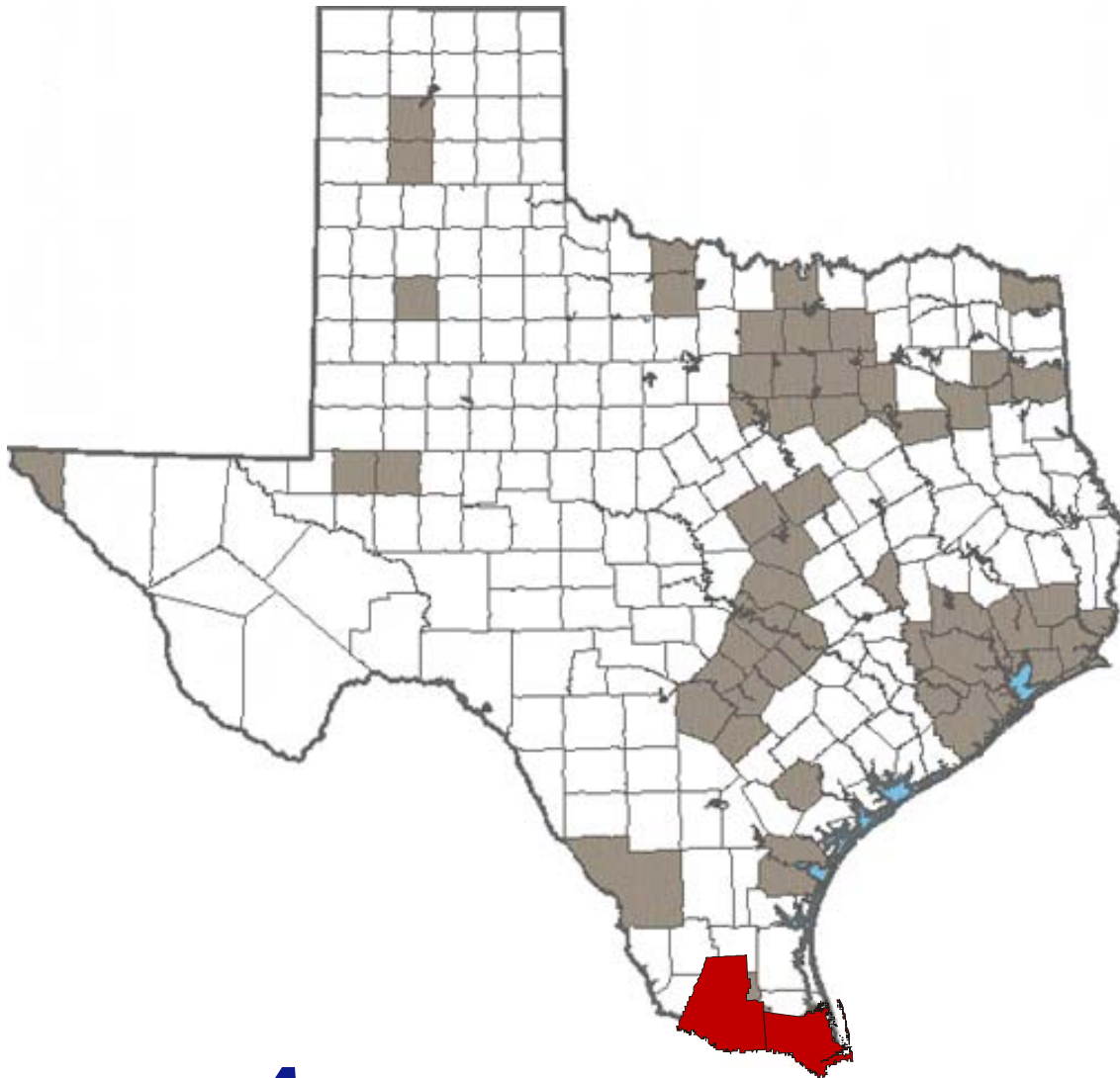


# 2005 Rio Grande Valley Commercial Vehicle Travel Survey Technical Summary



Prepared by the  
Texas Transportation Institute  
November 2007



# **2005 Rio Grande Valley Commercial Vehicle Survey**

## **TECHNICAL SUMMARY**

**Texas Department of Transportation Travel Survey Program**

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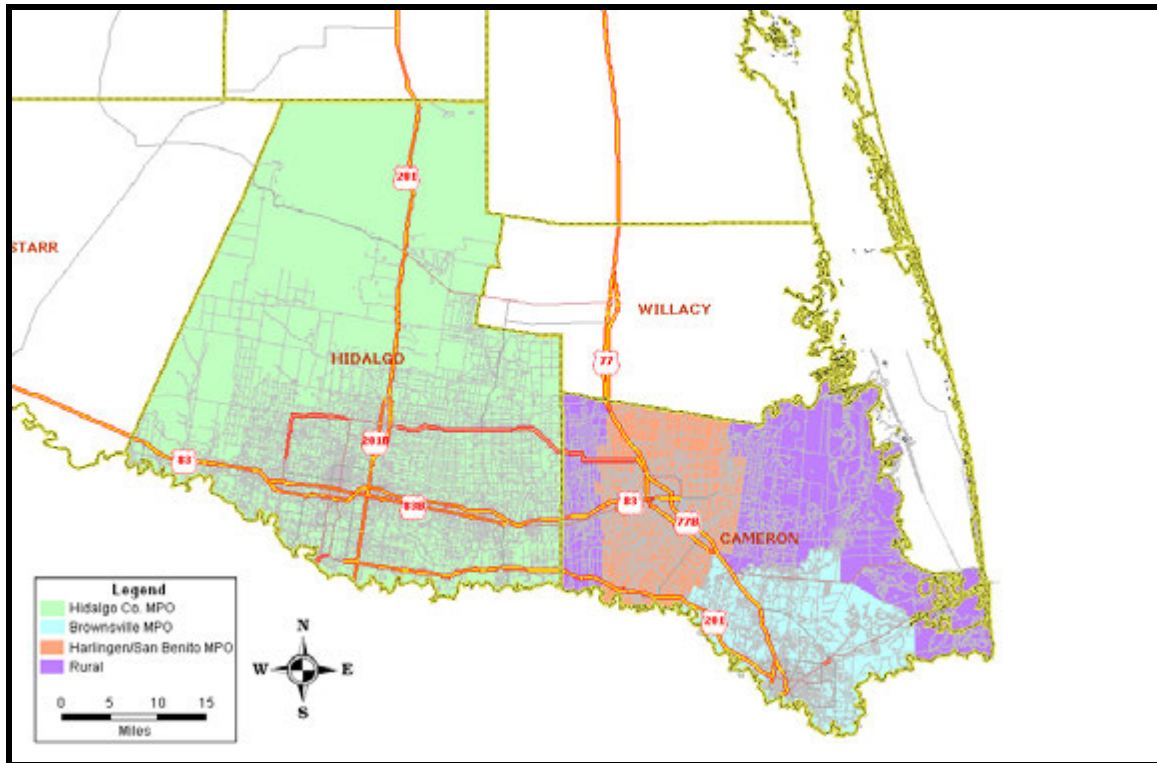
## **INTRODUCTION**

In 2005 the Transportation Planning and Programming (TPP) Division of the Texas Department of Transportation (TxDOT) funded a commercial vehicle travel survey in the Rio Grande Valley (Cameron and Hidalgo counties), Harlingen/San Benito Metropolitan Planning Organization (MPO), Brownsville MPO, and Hidalgo County MPO study areas. The commercial vehicle survey measured commercial vehicle travel patterns within the study areas. The purpose of the survey is to provide data that allows TxDOT to forecast commercial vehicle demand and travel patterns within the area.

This report presents a Technical Summary of the 2005 Rio Grande Valley Commercial Vehicle Survey and documents the data collected and the analysis results for the Rio Grande Valley study area. The summary is organized into seven sections. The first section presents a brief description of the Valley study area. The second discusses the survey methodology. The third section describes the data editing that was done, the fourth provides an overview of external commercial vehicle data, and the fifth presents summaries of the survey data. The sixth section discusses the methodology utilized to expand the survey data and also provide expanded survey results. The final section presents recommendations for use of the data in travel demand models. Additionally, survey instruments utilized for the Rio Grande Valley Commercial Vehicle survey are provided in the Appendix.

## **RIO GRANDE VALLEY STUDY AREA**

The boundary established for the Rio Grande Valley commercial vehicle survey was comprised of the entirety of Hidalgo and Cameron counties. The study area, as shown in Figure 1, is located in south Texas along the Texas/Mexico border. For travel demand modeling purposes, urban areas are typically divided into small geographic sections called traffic analysis zones (TAZ). Each zone is normally bound by transportation facilities and/or geographic features (e.g. bodies of water, parks, etc), and the activity that occurs within that area is typically somewhat homogenous. Zones are categorized by the density of activity associated with them. The zonal density is measured in terms of population and employment relative to the area in acres. The three local MPOs defined the TAZ structure within the study area boundary for each respective MPO. The general location of the study area for the Valley is provided in Figure 1.



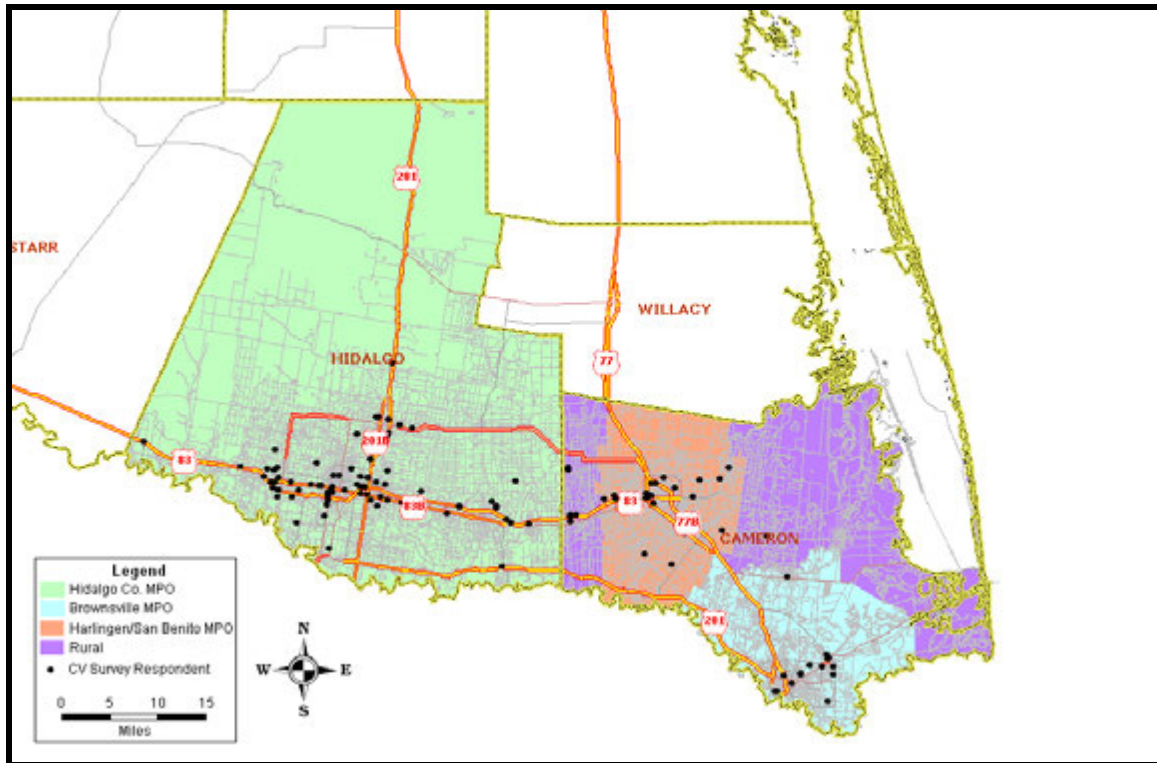
**Figure 1. Valley MPO Study Areas.**

According to the 2000 census, the population of the two-county area was approximately 900,000 persons. There were nearly 255,000 households in the study area in 2000 and the average household size according to this census was 3.60 persons per household.

