	0.2	0	0.0	1	0.1
34	0	0.0	0	0.0	0	0.0
35	6	1.0	0	0.0	6	0.4
36	0	0.0	1	0.1	1	0.1
37	2	0.3	1	0.1	3	0.2
38	2	0.3	1	0.1	3	0.2
39	0	0.0	0	0.0	0	0.0
40	2	0.3	0	0.0	2	0.1
>40	0	0.0	0	0.0	0	0.0
Total	**623**	**100.0**	**957**	**100.0**	**1,580**	**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 8.1 minutes, with cargo vehicles averaging 9.1 minutes and service vehicles averaging 7.4 minutes. By land use types, trips made by cargo vehicles to "other" sites have the longest average travel duration of 10.7 minutes, with an average travel speed of 40.1 mph. For service vehicles, trips to office sites also had the highest average travel time of 8.1 minutes and an average travel speed of 38.1 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)
Office	64	9.3	38.2	124	8.1	38.1	188	8.5	38.2
Retail	169	8.9	38.0	251	7.5	37.8	420	8.1	37.9
Industrial	83	8.5	38.7	128	7.5	37.1	211	7.9	37.8
Medical	24	9.3	38.3	33	7.3	36.8	57	8.2	37.6
Education	6	8.6	39.3	22	6.3	36.7	28	6.8	37.4
Government	48	9.5	40.1	60	7.7	37.3	108	8.5	38.7
Residential	131	8.4	38.3	182	7.0	37.3	313	7.6	37.8
Other	98	10.7	40.1	157	7.4	37.6	255	8.6	38.8
Unknown	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Total	**623**	**9.1**	**38.8**	**957**	**7.4**	**37.6**	**1,580**	**8.1**	**38.1**

Table 27 shows the average travel time and speed to destinations by commodity group for trips made by cargo vehicles only. Trips transporting hazardous materials had the longest average trip duration of 25.9 minutes, with an average travel speed of 39.3 mph. Of the known commodity groups, machinery had the highest number of trips, with an average travel time of 9.0 minutes and an average travel speed of 38.7 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	21	10.6	38.8
Raw Materials	18	9.5	36.9
Food	4	6.1	35.6
Textiles	7	6.3	34.6
Wood	27	9.4	42.6
Building Materials	18	16.8	41.7
Machinery	80	9.0	38.7
Miscellaneous	0	0.0	0.0
Hazardous	1	25.9	39.3
Transportation	0	0.0	0.0
Unknown	440	8.7	38.4
Empty	7	11.2	40.2
Total	**623**	**9.1**	**38.8**

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 zone 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 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 occur within the trip tour.

There were 2,109 trips observed in the Bryan/College Station 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) 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. 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 zone number, 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 56 percent of the total trips generated by cargo vehicles were non-base trips and 44 percent were base trips. For trips made by service vehicles, 57 percent were base trips and 43 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	435	44.4	645	57.1	1,080	51.2
Non-Base	545	55.6	484	42.9	1,029	48.8
Total	**980**	**100.0**	**1,129**	**100.0**	**2,109**	**100.0**

Table 29 shows the distribution of trip tours for cargo and service vehicles. There were 913 trip tours generated by 1,240 vehicles making at least one trip tour. Cargo vehicles made 584 tours and service vehicles produced 1,365 tours. The number of tours varied from 1-to-6 tours for cargo vehicles, and 1-to-7 tours for service vehicles. Approximately 72 percent of the cargo vehicles and 63 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 5.5 trips and 4.4 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 3.9.