## **SURVEY METHODOLOGY**

The sample of survey vehicles was randomly selected from motor carrier and vehicle registration databases. For the purpose of the survey, commercial vehicles were defined as any vehicle having six or more tires, a gross vehicle weight of over 8,500 pounds, and primarily used for commercial purposes. Gram Traffic Counting conducted the commercial vehicle survey in the Rio Grande Valley. Selected businesses were contacted by Gram and asked to participate in the survey effort. Those businesses agreeing to participate were provided with survey packets to distribute to drivers and with instructions on how the survey forms should be filled out. After the survey of a business was complete, a representative from Gram would retrieve all survey packets. A total of 510 vehicle surveys were obtained from 138 participating businesses during the conduct of the Rio Grande Valley commercial vehicle survey. The geographic distribution of

the participating businesses is shown in Figure 2. It is worth noting that some totals will not always match this total exactly. This is a result of non-response to certain questions on the survey instrument.



**Figure 2. Businesses Participating in Survey.**

## DATA EDITING

Data editing consisted primarily of reviewing the database to ensure that it was complete and followed guidelines set forth in the bid specification issued by TxDOT. A program was utilized to perform checks relative to geocoding of locations as well as logic checks of survey responses. The majority of the data errors were corrected prior to the data being submitted by Gram. However, there was one prevalent error that was not correctable. It is not uncommon for there to be a misunderstanding between transportation planners and the general public as to the definition of a trip. In travel surveys, a trip is defined as the journey from one location to another. The trip ends consist of the last location where a driver got into the vehicle (the origin) and the next location that the driver will stop or exit the vehicle (the destination). However, to the general public a trip is often interpreted as a “round-trip” where the origin and destination are the same

location and any stops in between are omitted. In the Rio Grande Valley commercial vehicle survey, there were a number of trips with the same TAZ for the origin and destination location. Each trip was reviewed to ascertain whether the address and/or location provided were identical for each trip end. If identical origin and destination information was given, then the trip was removed from the analysis. If multiple instances of duplicate origin/destination information were given for a vehicle, then the vehicle data were removed from the analysis. However, no vehicles in the survey sample fit this criterion.

### **TRIP TYPE INFORMATION**

For the purpose of this analysis, two primary trip types are utilized. Those trips types are internal trips and external trips. Internal trips are those with both trip ends (origin and destination) inside the study area. External trips are those where one or both trip ends are located outside of the study area. The primary purpose of the commercial vehicle analysis is to ascertain commercial vehicle characteristics and movements within a study area. Therefore, with the exception of trip tour characteristics, trip data for vehicles having one trip end outside of the study area (external trips) were removed from the analysis of trip related characteristics.

Certain data quality elements preclude a detailed analysis of external trip data. For instance, trip information relative to reported departure and arrival times as well as odometer readings are historically inaccurate. For internal trips, trip lengths and travel times from one TAZ to another can be estimated from network travel time and distance matrices developed from the transportation network for The Rio Grande Valley. However, this type of information is not available for locations outside of a specific study area. As a result, external trips were categorized into one of three groups.

- Texas (non-study area)
- Mexico
- United States (non-Texas)

Using these groups, trips were summarized by origin and destination and the results are provided in Table 1. As shown in Table 1, 3,190 of the 3,398 trips (94 percent) were internal trips (both

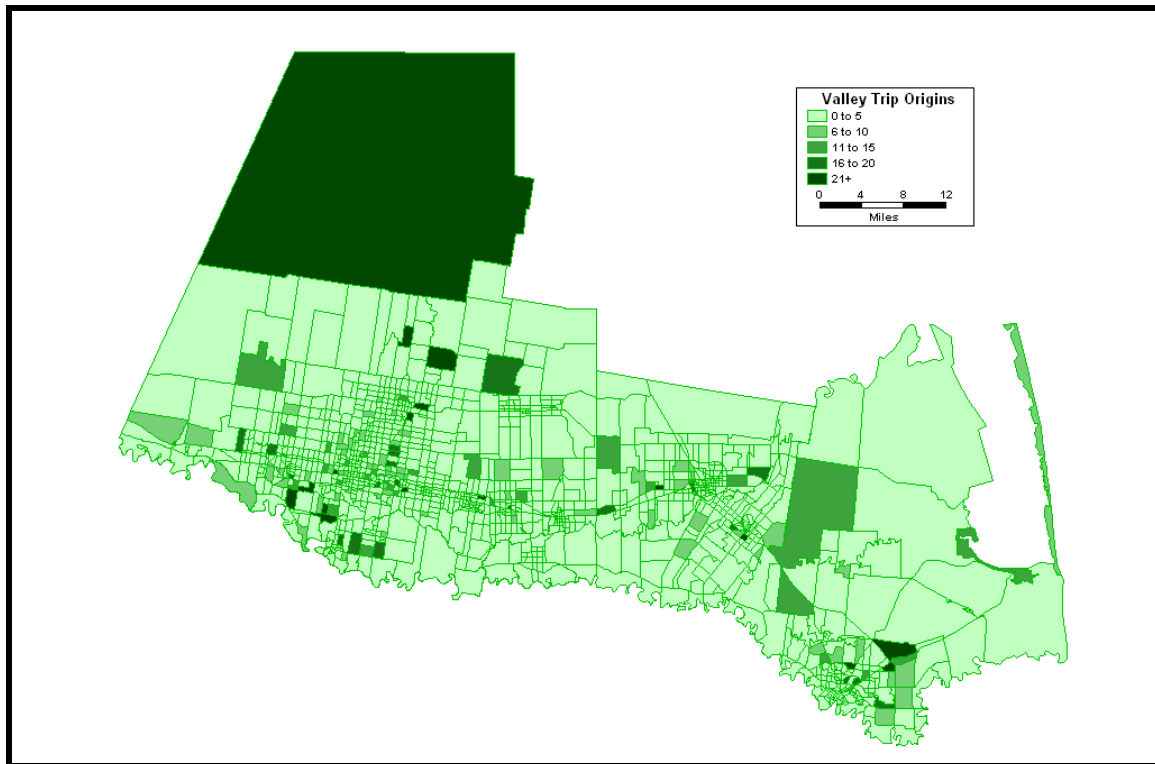
the origin and destination were within the study area). Of those internal trips, 2,990 (94 percent) were inter-zonal and 200 (6 percent) were intra-zonal.

External trips (one or both trip ends outside of the study area) comprised 208 of the total 3,398 trips (16 percent). Of those 208 trips, 155 (75 percent) had only one trip end outside the study area, and 53 trips (25 percent) had both trip ends outside of the study area. Fifteen trips ended within the United States (non-Texas) and no trips were reported having an origin or destination in Mexico.

**Table 1. Trips by Origin and Destination.**

| Trip Origin          | Trip Destination |          |                      |              |              |
|----------------------|------------------|----------|----------------------|--------------|--------------|
|                      | External (Texas) | Mexico   | External (Non-Texas) | Internal     | Total        |
| External (Texas)     | 45               | 0        | 8                    | 51           | 104          |
| Mexico               | 0                | 0        | 0                    | 0            | 0            |
| External (non-Texas) | 0                | 0        | 0                    | 0            | 0            |
| Internal             | 97               | 0        | 7                    | 3,190        | 3,294        |
| <b>Total Trips</b>   | <b>142</b>       | <b>0</b> | <b>15</b>            | <b>3,241</b> | <b>3,398</b> |

For those trips with origins and destinations within the study area, an analysis to determine the most frequently cited origin and destination zones was performed. The results of the analysis are provided in Figure 3 below. While Figure 3 illustrates the frequency of only the origin zones, it is worth noting that the illustration is fairly representative of the destination frequencies as well. This is because the destination of one trip is typically the origin of the next trip. Also, the origin of the first trip is generally the destination of the last trip.



**Figure 3. Valley Trip Origin Frequency by Zone.**

## **SURVEY SUMMARIES**

### **Survey Sample Fleet Characteristics**

Since the survey methodology employs a random selection process, it is presumed that each commercial vehicle in the study area has a non-zero probability of being selected to participate in the survey. Using a random sampling of vehicles provides a means for expanding the data that were obtained through the survey to the entire population of vehicles operating within the study area.

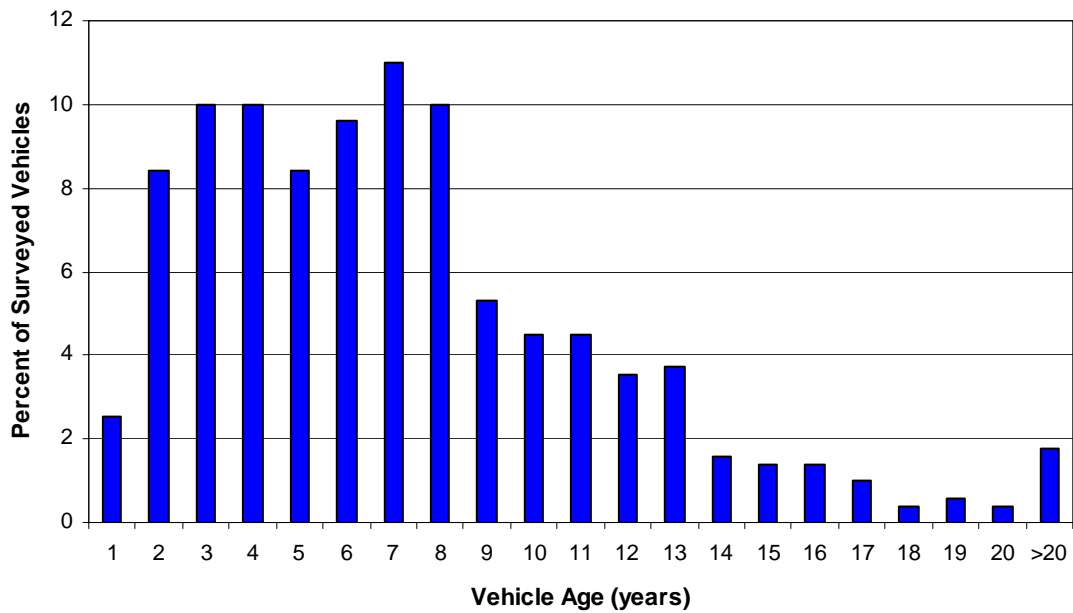
As previously mentioned, a total of 510 commercial vehicles were surveyed in the Rio Grande Valley area. As part of the survey, information relative to the year, make and model, odometer reading, and fuel type of each vehicle surveyed was collected. This provides an indication of the distribution of vehicles traveling in the study area by type, age, and condition (as implied by the number of miles on the vehicle). Table 2 below shows the age distribution of the surveyed vehicles. Figure 4 and Figure 5 provide the distribution and cumulative distribution of surveyed vehicles by age. Vehicles four years old or less comprised nearly one-third of the fleet (31



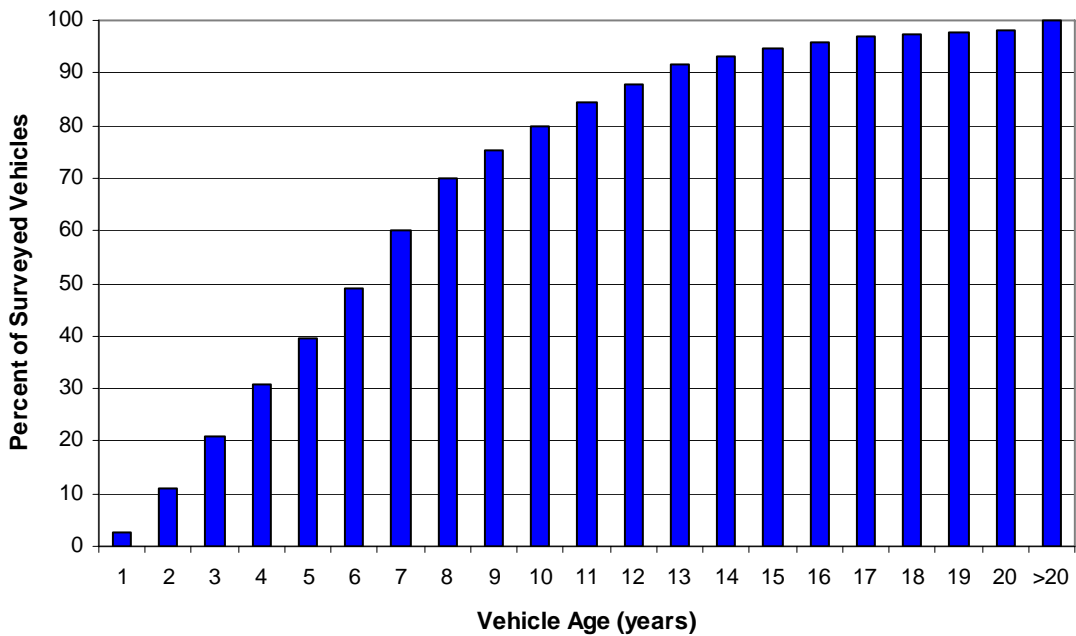
percent), while nearly half the vehicles (49 percent) were six years old or less. Three-quarters of the vehicles (75 percent) were nine years of age or less. All of the 510 surveyed vehicles responded to the age of vehicle question, and all of the vehicles reported odometer values. The average reported odometer value for all vehicles was 281,837 miles per vehicle and the average vehicle age was 6.3 years.