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	105	105	579	5.5
2	28	56	207	3.7
3	5	15	40	2.7
4	5	20	53	2.7
5	1	5	9	1.8
6	2	12	25	2.1
Cargo Total	**146**	**213**	**913**	**4.3**

Service Vehicles				
Total Number of Trip Tours	**Number of Vehicles**	**Number of Tours**	**Number of Trips**	**Average Trips per Tour**
1	114	114	505	4.4
2	47	94	324	3.4
3	10	30	73	2.4
4	4	16	39	2.4
5	4	20	51	2.6
6	1	6	13	2.2
7	1	7	14	2.0
Service Total	**181**	**287**	**1,019**	**3.6**
Grand Total	**327**	**500**	**1,932**	**3.9**

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 1,932 trips observed within the total 500 trip tours. For all vehicles, 419 were external trips (22 percent), 1,444 were inter-zonal trips (75 percent), and 69 were intra-zonal trips (3 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	235	105	321	390	23	10	579	505
2	30	19	174	295	3	10	207	324
3	19	0	19	70	2	3	40	73
4	0	2	51	35	2	2	53	39
5	0	0	2	46	7	5	9	51
6	9	0	14	13	2	0	25	13
7	0	0	0	14	0	0	0	14
Total	**293**	**126**	**581**	**863**	**39**	**30**	**913**	**1,019**

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	368	269	637	579	63.4	505	49.6	1,084	56.1
2	97	138	235	207	22.7	324	31.7	531	27.5
3	12	14	26	40	4.4	73	7.2	113	5.8
4	13	7	20	53	5.8	39	3.8	92	4.8
5	0	12	12	9	1.0	51	5.0	60	3.1
6	1	1	2	25	2.7	13	1.3	38	2.0
7	0	0	0	0	0.0	14	1.4	14	0.7
Total	**491**	**441**	**932**	**913**	**100.0**	**1,019**	**100.0**	**1,932**	**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.
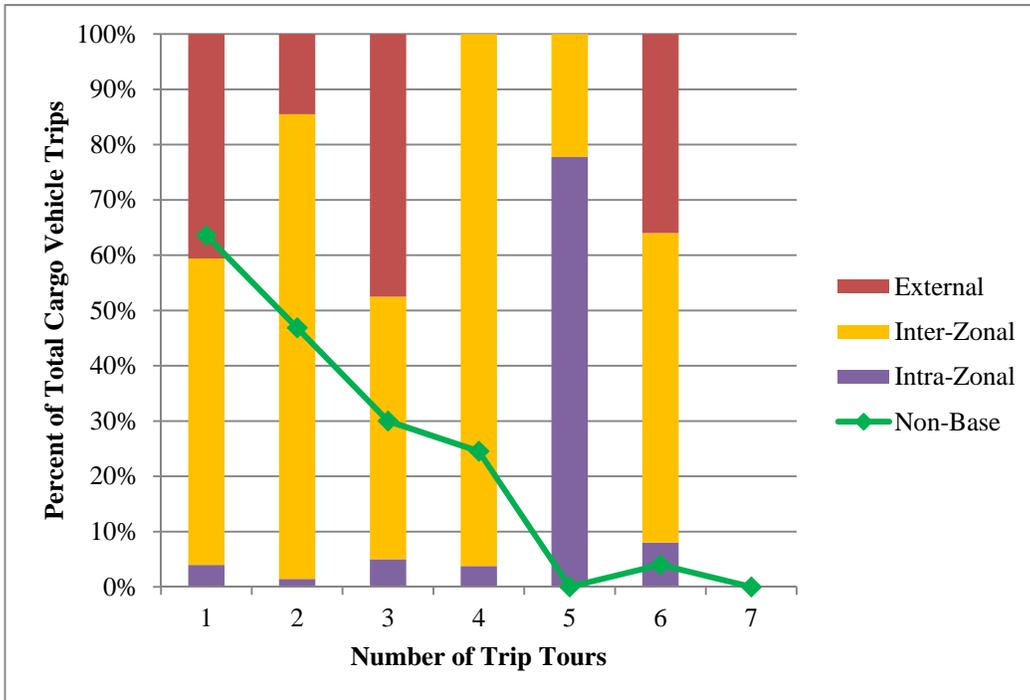
Figure 13. Cargo Vehicle Trips within Trip Tours by Trip Type.
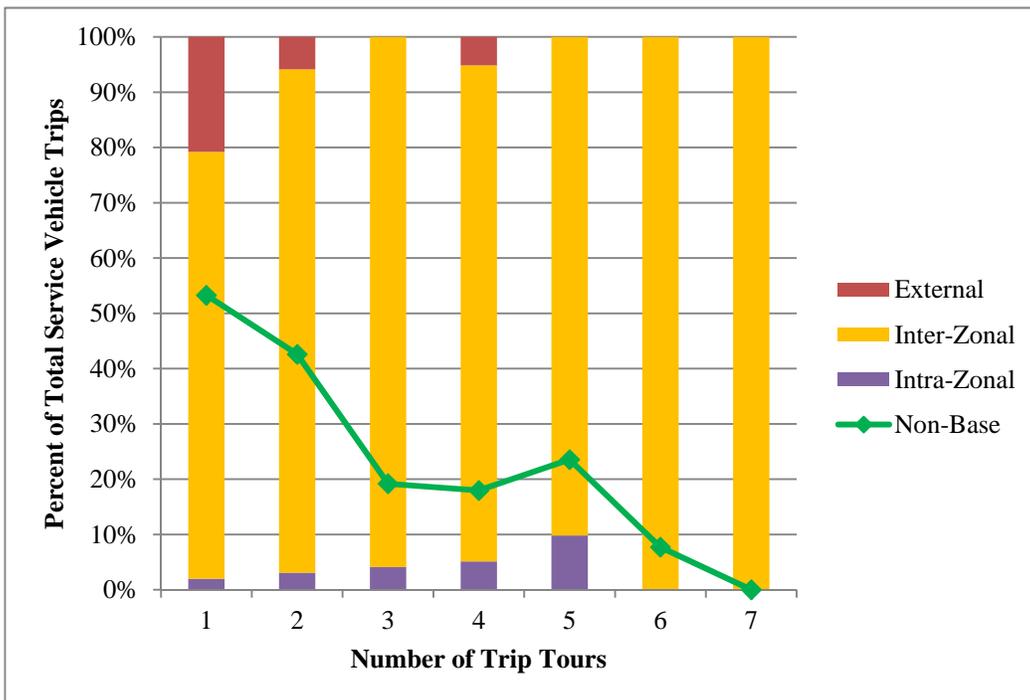
Figure 14. Service Vehicle Trips within Trip Tours by Trip Type.

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 earlier, 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. Slightly over 4 percent of the trips made in an open tour (that contained a tour) by cargo and service vehicles combined were before the first trip tour or after the last completed trip 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
Before Start of First Tour	4	0.4	42	3.7	46	2.2
After End of Last Tour	3	0.3	37	3.3	40	1.9
Only Open	57	5.8	12	1.1	69	3.3
Within Closed	916	93.5	1,038	91.9	1,954	92.6
Total	**980**	**100.0**	**1,129**	**100.0**	**2,109**	**100.0**
No Tours	6	0.6	3	0.3	9	0.4

*Total does not include the "No Tours" category; NA: Not Applicable.

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 Bryan/College Station 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, a correction factor is applied to the data to obtain average weekday VMT by functional classification. Table 33 provides the adjusted 2012 HPMS VMT estimates for the Bryan/College Station study area.

Table 33. 2012 HPMS Estimates of Weekday VMT in the Bryan/College Station Study Area.

Functional Classification	Total Weekday VMT
Freeway	698,346
Arterial	2,446,650
Collector	756,489
Local	193,568
Total	**4,095,053**

The percentages of commercial and non-commercial vehicles by functional classification were determined by using vehicle classification counts for the Bryan/College Station area obtained from TxDOT. 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		
	Internal Sites (69%)	External Sites (31%)	Weighted Average	Internal Sites (69%)	External Sites (31%)	Weighted Average
Freeway	12	16	13	88	84	87
Arterial	6	11	7	94	89	93
Collector	6	7	7	94	93	93
Local	4	N/A	8	96	N/A	92

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

Functional Classification	Commercial VMT	Non-Commercial VMT	Total VMT
Freeway	93,821	604,524	698,346
Arterial	182,694	2,263,957	2,446,650
Collector	49,354	707,135	756,489
Local	15,485	178,082	193,568
Total	**341,354**	**3,753,698**	**4,095,052**

The total commercial VMT of 341,355 miles represents all commercial vehicles that traveled within the Bryan/College Station study area. 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 external commercial VMT was estimated to be 67,815 miles. Therefore, the internal commercial VMT estimate was 273,540 miles.

The total internal VMT observed from the commercial vehicle survey was 8,197 miles, of which 3,676 miles were cargo VMT and 4,521 miles were service VMT. This estimate was based on 1,585 inter-zonal trips (623 cargo vehicle trips and 962 service vehicle trips), multiplied by the average trip length (5.9 miles for cargo and 4.7 miles for service vehicles). The total internal commercial VMT (273,540 miles) represented all commercial vehicles and is not distinguished by cargo or service vehicles. Based on the vehicle classification counts conducted in the study area, approximately 19 percent of the commercial vehicles belonged to 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. Approximately 81 percent of the commercial vehicles belonged to Class 3 (pick-up, van, or two-axle four-tire single unit trailers) and Class 4 (buses) and were assumed as 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 51,591 miles for cargo vehicles and 221,948 miles for service vehicles.

An expansion factor was developed based on the quotient between total internal VMT and observed internal VMT (from the survey) for each commercial vehicle type. The expansion factors (14.04 for cargo vehicles and 49.09 for service vehicles) were then multiplied by the observed number of inter-zonal trips to estimate the total vehicle trips. The resulting inter-zonal trip estimates were approximately 8,744 cargo vehicle trips and 47,223 service vehicle trips. Additionally, 2,174 intra-zonal trips (604 cargo trips and 1,571 service trips) were made, bringing the total number of internal commercial vehicle trips to 58,142. Based on the average number of inter-zonal trips per day of 4.07 trips for cargo vehicles and 5.14 trips for service vehicles, 11,781 commercial vehicles (2,296 cargo vehicles and 9,485 service vehicles) were estimated to be operating within the Bryan/College Station study area on a daily basis. This estimate is 3.1 times more than the approximate 3,800 trucks registered in the study area in 2014. Table 36 provides a summary of key results from the Bryan/College Station 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	153	187	340
Total Inter-Zonal Trips	623	962	1,585
Total Intra-Zonal Trips	43	32	75
Total Internal Trips	666	994	1,660
Total External Trips	314	135	449
Total Internal and External Trips	980	1,129	2,109
Average Total Trips per Vehicle	6.4	6.0	6.2
Average Total Internal Trips per Vehicle*	4.4	5.3	4.9
Average Trip Length	5.9	4.7	5.1
Observed Internal VMT	3,676	4,521	8,197
Total Internal Commercial VMT	51,592	221,948	273,540
Survey Expansion Factor	14.04	49.09	33.37
Total Expanded Inter-Zonal Commercial Vehicle Trips	8,744	47,223	55,967
Total Expanded Intra-Zonal Commercial Vehicle Trips	604	1,571	2,174
Total Expanded Commercial Vehicle Trips	9,348	48,794	58,142
Number of Commercial Vehicles Operating on a Daily Basis	2,296	9,485	11,781
Attraction Rate to Households	--	--	0.171

*Based on internal trips of 340 surveyed commercial vehicles (153 cargo vehicles and 187 service vehicles).

One final calculation was the determination of the commercial vehicle attraction rate to households. In the survey, approximately 21 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 12,402 trips to residential locations. The residential trip estimate was divided by the estimated number of households in the Bryan/College Station area (72,506) to obtain an attraction rate of 0.171.