**Table 2. Commercial Vehicle Age Distribution.**

| Age          | Number of Vehicles | Percent of Total | Cumulative Percent of Total | Vehicles with Odometer Values Reported | Percent of Total | Average Reported Odometer Value |
|--------------|--------------------|------------------|-----------------------------|--|------------------|---------------------------------|
| 1            | 13                 | 2.55             | 2.55                        | 13                                     | 2.55             | 47,353                          |
| 2            | 43                 | 8.43             | 10.98                       | 43                                     | 8.43             | 70,045                          |
| 3            | 51                 | 10.00            | 20.98                       | 51                                     | 10.00            | 99,219                          |
| 4            | 51                 | 10.00            | 30.98                       | 51                                     | 10.00            | 130,316                         |
| 5            | 43                 | 8.43             | 39.41                       | 43                                     | 8.43             | 170,736                         |
| 6            | 49                 | 9.61             | 49.02                       | 49                                     | 9.61             | 250,038                         |
| 7            | 56                 | 10.98            | 60.00                       | 56                                     | 10.98            | 298,656                         |
| 8            | 51                 | 10.00            | 70.00                       | 51                                     | 10.00            | 376,944                         |
| 9            | 27                 | 5.29             | 75.29                       | 27                                     | 5.29             | 418,184                         |
| 10           | 23                 | 4.51             | 79.80                       | 23                                     | 4.51             | 462,717                         |
| 11           | 23                 | 4.51             | 84.31                       | 23                                     | 4.51             | 485,717                         |
| 12           | 18                 | 3.53             | 87.84                       | 18                                     | 3.53             | 538,816                         |
| 13           | 19                 | 3.73             | 91.57                       | 19                                     | 3.73             | 517,329                         |
| 14           | 8                  | 1.57             | 93.14                       | 8                                      | 1.57             | 219,257                         |
| 15           | 7                  | 1.37             | 94.51                       | 7                                      | 1.37             | 695,017                         |
| 16           | 7                  | 1.37             | 95.88                       | 7                                      | 1.37             | 533,923                         |
| 17           | 5                  | 0.98             | 96.86                       | 5                                      | 0.98             | 462,012                         |
| 18           | 2                  | 0.39             | 97.25                       | 2                                      | 0.39             | 251,078                         |
| 19           | 3                  | 0.59             | 97.84                       | 3                                      | 0.59             | 244,444                         |
| 20           | 2                  | 0.39             | 98.24                       | 2                                      | 0.39             | 144,717                         |
| >20          | 9                  | 1.76             | 100.00                      | 9                                      | 1.76             | 670,665                         |
| <b>Total</b> | <b>510</b>         | <b>100.00</b>    |                             | <b>510</b>                             | <b>100.00</b>    |                                 |



**Figure 4. Commercial Vehicle Age Distribution.**



**Figure 5. Cumulative Vehicle Age Distribution.**

The majority of the respondents surveyed listed diesel as the fuel utilized by the vehicle. Diesel accounted for 95 percent of the fuel types. Unleaded gasoline (5 percent) was the only other fuel type listed.

Tractor-trailers accounted for 36 percent of the sample. Single unit 2-axle vehicles comprised 34 percent of the sample, with single unit 3-axle vehicles accounting for an additional 28 percent of the sample. The distribution of vehicle classification information is provided in Table 3.

**Table 3. Vehicle Classification Distribution.**

| Vehicle Classification                  | Number of Vehicles | Percent of Total | Cumulative Number | Cumulative Percent |
|---|--------------------|------------------|-------------------|--------------------|
| Single Unit 2-axle (6 wheels)           | 174                | 34.12            | 174               | 34.12              |
| Single Unit 3-axle (10 wheels)          | 144                | 28.24            | 318               | 62.35              |
| Single Unit 4-axle (14 wheels)          | 6                  | 1.18             | 324               | 63.53              |
| Semi (all tractor-trailer combinations) | 186                | 36.46            | 510               | 100.00             |
| Other                                   | 0                  | 0.00             | 510               | 100.00             |
| <b>Total</b>                            | <b>510</b>         | <b>100.00</b>    |                   |                    |

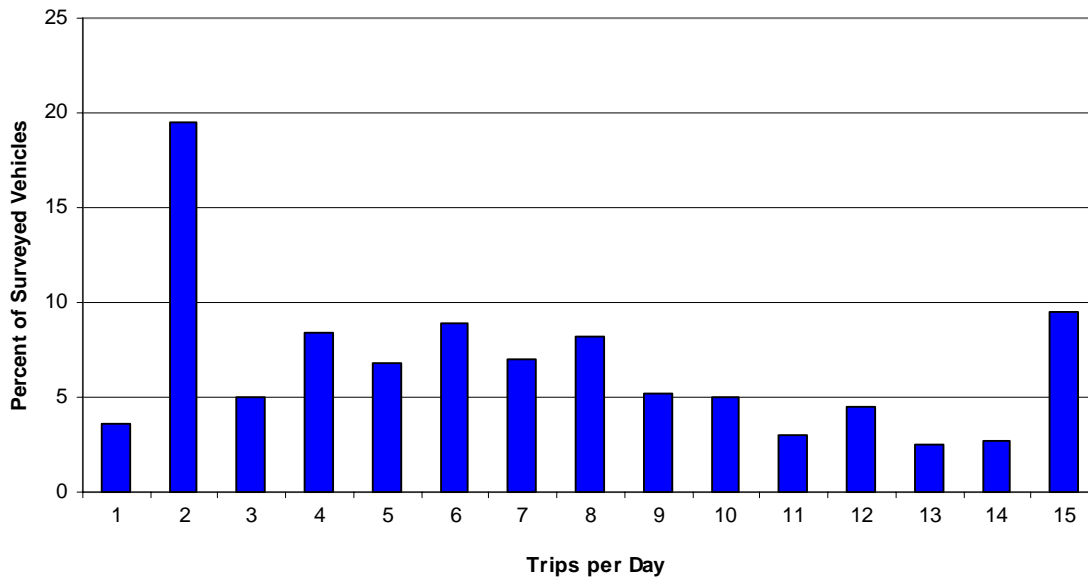
The distribution of the number of internal trips per day for commercial vehicles is provided in Table 4 and Figure 6. The greatest percentage of vehicles (20 percent) made only two trips and approximately half (52 percent) made six or fewer trips per day. Nearly a quarter of the vehicles (27 percent) made 10 or more trips per day. The average number of internal trips per day per vehicle was 7.25.

**Table 4. Distribution of Vehicles by Total Number of Internal Trips.**

| Number of Trips per Day | Number of Vehicles | Percent of Total | Cumulative Total |
|-------------------------|--------------------|------------------|------------------|
| 1                       | 16                 | 3.64             | 3.64             |
| 2                       | 86                 | 19.55            | 23.18            |
| 3                       | 22                 | 5.00             | 28.18            |
| 4                       | 37                 | 8.41             | 36.59            |
| 5                       | 30                 | 6.82             | 43.41            |
| 6                       | 39                 | 8.86             | 52.27            |
| 7                       | 31                 | 7.05             | 59.32            |
| 8                       | 36                 | 8.18             | 67.50            |

| Number of Trips per Day | Number of Vehicles | Percent of Total | Cumulative Total |
|-------------------------|--------------------|------------------|------------------|
| 9                       | 23                 | 5.23             | 72.73            |
| 10                      | 22                 | 5.00             | 77.73            |
| 11                      | 13                 | 2.95             | 80.68            |
| 12                      | 20                 | 4.55             | 85.23            |
| 13                      | 11                 | 2.50             | 87.73            |
| 14                      | 12                 | 2.73             | 90.45            |
| 15+                     | 42                 | 9.55             | 100.00           |
| <b>Total</b>            | <b>440</b>         | <b>100.00</b>    |                  |



**Figure 6. Vehicle Trip Count Distribution.**

The number of trips per day by vehicle classification is provided in Table 5. Due to similarities among certain classes of vehicles, the classification groups provided in Table 3 are aggregated into three new groups. For the remainder of the analysis, all of the single unit multi-axle vehicles are aggregated into a “small-medium” classification. Semi/tractor-trailer combinations are listed as the “large” classification, and any vehicles listed as other are categorized as “other”. Approximately 69 percent of the trips shown in Table 5 were made by vehicles in the small-medium category, and large vehicles accounted for the remaining 31 percent of the trips. There were no vehicles in the ‘other’ category. The total number of vehicles provided in Table 4 and Table 5 (440) is significantly less than the total number of surveyed vehicles (510). The reason for this is that for this portion of the analysis, vehicles making any external trips were removed from the analysis. Although this amounts to 14 percent of the vehicles being removed, certain trip related characteristics for vehicles making external trips can not be determined. Vehicles making external trips are, however, included in the trip tour characteristics portion of the analysis.

**Table 5. Distribution of Total Number of Trips by Vehicle Classification.**

| Number of Trips per Day | Small-Medium Vehicles |                  | Large Vehicles     |                  | Total      |
|-------------------------|-----------------------|------------------|--------------------|------------------|------------|
|                         | Number of Vehicles    | Percent of Total | Number of Vehicles | Percent of Total |            |
| 1                       | 3                     | 0.99             | 13                 | 9.49             | 16         |
| 2                       | 68                    | 22.44            | 18                 | 13.14            | 86         |
| 3                       | 17                    | 5.61             | 5                  | 3.65             | 22         |
| 4                       | 27                    | 8.91             | 10                 | 7.30             | 37         |
| 5                       | 24                    | 7.92             | 6                  | 4.38             | 30         |
| 6                       | 28                    | 9.24             | 11                 | 8.03             | 39         |
| 7                       | 21                    | 6.93             | 10                 | 7.30             | 31         |
| 8                       | 32                    | 10.56            | 4                  | 2.92             | 36         |
| 9                       | 15                    | 4.95             | 8                  | 5.84             | 23         |
| 10                      | 19                    | 6.27             | 3                  | 2.19             | 22         |
| 11                      | 9                     | 2.97             | 4                  | 2.92             | 13         |
| 12                      | 13                    | 4.29             | 7                  | 5.11             | 20         |
| 13                      | 3                     | 0.99             | 8                  | 5.84             | 11         |
| 14                      | 3                     | 0.99             | 9                  | 6.57             | 12         |
| 15+                     | 21                    | 6.93             | 21                 | 15.33            | 42         |
| <b>Total</b>            | <b>303</b>            | <b>100.00</b>    | <b>137</b>         | <b>100.00</b>    | <b>440</b> |

**Trip Purpose and Cargo Characteristics**

An analysis of the distribution of trip origins (productions) and destinations (attractions) disaggregated by land use type are provided in Table 6. The largest percentage of trip origins and destinations was classified as industrial (20 percent each). Industrial, retail, residential, and office building land use types accounted for 43 percent of the origins and destinations. Over one third (35 percent) of the origin and destination land use types were in the intermodal facility, warehouse, distribution center, and construction site categories. The survey instrument provided two educational land use categories (12<sup>th</sup> grade or less and college/trade/etc.), but for the purpose of the analysis, the two categories were combined into one.