SURVEY SUMMARY

This section provides a summary of vehicle and trip characteristics of 340 commercial vehicles that participated in the 2013 Bryan/College Station 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 7.9 years compared to 6.5 years for service vehicles. The odometer readings reported by cargo vehicles indicated an average mileage of 188,000 miles, which was approximately 2.5 times more than the reported average mileage of 78,000 miles by service vehicles. In terms of fuel use, around 56 percent of cargo vehicles used diesel and 44 percent used unleaded gasoline, while 89 percent of service vehicles used unleaded gasoline and 11 percent used diesel.

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 6.4 total trips per day, compared to 6.0 trips per day for service vehicles. Excluding the trips made outside of the study area (external trips), cargo vehicles produced 4.2 internal trips per day, with average travel distance of 5.9 miles, compared to service vehicles which made 5.3 internal trips per day, with average trip length of 4.7 miles. The average travel time per trip for cargo vehicles was 9.1 minutes and for service vehicles the average travel time per trip was 7.4 minutes.

In terms of trip purpose at trip destinations, approximately 48 percent of the cargo vehicle trips were for delivery, 21 percent were base related, and 18 percent were classified as "pick-up." For trips made by service vehicles, approximately 27 percent were base related, 22 percent were "other," and 18 percent were for sales.

In terms of land use activity, approximately 31 percent of the trips made by cargo vehicles traveled to retail locations, followed by 21 percent to residential locations, and 12 percent to industrial/manufacturing locations. For service vehicles, nearly 27 percent of the trips traveled to retail/shopping sites, followed by 22 percent to residential locations, and 15 percent to office 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 4,500 lbs. Agriculture products showed the highest average net cargo weight of approximately 19,100 lbs. per trip, but the most frequently transported commodity was

machinery products with an average net cargo weight of over 2,100 lbs. per trip. The land use category "other" showed the highest average net cargo weight of approximately 10,300 lbs. per trip. The delivery trip purpose had the highest average net cargo weight of approximately 8,800 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 500 trip tours were generated by the surveyed vehicles, with cargo vehicles making 213 tours and service vehicles producing 287 tours. The number of trip tours per vehicle varied from one-to-six tours for cargo vehicles and one-to-seven 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 3.9. Trips made as part of trip tours accounted for 1,932 trips (913 trips by cargo vehicles and 1,019 trips by service vehicles). Within the trip tours, approximately 75 percent were inter-zonal trips, 3 percent were intra-zonal trips and the remaining 22 percent were external trips. Non-base trips (which were not mutually-exclusive of the other trip types) comprised approximately 48 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 Bryan/College Station 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 11,800 commercial vehicles (2,300 cargo vehicles and 9,500 service vehicles) were estimated to be operating within the Bryan/College Station study area on a daily basis, approximately 3.1 times the volume of trucks registered in the study area in 2014.

APPENDIX

Record 20

COMMERCIAL TRAVEL SURVEY
PART 1: VEHICLE INFORMATION

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

Official Use	Vehicle ID #: _____	NAICS Code: _____

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

Company or Name of Owner (name on registration):

_____

Company Address:

_____
(Street Address or Names of Nearest Intersecting Streets)

_____
City   State   Zip Code

Company - Type of Place (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) ☐ Cargo Delivery and Commercial Service Vehicle

Vehicle Fuel: 1) ☐ Unleaded Gas   2) ☐ Diesel   3) ☐ Propane   4) ☐ Natural Gas (LNG or CNG)

                        5) ☐ Electric   6) ☐ Gas/Electric   96) ☐ Other (specify) _____

What is the average Miles Per Gallon (MPG) of the vehicle? _____

Vehicle Classification:
      1) ☐ Passenger Car   5) ☐ Single Unit 2-axle (6 wheels)
      2) ☐ Pick-up   6) ☐ Single Unit 3-axle (10 wheels)
      3) ☐ Van (Cargo or Minivan)   7) ☐ Single Unit 4-axle (14 wheels)
      4) ☐ Sport Utility Vehicle (SUV)   8) ☐ Semi (all Tractor-Trailer combinations)
                                                  96) ☐ Other _____