**Table 6. Distribution of Trip Origins and Destinations by Land Use Activity.**

| <b>Land Use Type</b> | <b>Origins</b> | <b>Percent of Total</b> | <b>Destinations</b> | <b>Percent of Total</b> |
|----------------------|----------------|-------------------------|---------------------|-------------------------|
| Office Building      | 63             | 1.97                    | 63                  | 1.97                    |
| Retail               | 354            | 11.10                   | 357                 | 11.19                   |
| Industrial           | 635            | 19.91                   | 630                 | 19.75                   |
| Medical              | 29             | 0.91                    | 29                  | 0.91                    |
| Educational          | 345            | 10.82                   | 346                 | 10.85                   |
| Government           | 97             | 3.04                    | 96                  | 3.01                    |
| Residential          | 323            | 10.13                   | 321                 | 10.06                   |
| Airport              | 2              | 0.06                    | 2                   | 0.06                    |
| Intermodal Facility  | 9              | 0.28                    | 9                   | 0.28                    |
| Warehouse            | 292            | 9.15                    | 298                 | 9.34                    |
| Distribution Center  | 261            | 8.18                    | 254                 | 7.96                    |
| Construction Site    | 559            | 17.52                   | 560                 | 17.55                   |
| Other                | 221            | 6.93                    | 225                 | 7.05                    |
| <b>Total</b>         | <b>3,190</b>   | <b>100.00</b>           | <b>3,190</b>        | <b>100.00</b>           |

A large majority of the trip origins and destinations (64 percent) were for the small-medium vehicle classification. Large vehicles accounted for the remaining 36 percent of the trip origins and destinations. Table 7 provides the trip origins by land use type and vehicle classification while Table 8 provides the trip destinations for the same categories.

**Table 7. Distribution of Trip Origins by Land Use Type and Vehicle Classification.**

| Land Use Type       | Small-Medium Vehicles |                  | Large Vehicles     |                  | Total        |
|---------------------|-----------------------|------------------|--------------------|------------------|--------------|
|                     | Number of Vehicles    | Percent of Total | Number of Vehicles | Percent of Total |              |
| Office Building     | 22                    | 1.08             | 41                 | 3.55             | 63           |
| Retail              | 137                   | 6.74             | 217                | 18.77            | 354          |
| Industrial          | 342                   | 16.81            | 293                | 25.35            | 635          |
| Medical             | 8                     | 0.39             | 21                 | 1.82             | 29           |
| Educational         | 334                   | 16.42            | 11                 | 0.95             | 345          |
| Government          | 80                    | 3.93             | 17                 | 1.47             | 97           |
| Residential         | 291                   | 14.31            | 32                 | 2.77             | 323          |
| Airport             | 1                     | 0.05             | 1                  | 0.09             | 2            |
| Intermodal Facility | 0                     | 0.00             | 9                  | 0.78             | 9            |
| Warehouse           | 166                   | 8.16             | 126                | 10.90            | 292          |
| Distribution Center | 116                   | 5.70             | 145                | 12.54            | 261          |
| Construction Site   | 379                   | 18.63            | 180                | 15.57            | 559          |
| Other               | 158                   | 7.77             | 63                 | 5.45             | 221          |
| <b>Total</b>        | <b>2,034</b>          | <b>100.00</b>    | <b>1,156</b>       | <b>100.00</b>    | <b>3,190</b> |

**Table 8. Distribution of Trip Destinations by Land Use Type and Vehicle Classification.**

| Land Use Type       | Small-Medium Vehicles |                  | Large Vehicles     |                  | Total        |
|---------------------|-----------------------|------------------|--------------------|------------------|--------------|
|                     | Number of Vehicles    | Percent of Total | Number of Vehicles | Percent of Total |              |
| Office Building     | 22                    | 1.08             | 41                 | 3.55             | 63           |
| Retail              | 137                   | 6.74             | 220                | 19.03            | 357          |
| Industrial          | 343                   | 16.86            | 287                | 24.83            | 630          |
| Medical             | 8                     | 0.39             | 21                 | 1.82             | 29           |
| Educational         | 335                   | 16.47            | 11                 | 0.95             | 346          |
| Government          | 79                    | 3.88             | 17                 | 1.47             | 96           |
| Residential         | 288                   | 14.16            | 33                 | 2.85             | 321          |
| Airport             | 1                     | 0.05             | 1                  | 0.09             | 2            |
| Intermodal Facility | 0                     | 0.00             | 9                  | 0.78             | 9            |
| Warehouse           | 170                   | 8.36             | 128                | 11.07            | 298          |
| Distribution Center | 113                   | 5.56             | 141                | 12.20            | 254          |
| Construction Site   | 380                   | 18.68            | 180                | 15.57            | 560          |
| Other               | 158                   | 7.77             | 67                 | 5.80             | 225          |
| <b>Total</b>        | <b>2,034</b>          | <b>100.00</b>    | <b>1,156</b>       | <b>100.00</b>    | <b>3,190</b> |

Table 9 summarizes the analysis of trip purposes reported in the survey in terms of the trip origin and destination. The most common trip purpose reported at both the origin and destination was delivery (57 percent). Fourteen percent of the origin purposes and 13 percent of the destination purposes were listed as ‘base location/return to base.’

**Table 9. Trip Purpose Origin – Destination Summary.**

| Trip Origin Purpose          | Trip Destination Purpose     |              |            |                      |                     |              |            |          |              |
|------------------------------|------------------------------|--------------|------------|----------------------|---------------------|--------------|------------|----------|--------------|
|                              | Base Location/Return to Base | Delivery     | Pick-Up    | Pick-Up and Delivery | Vehicle Maintenance | Driver Needs | To Home    | Other    | Total        |
| Base Location/Return to Base | 1                            | 265          | 88         | 12                   | 6                   | 3            | 57         | 0        | 432          |
| Delivery                     | 287                          | 1,013        | 487        | 3                    | 5                   | 20           | 7          | 1        | 1,823        |
| Pick-up                      | 65                           | 518          | 108        | 0                    | 1                   | 6            | 3          | 0        | 701          |
| Pick-up and Delivery         | 10                           | 4            | 1          | 38                   | 0                   | 1            | 0          | 0        | 54           |
| Vehicle Maintenance          | 3                            | 4            | 3          | 0                    | 6                   | 1            | 2          | 0        | 19           |
| Driver Needs                 | 0                            | 18           | 10         | 1                    | 1                   | 0            | 10         | 0        | 40           |
| To Home                      | 49                           | 3            | 9          | 0                    | 2                   | 10           | 48         | 0        | 121          |
| Other                        | 0                            | 0            | 0          | 0                    | 0                   | 0            | 0          | 0        | 0            |
| <b>Total</b>                 | <b>415</b>                   | <b>1,825</b> | <b>706</b> | <b>54</b>            | <b>21</b>           | <b>41</b>    | <b>127</b> | <b>1</b> | <b>3,190</b> |

A more detailed breakdown by vehicle classification is provided in Table 10. As with the overall totals, ‘delivery’ was the most commonly cited origin and destination purpose (52 percent) for the small-medium category. In the large category, 66 percent of the origin and destination purposes were listed as ‘delivery.’



**Table 10. Trip Purpose Origin – Destination Summary by Vehicle Classification.**

| Small-Medium Vehicles        |                              |              |            |                      |                     |              |            |          |              |
|------------------------------|------------------------------|--------------|------------|----------------------|---------------------|--------------|------------|----------|--------------|
| Trip Origin Purpose          | Trip Destination Purpose     |              |            |                      |                     |              |            |          |              |
|                              | Base Location/Return to Base | Delivery     | Pick-Up    | Pick-Up and Delivery | Vehicle Maintenance | Driver Needs | To Home    | Other    | Total        |
| Base Location/Return to Base | 0                            | 198          | 48         | 8                    | 4                   | 3            | 46         | 0        | 307          |
| Delivery                     | 209                          | 501          | 333        | 2                    | 4                   | 9            | 4          | 0        | 1,062        |
| Pick-up                      | 35                           | 351          | 77         | 0                    | 1                   | 2            | 2          | 0        | 468          |
| Pick-up and Delivery         | 8                            | 2            | 0          | 36                   | 0                   | 1            | 0          | 0        | 47           |
| Vehicle Maintenance          | 1                            | 3            | 2          | 0                    | 6                   | 1            | 2          | 0        | 15           |
| Driver Needs                 | 0                            | 9            | 5          | 1                    | 1                   | 0            | 10         | 0        | 26           |
| To Home                      | 44                           | 1            | 6          | 0                    | 0                   | 10           | 48         | 0        | 109          |
| Other                        | 0                            | 0            | 0          | 0                    | 0                   | 0            | 0          | 0        | 0            |
| <b>Total</b>                 | <b>297</b>                   | <b>1,065</b> | <b>471</b> | <b>47</b>            | <b>16</b>           | <b>26</b>    | <b>112</b> | <b>0</b> | <b>2,034</b> |
| Large Vehicles               |                              |              |            |                      |                     |              |            |          |              |
| Trip Origin Purpose          | Trip Destination Purpose     |              |            |                      |                     |              |            |          |              |
|                              | Base Location/Return to Base | Delivery     | Pick-Up    | Pick-Up and Delivery | Vehicle Maintenance | Driver Needs | To Home    | Other    | Total        |
| Base Location/Return to Base | 1                            | 67           | 40         | 4                    | 2                   | 0            | 11         | 0        | 125          |
| Delivery                     | 78                           | 512          | 154        | 1                    | 1                   | 11           | 3          | 1        | 761          |
| Pick-up                      | 30                           | 167          | 31         | 0                    | 0                   | 4            | 1          | 0        | 233          |
| Pick-up and Delivery         | 2                            | 2            | 1          | 2                    | 0                   | 0            | 0          | 0        | 7            |
| Vehicle Maintenance          | 2                            | 1            | 1          | 0                    | 0                   | 0            | 0          | 0        | 4            |
| Driver Needs                 | 0                            | 9            | 5          | 0                    | 0                   | 0            | 0          | 0        | 14           |
| To Home                      | 5                            | 2            | 3          | 0                    | 2                   | 0            | 0          | 0        | 12           |
| Other                        | 0                            | 0            | 0          | 0                    | 0                   | 0            | 0          | 0        | 0            |
| <b>Total</b>                 | <b>118</b>                   | <b>760</b>   | <b>235</b> | <b>7</b>             | <b>5</b>            | <b>15</b>    | <b>15</b>  | <b>1</b> | <b>1,156</b> |

Drivers of commercial vehicles were asked to provide the type of cargo being delivered or picked up at each stop. The results of the responses are provided in Table 11. For cargo origins, miscellaneous shipments was the most common response (20 percent), followed by clay, concrete, glass or stone (17 percent) and metals and minerals (14 percent). At the destination, miscellaneous was again the most common response (19 percent). Other common cargos at the destination include ‘clay, concrete, glass, or stone’ (15 percent), metals and minerals (13 percent), and manufactured goods (13 percent).