Gross Vehicle Weight (including trailer): _____ pounds

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

PLACE 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 (12th grade or less)	**(10)** Intermodal Facility	

COMMERCIAL TRAVEL SURVEY
PART 2: TRIP INFORMATION

Vehicle Plate #: _____

The place my travel began today was:

☐ Work / Base Location (Company address)　　☐ Other Location (Please describe): _____

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

_____　　TRAVEL DATE: _____
(Street Address or Names of Nearest Intersecting Streets)　　　　　　　　　　　　　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: Address including City, State, and Zip Code or Names of 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 1	☐ - Yes ☐ - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 2	☐ - Yes ☐ - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 3	☐ - Yes ☐ - 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		**(5)** Pick up Cargo	**(8)** Installation / Maintenance / Repair Service
(3) Industrial / Manufacturing	**(8)** Residential	**(13)** Construction Site	**(2)** Vehicle Maintenance (fuel, oil, etc.)	**(6)** Deliver and Pick up Cargo	**(9)** Sales / Professional Service
(4) Medical / Hospital	**(9)** Airport	**(96)** Other (specify)	**(3)** Driver Needs (lunch, restroom, etc.)		**(10)** Shopping for Business
(5) Education (12th grade or less)	**(10)** Intermodal Facility				**(96)** Other Activity (specify)

Commercial Travel Survey – Trip Information
(continued)

Vehicle Plate #: _____

	Record the following information about each place. Location: Address including City, State, and Zip Code or Names of 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 4		☐ - Yes ☐ - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 5		☐ - Yes ☐ - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 6		☐ - Yes ☐ - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 7		☐ - Yes ☐ - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 8		☐ - Yes ☐ - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 9		☐ - Yes ☐ - 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		(5) Pick up Cargo	(8) Installation / Maintenance / Repair Service
(3) Industrial / Manufacturing	(8) Residential	(13) Construction Site	(2) Vehicle Maintenance (fuel, oil, etc.)	(6) Deliver and Pick up Cargo	(9) Sales / Professional Service
(4) Medical / Hospital	(9) Airport	(96) Other (specify)	(3) Driver Needs (lunch, restroom, etc.)		(10) Shopping for Business
(5) Education (12th grade or less)	(10) Intermodal Facility				(96) Other Activity (specify)

Record 21

Commercial Travel Survey – Trip Information
(continued)

Vehicle Plate #: _____

Record the following information about each place. Location: Address including City, State, and Zip Code or Names of 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	☐ - Yes ☐ - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 11	☐ - Yes ☐ - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 12	☐ - Yes ☐ - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 13	☐ - Yes ☐ - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 14	☐ - Yes ☐ - 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 (12th 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 **(10)** Shopping for Business **(96)** Other Activity (specify)

Commercial Travel Survey – Trip Information
(continued)

Vehicle Plate #: _____

Record the following information about each place. Location: Address including City, State, and Zip Code or Names of 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	☐ - Yes ☐ - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 16	☐ - Yes ☐ - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 17	☐ - Yes ☐ - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 18	☐ - Yes ☐ - No		Arrive: _____ am/pm Depart: _____ am/pm			_____ Delivered _____ Picked Up
PLACE 19	☐ - Yes ☐ - 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 (12th grade or less) **(10)** Intermodal Facility	**(1)** Base Location / Return to Base Location **(4)** Deliver Cargo **(7)** Government Related Service **(5)** Pick up Cargo **(8)** Installation / Maintenance / Repair Service **(2)** Vehicle Maintenance (fuel, oil, etc.) **(6)** Deliver and Pick up Cargo **(9)** Sales / Professional Service **(3)** Driver Needs (lunch, restroom, etc.) **(10)** Shopping for Business **(96)** Other Activity (specify)