**Table 11. Distribution of Cargo Types by Origin and Destination.**

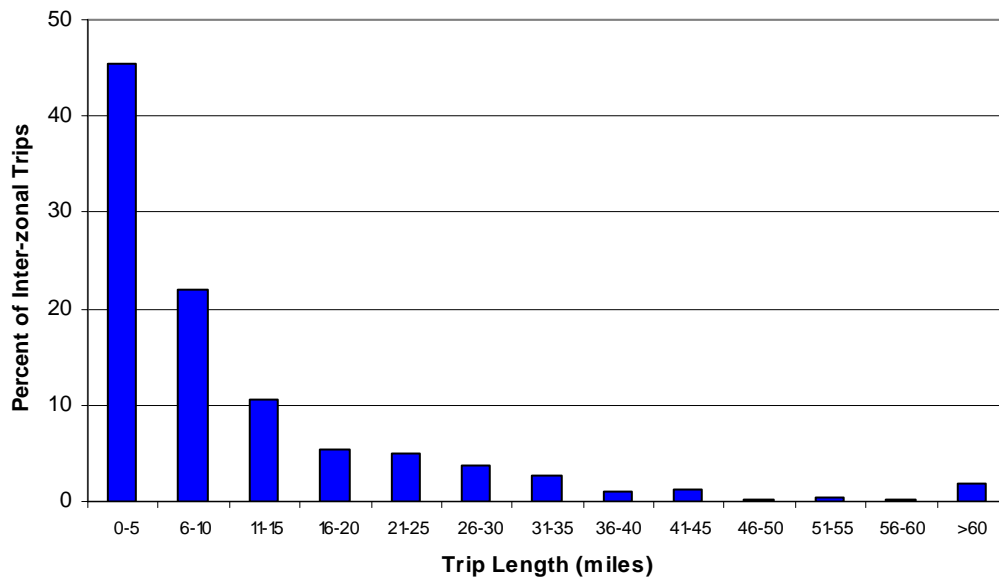
| Cargo Description |   | Surveyed Cargo at Origin                | Percent of Total | Surveyed Cargo at Destination | Percent of Total |       |
|-------------------|---|---|------------------|-------------------------------|------------------|-------|
| 1                 | — | Farm Products                           | 124              | 3.89                          | 120              | 3.76  |
| 2                 | — | Forest Products                         | 10               | 0.31                          | 10               | 0.31  |
| 3                 | — | Marine Products                         | 1                | 0.03                          | 0                | 0.00  |
| 4                 | — | Metals and Minerals                     | 451              | 14.14                         | 423              | 13.26 |
| 5                 | — | Food, Health, and Beauty Products       | 339              | 10.63                         | 325              | 10.19 |
| 6                 | — | Tobacco Products                        | 0                | 0.00                          | 0                | 0.00  |
| 7                 | — | Textiles                                | 15               | 0.47                          | 20               | 0.63  |
| 8                 | — | Wood Products                           | 155              | 4.86                          | 132              | 4.14  |
| 9                 | — | Printer Matter                          | 1                | 0.03                          | 1                | 0.03  |
| 10                | — | Chemical Products                       | 3                | 0.09                          | 3                | 0.09  |
| 11                | — | Refined Petroleum or Coal Products      | 0                | 0.00                          | 0                | 0.00  |
| 12                | — | Rubber, Plastic, and Styrofoam Products | 9                | 0.28                          | 10               | 0.31  |
| 13                | — | Clay, Concrete, Glass, or Stone         | 548              | 17.18                         | 478              | 14.98 |
| 14                | — | Manufactured Goods/Equipment            | 423              | 13.26                         | 412              | 12.92 |
| 15                | — | Wastes                                  | 148              | 4.64                          | 151              | 4.73  |
| 16                | — | Miscellaneous Shipments                 | 646              | 20.25                         | 604              | 18.93 |
| 17                | — | Hazardous Materials                     | 1                | 0.03                          | 1                | 0.03  |
| 18                | — | Transportation                          | 32               | 1.00                          | 32               | 1.00  |
| 19                | — | Unclassified Cargo                      | 131              | 4.11                          | 122              | 3.82  |
| 20                | — | Driver Refused to Answer                | 0                | 0.00                          | 0                | 0.00  |
| 21                | — | Unknown to Driver                       | 0                | 0.00                          | 0                | 0.00  |
| 22                | — | Empty                                   | 153              | 4.80                          | 346              | 10.85 |
| 23                | — | Other                                   | 0                | 0.00                          | 0                | 0.00  |
| <b>Total</b>      |   | <b>3,190</b>                            | <b>100.00</b>    | <b>3,190</b>                  | <b>100.00</b>    |       |

**Survey Trip Length Characteristics**

As part of the survey, respondents were asked to provide information about the location of each trip that was made on the survey day. This information, combined with trip lengths obtained from network travel time and distance matrices, allowed for the development of trip length frequency distributions. The results of this analysis are provided in Table 12 and in Figure 7. The information is provided in aggregated (5 mile increments) format. Nearly one-half of the trips (45 percent) were less than five miles in length. Seventeen percent of the trips were longer than twenty miles. The average trip length for all trips was 11.29 miles.

**Table 12. Trip Length Frequency Distribution for Inter-zonal Trips (Grouped Intervals).**

| Trip Length (Miles) | Number of Trips | Percent of Trips |
|---------------------|-----------------|------------------|
| 0-5                 | 1,356           | 45.35            |
| 6-10                | 656             | 21.94            |
| 11-15               | 316             | 10.57            |
| 16-20               | 163             | 5.45             |
| 21-25               | 151             | 5.05             |
| 26-30               | 111             | 3.71             |
| 31-35               | 82              | 2.74             |
| 36-40               | 34              | 1.14             |
| 41-45               | 39              | 1.30             |
| 46-50               | 9               | 0.30             |
| 51-55               | 12              | 0.40             |
| 56-60               | 8               | 0.27             |
| >60                 | 53              | 1.77             |
| <b>Total</b>        | <b>2,990</b>    | <b>100.00</b>    |



**Figure 7. Trip Length Frequency Distribution for Inter-zonal Trips (Grouped Intervals).**

In order to provide a more detailed summary, Table 13 provides the grouped interval trip length frequency distribution by vehicle classification. Additionally, trip length frequency distribution information is also provided in an ungrouped format in Table 14 and Figure 8. Table 14 provides trip length frequency distribution information from 1-40 miles, which represents 96 percent of all of the trips.

**Table 13. Trip Length Frequency Distribution by Vehicle Classification for Inter-Zonal Trips.**

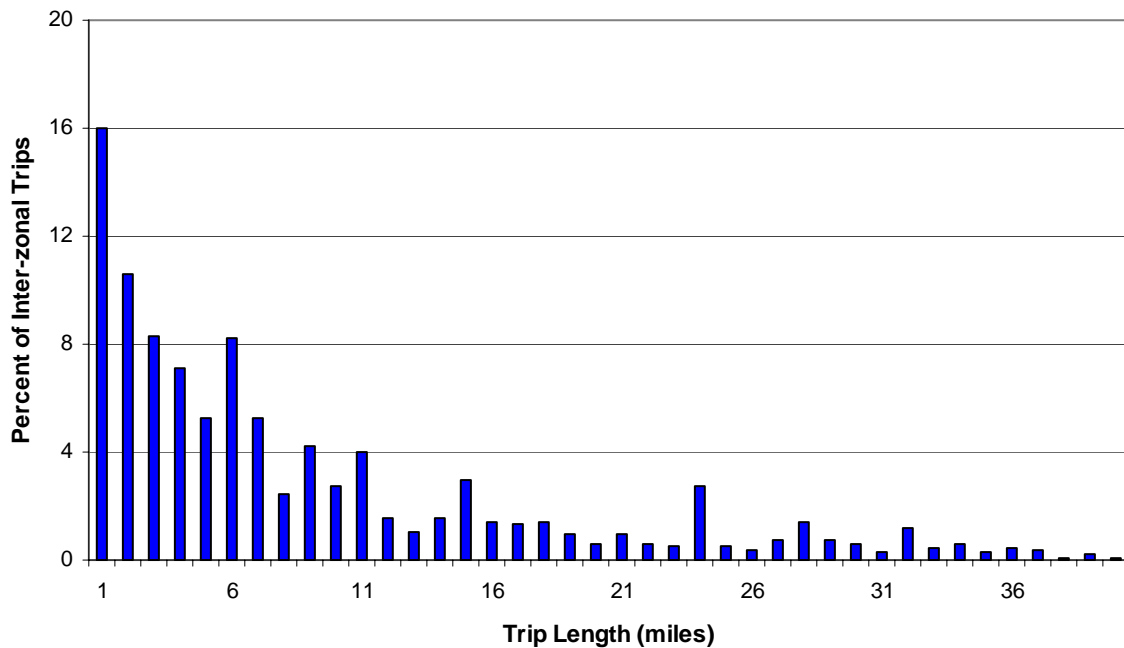
| Trip Length (Miles) | Small-Medium Vehicles |                  | Large Vehicles     |                  | Total        |
|---------------------|-----------------------|------------------|--------------------|------------------|--------------|
|                     | Number of Vehicles    | Percent of Total | Number of Vehicles | Percent of Total |              |
| 0-5                 | 888                   | 46.32            | 468                | 43.62            | 1,356        |
| 6-10                | 489                   | 25.51            | 167                | 15.56            | 656          |
| 11-15               | 253                   | 13.20            | 63                 | 5.87             | 316          |
| 16-20               | 119                   | 6.21             | 44                 | 4.10             | 163          |
| 21-25               | 54                    | 2.82             | 97                 | 9.04             | 151          |
| 26-30               | 55                    | 2.87             | 56                 | 5.22             | 111          |
| 31-35               | 33                    | 1.72             | 49                 | 4.57             | 82           |
| 36-40               | 3                     | 0.16             | 31                 | 2.89             | 34           |
| 41-45               | 8                     | 0.42             | 31                 | 2.89             | 39           |
| 46-50               | 4                     | 0.21             | 5                  | 0.47             | 9            |
| 51-55               | 5                     | 0.26             | 7                  | 0.65             | 12           |
| 56-60               | 3                     | 0.16             | 5                  | 0.47             | 8            |
| >60                 | 3                     | 0.16             | 50                 | 4.66             | 53           |
| <b>Total</b>        | <b>1,917</b>          | <b>100.00</b>    | <b>1,073</b>       | <b>100.00</b>    | <b>2,990</b> |

**Table 14. Ungrouped Trip Length Frequency Distribution for Inter-Zonal Trips.**

| Trip Length (Miles) | Number of Trips | Percent of Trips |
|---------------------|-----------------|------------------|
| 1                   | 460             | 16.03            |
| 2                   | 304             | 10.60            |
| 3                   | 239             | 8.33             |
| 4                   | 203             | 7.08             |
| 5                   | 150             | 5.23             |
| 6                   | 236             | 8.23             |
| 7                   | 150             | 5.23             |
| 8                   | 71              | 2.47             |
| 9                   | 121             | 4.22             |
| 10                  | 78              | 2.72             |
| 11                  | 114             | 3.97             |
| 12                  | 44              | 1.53             |
| 13                  | 30              | 1.05             |
| 14                  | 44              | 1.53             |
| 15                  | 84              | 2.93             |
| 16                  | 40              | 1.39             |
| 17                  | 39              | 1.36             |
| 18                  | 40              | 1.39             |
| 19                  | 28              | 0.98             |
| 20                  | 16              | 0.56             |

| Trip Length (Miles) | Number of Trips | Percent of Trips |
|---------------------|-----------------|------------------|
| 21                  | 27              | 0.94             |
| 22                  | 16              | 0.56             |
| 23                  | 15              | 0.52             |
| 24                  | 79              | 2.75             |
| 25                  | 14              | 0.49             |
| 26                  | 11              | 0.38             |
| 27                  | 22              | 0.77             |
| 28                  | 40              | 1.39             |
| 29                  | 21              | 0.73             |
| 30                  | 17              | 0.59             |
| 31                  | 9               | 0.31             |
| 32                  | 33              | 1.15             |
| 33                  | 13              | 0.45             |
| 34                  | 18              | 0.63             |
| 35                  | 9               | 0.31             |
| 36                  | 12              | 0.42             |
| 37                  | 10              | 0.35             |
| 38                  | 3               | 0.10             |
| 39                  | 6               | 0.21             |
| 40                  | 3               | 0.10             |
| <b>Total</b>        | <b>2,869</b>    | <b>100.00</b>    |

\*Trips longer than 40 miles not shown in the table.



**Figure 8. Ungrouped Trip Length Frequency Distribution for Inter-zonal Trips.**

Mean trip lengths for internal trips by land use type at the destination are presented in Table 15. The table also provides the mean trip lengths by vehicle classification. Internal (local) trip lengths are relatively small, and in The Rio Grande Valley area the overall average was 11.29 miles. The averages ranged from 4.42 miles for the educational land use to 15.56 miles for construction site land use. The shortest and longest mean trip length for land use types was more varied when the data were disaggregated by vehicle classification. For example, in the large vehicle classification, the shortest mean trip length was for the educational land use type (3.38 miles) and the longest mean trip length was 26.82 miles for the construction site category.

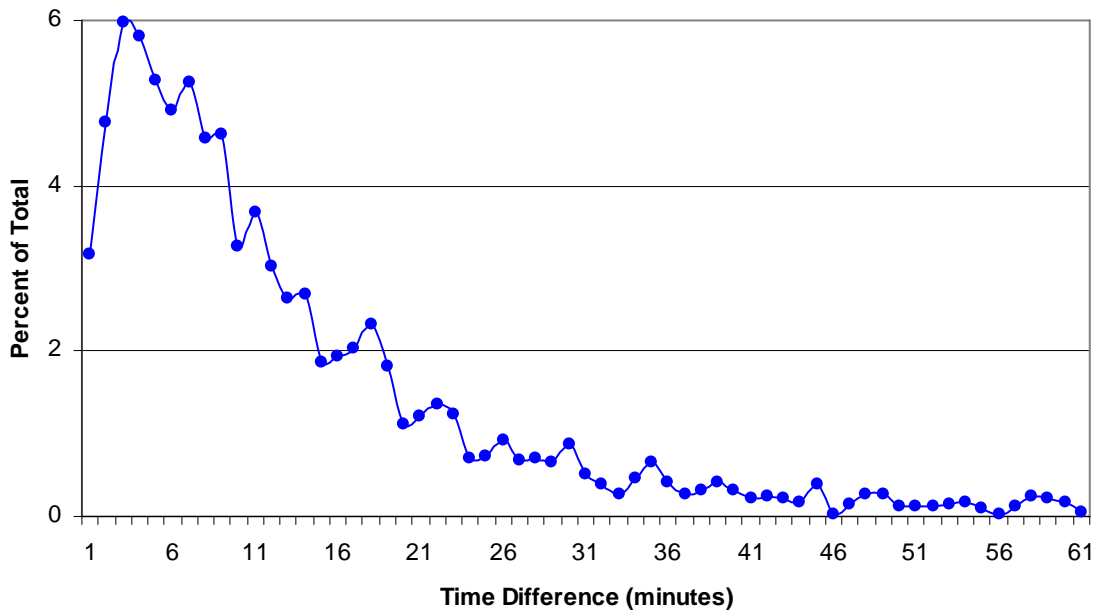
**Table 15. Mean Trip Length for Inter-Zonal Trips.**

| Land Use Type       | Overall Mean Trip Length (Miles) | Mean Trip Length (miles) |                |
|---------------------|----------------------------------|--------------------------|----------------|
|                     |                                  | Small-Medium Vehicles    | Large Vehicles |
| Office Building     | 11.69                            | 15.75                    | 9.46           |
| Retail              | 8.18                             | 8.89                     | 7.72           |
| Industrial          | 13.65                            | 10.93                    | 16.92          |
| Medical             | 6.58                             | 6.18                     | 6.73           |
| Educational         | 4.42                             | 6.48                     | 3.38           |
| Government          | 10.10                            | 7.77                     | 20.49          |
| Residential         | 9.55                             | 9.43                     | 10.53          |
| Airport             | 9.33                             | 9.33                     | —              |
| Intermodal Facility | 11.33                            | —                        | 11.33          |
| Warehouse           | 9.65                             | 10.33                    | 8.56           |
| Distribution Center | 14.29                            | 9.74                     | 17.83          |
| Construction Site   | 15.56                            | 10.09                    | 26.82          |
| Other               | 13.10                            | 10.64                    | 18.91          |
| <b>Average</b>      | <b>11.29</b>                     | <b>8.94</b>              | <b>15.48</b>   |

### Survey Travel Time and Speed Characteristics

Survey respondents were also asked to provide arrival and departure times for each logged trip on the survey day. Since external and intra-zonal travel time data is not provided in network travel time and distance matrices, reported travel times can provide information useful in estimating travel times for these types of trips. Additionally, reported travel times for inter-zonal trips can be compared to travel times provided in network travel time and distance matrices.

Historically, reported travel time data in many surveys has been found to be illogical and inaccurate. For instance, trips are often reported to arrive at the next location before it left the previous location. Additionally, it has been observed that the time information provided for arrivals and departures was often rounded off. The times typically were rounded off to either 15 or 30 minute increments. A comparative analysis of reported and network travel times was performed and the results are provided in Figure 9. Approximately half (51 percent) of the reported trips had a time difference (i.e. difference between the reported travel time and the network travel time matrix) of less than 10 minutes. One quarter (25 percent) of the trips had a time difference of less than 4 minutes.

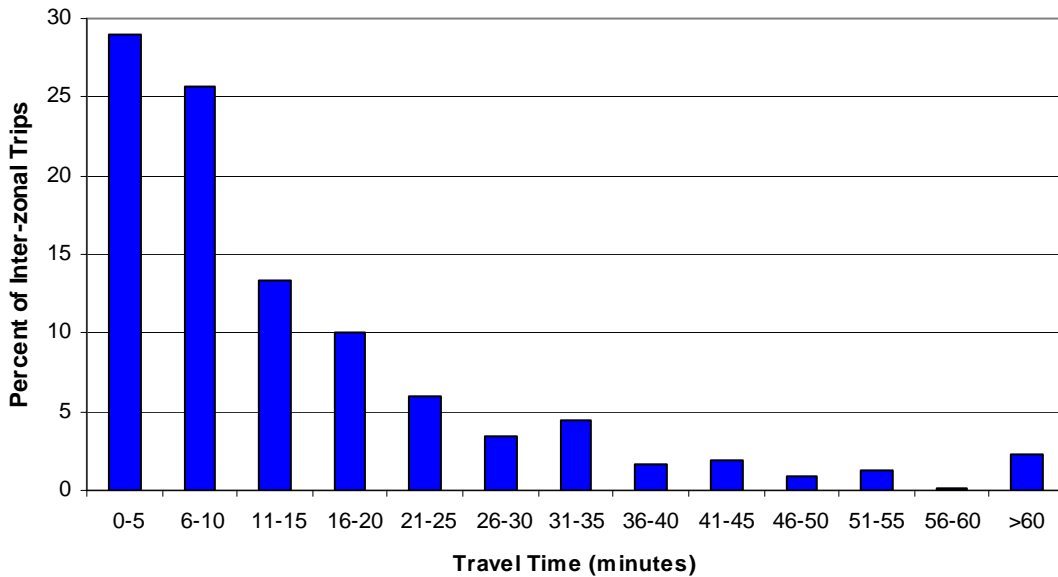


**Figure 9. Difference Between Reported and Network Travel Times.**

As with previous commercial vehicle survey analyses, reported travel time information was not utilized in the analysis of travel time characteristics. All travel time results are for inter-zonal trips and are based on network travel time matrices. The results of this analysis are provided in Table 16 and Figure 10. The most prevalent time interval was less than 5 minutes. Over one-quarter of the trips (29 percent) fell into this range. Over half of the trips (55 percent) were less than ten minutes. Only 13 percent of the trips were longer than thirty minutes.

**Table 16. Travel Time Frequency Distribution for Inter-zonal Trips (Grouped Intervals).**

| Travel Time (Minutes) | Number of Trips | Percent of Trips |
|-----------------------|-----------------|------------------|
| 0-5                   | 868             | 29.03            |
| 6-10                  | 768             | 25.69            |
| 11-15                 | 400             | 13.38            |
| 16-20                 | 299             | 10.00            |
| 21-25                 | 177             | 5.92             |
| 26-30                 | 104             | 3.48             |
| 31-35                 | 133             | 4.45             |
| 36-40                 | 49              | 1.64             |
| 41-45                 | 57              | 1.91             |
| 46-50                 | 26              | 0.87             |
| 51-55                 | 39              | 1.30             |
| 56-60                 | 3               | 0.10             |
| >60                   | 67              | 2.24             |
| <b>Total</b>          | <b>2,990</b>    | <b>100.00</b>    |



**Figure 10. Travel Time Frequency Distribution for Inter-Zonal Trips (Grouped Intervals).**



In order to provide a more detailed analysis, Table 17 provides the grouped interval travel time frequency distribution by vehicle classification. Additionally, travel time frequency distribution information is also provided in an ungrouped format in Table 18 and Figure 11. Table 18 provides trip length frequency distribution information from 1-40 minutes, which represents 94 percent of all of the trips.

**Table 17. Travel Time Frequency Distribution by Vehicle Classification for Inter-Zonal Trips.**

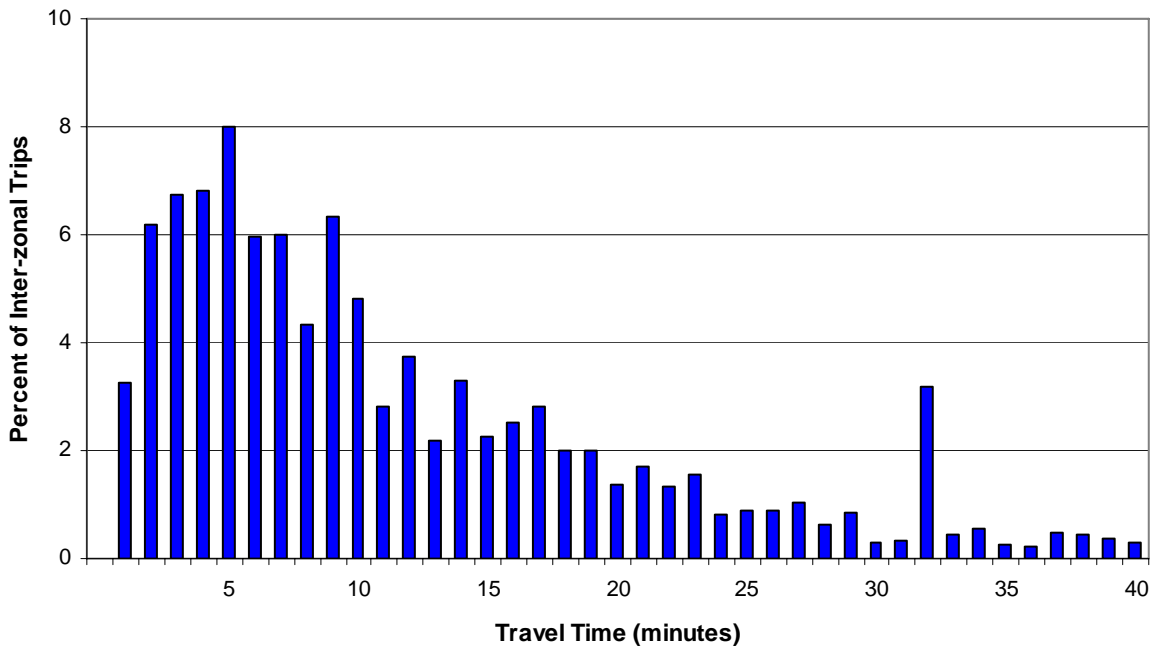
| Travel Time (Minutes) | Small-Medium Vehicles |                  | Large Vehicles     |                  | Total        |
|-----------------------|-----------------------|------------------|--------------------|------------------|--------------|
|                       | Number of Vehicles    | Percent of Total | Number of Vehicles | Percent of Total |              |
| 0-5                   | 596                   | 31.09            | 272                | 25.35            | 868          |
| 6-10                  | 514                   | 26.81            | 254                | 23.67            | 768          |
| 11-15                 | 288                   | 15.02            | 112                | 10.44            | 400          |
| 16-20                 | 228                   | 11.89            | 71                 | 6.62             | 299          |
| 21-25                 | 136                   | 7.09             | 41                 | 3.82             | 177          |
| 26-30                 | 61                    | 3.18             | 43                 | 4.01             | 104          |
| 31-35                 | 27                    | 1.41             | 106                | 9.88             | 133          |
| 36-40                 | 13                    | 0.68             | 36                 | 3.36             | 49           |
| 41-45                 | 25                    | 1.30             | 32                 | 2.98             | 57           |
| 46-50                 | 11                    | 0.57             | 15                 | 1.40             | 26           |
| 51-55                 | 8                     | 0.42             | 31                 | 2.89             | 39           |
| 56-60                 | 2                     | 0.10             | 1                  | 0.09             | 3            |
| >60                   | 8                     | 0.42             | 59                 | 5.50             | 67           |
| <b>Total</b>          | <b>1,917</b>          | <b>100.00</b>    | <b>1,073</b>       | <b>100.00</b>    | <b>2,990</b> |

**Table 18. Ungrouped Travel Time Frequency Distribution for Inter-Zonal Trips.**

| Travel Time (Minutes) | Number of Trips | Percent of Trips |
|-----------------------|-----------------|------------------|
| 1                     | 91              | 3.25             |
| 2                     | 173             | 6.18             |
| 3                     | 189             | 6.75             |
| 4                     | 191             | 6.83             |
| 5                     | 224             | 8.01             |
| 6                     | 167             | 5.97             |
| 7                     | 168             | 6.00             |
| 8                     | 121             | 4.32             |
| 9                     | 177             | 6.33             |
| 10                    | 135             | 4.82             |
| 11                    | 79              | 2.82             |
| 12                    | 105             | 3.75             |
| 13                    | 61              | 2.18             |
| 14                    | 92              | 3.29             |
| 15                    | 63              | 2.25             |
| 16                    | 70              | 2.50             |
| 17                    | 79              | 2.82             |
| 18                    | 56              | 2.00             |
| 19                    | 56              | 2.00             |
| 20                    | 38              | 1.36             |
|                       |                 |                  |

| Travel Time (Minutes) | Number of Trips | Percent of Trips |
|-----------------------|-----------------|------------------|
| 21                    | 48              | 1.72             |
| 22                    | 37              | 1.32             |
| 23                    | 44              | 1.57             |
| 24                    | 23              | 0.82             |
| 25                    | 25              | 0.89             |
| 26                    | 25              | 0.89             |
| 27                    | 29              | 1.04             |
| 28                    | 18              | 0.64             |
| 29                    | 24              | 0.86             |
| 30                    | 8               | 0.29             |
| 31                    | 9               | 0.32             |
| 32                    | 89              | 3.18             |
| 33                    | 12              | 0.43             |
| 34                    | 16              | 0.57             |
| 35                    | 7               | 0.25             |
| 36                    | 6               | 0.21             |
| 37                    | 13              | 0.46             |
| 38                    | 12              | 0.43             |
| 39                    | 10              | 0.36             |
| 40                    | 8               | 0.29             |
| <b>Total</b>          | <b>2,798</b>    | <b>100.00</b>    |

\*Trips longer than 40 minutes are not shown in the table.



**Figure 11. Ungrouped Travel Time Frequency Distribution for Inter-Zonal Trips.**

Mean travel times for local trips by land use type at the destination are provided in Table 19. The overall mean travel time for The Valley area was 14.94 minutes. The shortest mean travel time was for educational land use types (6.69 minutes) and the longest was 20.2 minutes for construction site land use types. The table also provides the mean travel times by vehicle classification.

**Table 19. Mean Travel Times for Inter-Zonal Trips.**

| Land Use Type       | Overall Mean Travel Time (minutes) | Mean Travel Time (Minutes) |                |
|---------------------|------------------------------------|----------------------------|----------------|
|                     |                                    | Small-Medium Vehicles      | Large Vehicles |
| Office Building     | 14.56                              | 18.36                      | 12.47          |
| Retail              | 11.41                              | 12.23                      | 10.87          |
| Industrial          | 17.41                              | 14.30                      | 21.15          |
| Medical             | 10.40                              | 10.92                      | 10.20          |
| Educational         | 6.69                               | 9.64                       | 5.37           |
| Government          | 13.96                              | 11.62                      | 24.42          |
| Residential         | 13.29                              | 13.15                      | 14.34          |
| Airport             | 12.36                              | 12.36                      | —              |
| Intermodal Facility | 13.59                              | —                          | 13.59          |
| Warehouse           | 12.88                              | 13.98                      | 11.14          |
| Distribution Center | 17.90                              | 12.92                      | 21.79          |
| Construction Site   | 20.20                              | 13.75                      | 33.47          |
| Other               | 17.18                              | 14.35                      | 23.86          |
| <b>Average</b>      | <b>14.94</b>                       | <b>12.30</b>               | <b>19.65</b>   |

In The Rio Grande Valley, the overall mean travel time was 14.94 minutes and the overall average speed for local trips was 39.50 miles per hour. Mean travel speeds for local trips by land use at the destination are provided in Table 20. The table also provides the travel speeds for each land use type by vehicle classification. Medical land use types had the lowest average travel speed (34.88 mph) and airport land use types had the highest average travel speed (45.33 mph).

**Table 20. Mean Travel Speed for Inter-Zonal Trips.**

| Land Use Type       | Overall Mean Speed<br>(miles per hour) | Mean Speed (mph)         |                   |
|---------------------|--|--------------------------|-------------------|
|                     |  | Small-Medium<br>Vehicles | Large<br>Vehicles |
| Office Building     | 41.49                                  | 44.62                    | 39.78             |
| Retail              | 36.35                                  | 37.86                    | 35.37             |
| Industrial          | 42.48                                  | 43.44                    | 41.32             |
| Medical             | 34.88                                  | 33.95                    | 35.23             |
| Educational         | 35.26                                  | 36.71                    | 33.85             |
| Government          | 36.91                                  | 35.24                    | 44.38             |
| Residential         | 39.20                                  | 39.19                    | 39.25             |
| Airport             | 45.33                                  | 45.33                    | —                 |
| Intermodal Facility | 43.71                                  | —                        | 43.71             |
| Warehouse           | 38.97                                  | 39.30                    | 38.46             |
| Distribution Center | 41.11                                  | 38.30                    | 43.31             |
| Construction Site   | 42.55                                  | 41.00                    | 45.76             |
| Other               | 41.41                                  | 39.50                    | 45.93             |
| <b>Average</b>      | <b>39.50</b>                           | <b>38.69</b>             | <b>40.94</b>      |

Given the geographic size of the study area, mean trip length, travel time, and speed values seem reasonable. However, until better methods are available to provide more accurate reported odometer readings and arrival and departure times, there is a limited ability to compare the difference between observed values and transportation network travel time and distance matrices. Additionally, external and intra-zonal trip lengths and travel times can not be determined.

### **Trip Tour Characteristics**

In an effort to ascertain the amount of circuitous travel performed by commercial vehicles, analyses of trip tours were conducted. A trip tour is defined as a combination (or chaining) of trips where a surveyed vehicle leaves and returns to a common point, typically the vehicle’s base location. In order to accurately analyze trip tour information, external trips had to be added back into the analysis. As a result, there are a total of 3,398 trips recorded. This was done since it is possible for trip tours to begin within the study area, travel outside of the study area, and return

back during the one-day survey period. Therefore, to exclude external trip data would significantly reduce the accuracy of trip tour analyses.

For each trip recorded, information was provided on whether or not the trip origin location was the vehicle’s base location. This served as the basis for determining if the trip was a base trip or non-base trip. For a trip to be a base trip, either the origin or destination of the trip had to be at the base location. If neither trip end was at the base location, then the trip was a non-base trip. In The Valley, there were a total of 1,605 base trips (47 percent) and 1,793 non-base trips (53 percent). Table 21 provides a breakdown of base and non-base trip by vehicle classification.

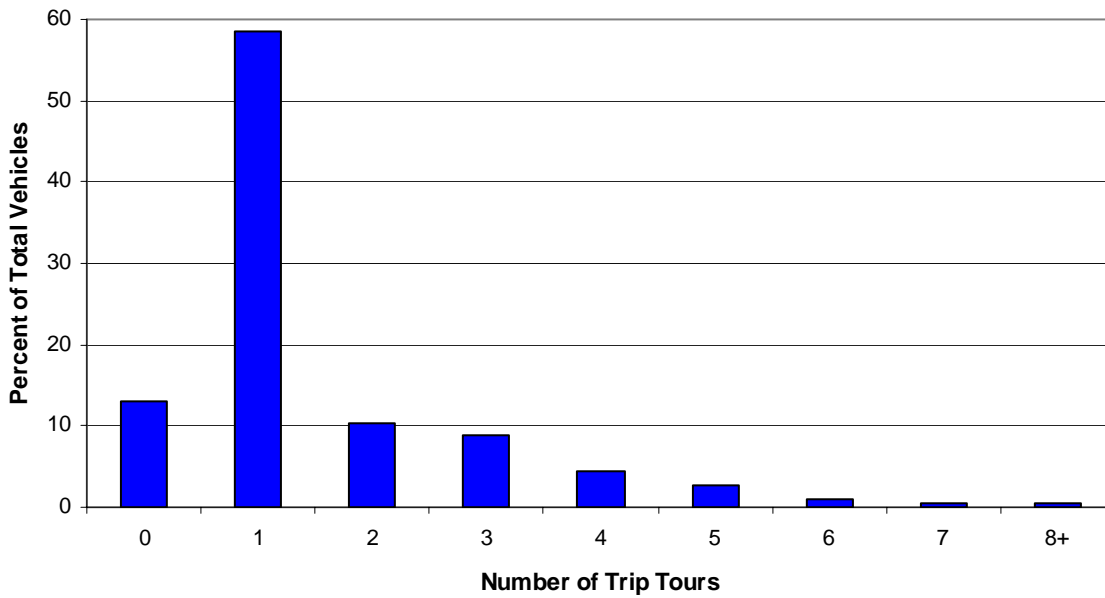
**Table 21. Base vs. Non-Base Trips by Functional Classification.**

| Trip Type    | Small-Medium Vehicles |                  | Large Vehicles  |                  | Total        |
|--------------|-----------------------|------------------|-----------------|------------------|--------------|
|              | Number of Trips       | Percent of Total | Number of Trips | Percent of Total |              |
| Base         | 1,199                 | 57.15            | 406             | 31.23            | 1,605        |
| Non-Base     | 899                   | 42.85            | 894             | 68.77            | 1,793        |
| <b>Total</b> | <b>2,098</b>          | <b>100.00</b>    | <b>1,300</b>    | <b>100.00</b>    | <b>3,398</b> |

The sequence of trips provided by survey respondents was analyzed in order to determine the total number of trip tours that were made on the survey day as well as ascertain the number and type of trips made during each respective trip tour. The 510 commercial vehicles included in the analysis reported making 774 trip tours. A breakdown of the number and percent of tours performed per vehicle is provided in Table 22 and in Figure 12. A detailed breakdown by vehicle classification is provided in Table 23. The majority of the vehicles (59 percent) made only one trip tour on the survey day. The overwhelming majority of vehicles (91 percent) made three or less trip tours on the survey day. Sixty-seven vehicles (13 percent) reported making no trip tours, and the most tours made in one day was fourteen. The average number of tours per vehicle was 1.52. As previously mentioned, there were 67 instances where a vehicle reported making no trip tours. Reasons for this could include a trip path that involved traveling out of the study area and not returning until the next day, or instances when the vehicle operator took the vehicle to the person’s residence at the end of the day.

**Table 22. Number and Percent of Trips Tours per Vehicle.**

| Number of Trip Tours | Number of Vehicles | Percent of Total | Cumulative Number | Cumulative Percent | Total Number of tours |
|----------------------|--------------------|------------------|-------------------|--------------------|-----------------------|
| 0                    | 67                 | 13.14            | 67                | 13.14              | 0                     |
| 1                    | 299                | 58.63            | 366               | 71.76              | 299                   |
| 2                    | 53                 | 10.39            | 419               | 82.16              | 106                   |
| 3                    | 45                 | 8.82             | 464               | 90.98              | 135                   |
| 4                    | 22                 | 4.31             | 486               | 95.29              | 88                    |
| 5                    | 14                 | 2.75             | 500               | 98.04              | 70                    |
| 6                    | 5                  | 0.98             | 505               | 99.02              | 30                    |
| 7                    | 2                  | 0.39             | 507               | 99.41              | 14                    |
| 8+                   | 3                  | 0.59             | 510               | 100.00             | 32                    |
| <b>Total</b>         | <b>510</b>         | <b>100.00</b>    |                   |                    | <b>774</b>            |



**Figure 12. Number and Percent of Trip Tours per Vehicle.**

**Table 23. Number and Percent of Trips Tours per Vehicle by Vehicle Classification.**

| Number of Trip Tours | Small-Medium Vehicles |                  | Large Vehicles     |                  | Total      |
|----------------------|-----------------------|------------------|--------------------|------------------|------------|
|                      | Number of Vehicles    | Percent of Total | Number of Vehicles | Percent of Total |            |
| 0                    | 17                    | 5.25             | 50                 | 26.88            | 67         |
| 1                    | 186                   | 57.41            | 113                | 60.75            | 299        |
| 2                    | 42                    | 12.96            | 11                 | 5.91             | 53         |
| 3                    | 37                    | 11.42            | 8                  | 4.30             | 45         |
| 4                    | 19                    | 5.86             | 3                  | 1.61             | 22         |
| 5                    | 14                    | 4.32             | 0                  | 0.00             | 14         |
| 6                    | 5                     | 1.54             | 0                  | 0.00             | 5          |
| 7                    | 2                     | 0.62             | 0                  | 0.00             | 2          |
| 8+                   | 2                     | 0.62             | 1                  | 0.54             | 3          |
| <b>Total</b>         | <b>324</b>            | <b>100.00</b>    | <b>186</b>         | <b>100.00</b>    | <b>510</b> |

Knowing the number of trip tours that were made is useful, but it does not reveal the total amount and type of travel that occurred during the course of the tour. Therefore, the analysis also ascertained the number and type of trips that were made in the trip tours. The review of trip tour data was divided into three components; the number of non-base trips within trip tours, the number of external trips within trip tours, and the number of internal trips within trip tours. The analysis provides the frequency that a particular vehicle made a specific number of trip types (i.e. non-base, external, and internal). In Table 24, the number of non-base trips that occurred within trip tours is provided. As shown in the table, all of the trip tours had two non-base trips. The number of non-base trips within trip tours by vehicle classification is provided in Table 25.

**Table 24. Number and Percent of Non-Base Trips Within Trip Tours.**

| Number of Trips | Frequency  | Percent of Total | Cumulative Number | Cumulative Percent |
|-----------------|------------|------------------|-------------------|--------------------|
| 0               | 0          | 0.00             | 0                 | 0.00               |
| 1               | 0          | 0.00             | 0                 | 0.00               |
| 2               | 766        | 100.00           | 766               | 100.00             |
| <b>Total</b>    | <b>766</b> | <b>100.00</b>    |                   |                    |



As previously mentioned, there were a total of 774 trip tours reported. However, 8 of those tours had an origin and destination listed as the base (i.e. same location). The analysis assumes that the vehicle did make a trip tour and the survey respondent omitted a trip in the tour. As a result, there is no way to determine the number and type of trip that was omitted, so the tables containing this information will show there being only 766 trip tours.

**Table 25. Number and Percent of Non-Base Trips Within Trip Tours by Vehicle Classification.**

| Number of Trips | Small-Medium Vehicles |                  | Large Vehicles |                  | Total      |
|-----------------|-----------------------|------------------|----------------|------------------|------------|
|                 | Frequency             | Percent of Total | Frequency      | Percent of Total |            |
| 0               | 0                     | 0.00             | 0              | 0.00             | 0          |
| 1               | 0                     | 0.00             | 0              | 0.00             | 0          |
| 2               | 588                   | 100.00           | 178            | 100.00           | 766        |
| <b>Total</b>    | <b>588</b>            | <b>100.00</b>    | <b>178</b>     | <b>100.00</b>    | <b>766</b> |

The number and percent of external trips within trip tours is provided in Table 26, while Table 27 provides the information by vehicle classification. The overwhelming majority of the trip tours (94 percent) did not have any external trips. Two external trips within a tour was the second most common occurrence (5 percent). This is logical since each trip leaving the study area needs to have a trip returning to the study area in order to make a completed tour possible. However, there was one trip tour that recorded only one external trip. This appears to be an illogical event.

**Table 26. Number and Percent of External Trips Within Trip Tours.**

| Number of Trips | Frequency  | Percent of Total | Cumulative Number | Cumulative Percent |
|-----------------|------------|------------------|-------------------|--------------------|
| 0               | 717        | 93.60            | 717               | 93.60              |
| 1               | 1          | 0.13             | 718               | 93.73              |
| 2               | 38         | 4.96             | 756               | 98.69              |
| 3               | 3          | 0.39             | 759               | 99.09              |
| 4               | 2          | 0.26             | 761               | 99.35              |
| 5               | 3          | 0.39             | 764               | 99.74              |
| 6               | 1          | 0.13             | 765               | 99.87              |
| 7               | 1          | 0.13             | 766               | 100.00             |
| <b>Total</b>    | <b>766</b> | <b>100.00</b>    |                   |                    |

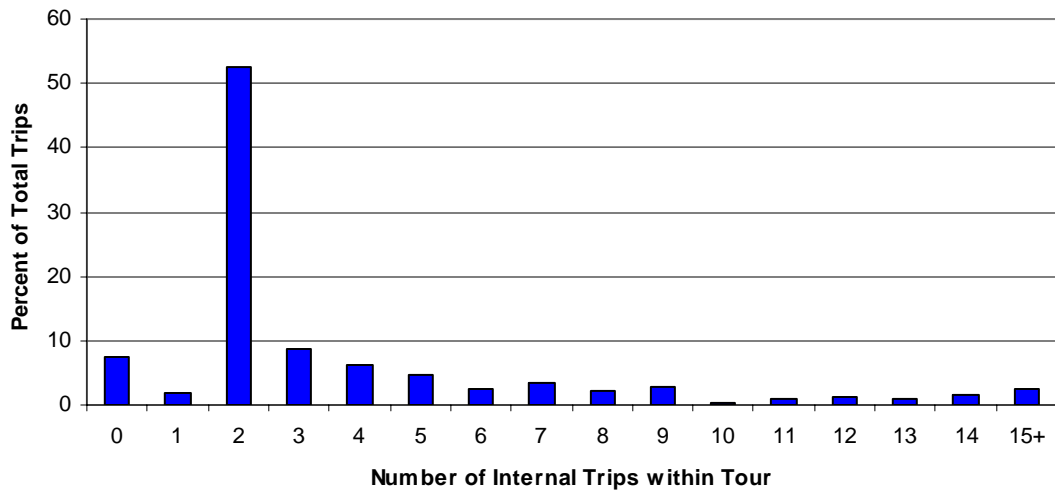
**Table 27. Number and Percent of External Trips Within Trip Tours by Vehicle Classification.**

| Number of Trips | Small-Medium Vehicles |                  | Large Vehicles |                  | Total      |
|-----------------|-----------------------|------------------|----------------|------------------|------------|
|                 | Frequency             | Percent of Total | Frequency      | Percent of Total |            |
| 0               | 567                   | 96.43            | 150            | 84.27            | 717        |
| 1               | 0                     | 0.00             | 1              | 0.56             | 1          |
| 2               | 18                    | 3.06             | 20             | 11.24            | 38         |
| 3               | 1                     | 0.17             | 2              | 1.12             | 3          |
| 4               | 1                     | 0.17             | 1              | 0.56             | 2          |
| 5               | 1                     | 0.17             | 2              | 1.12             | 3          |
| 6               | 0                     | 0.00             | 1              | 0.56             | 1          |
| 7               | 0                     | 0.00             | 1              | 0.56             | 1          |
| <b>Total</b>    | <b>588</b>            | <b>100.00</b>    | <b>178</b>     | <b>100.00</b>    | <b>766</b> |

The number and percent of internal trips within trip tours is provided in Table 28 and Figure 13. The largest percentage of trip tours (52 percent) had two internal trips. Three internal trips within a tour was the second most common occurrence (9 percent). Approximately three-quarters (77 percent) of the trip tours had four or less internal trips within their respective trip tours. Sixty of the trip tours (8 percent) had ten or more internal trips. Three trip tours reported making 21 internal trips and one trip tour reported making 22 internal trips.

**Table 28. Number and Percent of Internal Trips Within Trip Tours.**

| Number of Trips | Frequency  | Percent of Total | Cumulative Number | Cumulative Percent |
|-----------------|------------|------------------|-------------------|--------------------|
| 0               | 58         | 7.57             | 58                | 7.57               |
| 1               | 14         | 1.83             | 72                | 9.40               |
| 2               | 402        | 52.48            | 474               | 61.88              |
| 3               | 66         | 8.62             | 540               | 70.50              |
| 4               | 47         | 6.14             | 587               | 76.63              |
| 5               | 36         | 4.70             | 623               | 81.33              |
| 6               | 18         | 2.35             | 641               | 83.68              |
| 7               | 26         | 3.39             | 667               | 87.08              |
| 8               | 17         | 2.22             | 684               | 89.30              |
| 9               | 22         | 2.87             | 706               | 92.17              |
| 10              | 3          | 0.39             | 709               | 92.56              |
| 11              | 8          | 1.04             | 717               | 93.60              |
| 12              | 9          | 1.17             | 726               | 94.78              |
| 13              | 7          | 0.91             | 733               | 95.69              |
| 14              | 13         | 1.70             | 746               | 97.39              |
| 15+             | 20         | 2.61             | 766               | 100.00             |
| <b>Total</b>    | <b>766</b> | <b>100.00</b>    |                   |                    |

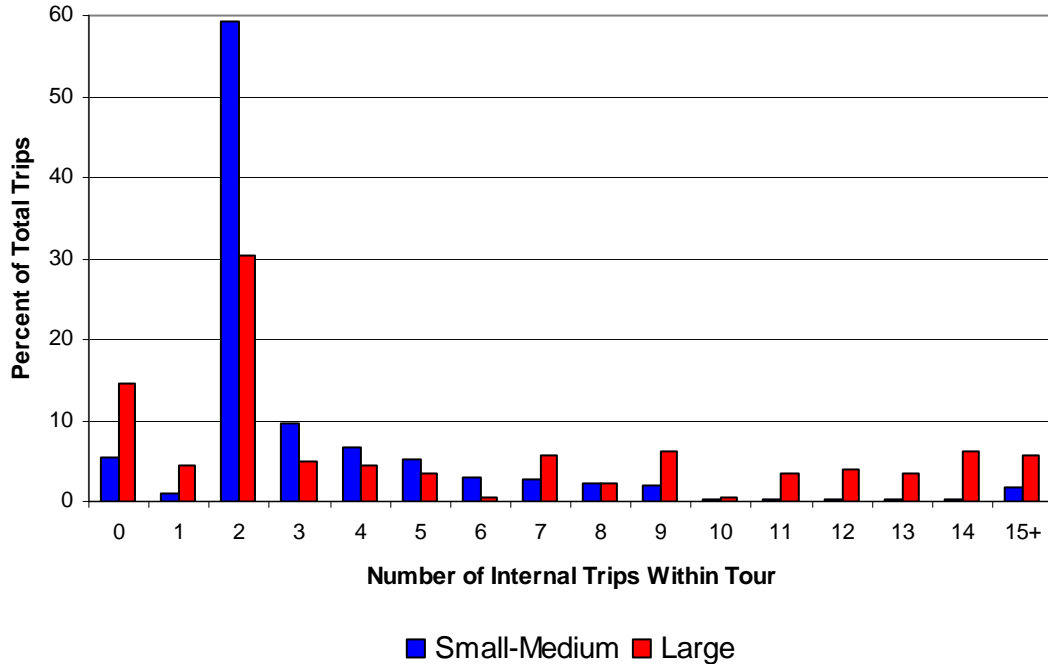


**Figure 13. Internal Trips within Tours.**

The number and percent of internal trips within trip tours are disaggregated by vehicle classification and are provided in Table 29 and Figure 14.

**Table 29. Number and Percent of Internal Trips Within Trip Tours by Vehicle Classification.**

| Number of Trips | Small-Medium Vehicles |                  | Large Vehicles |                  | Total      |
|-----------------|-----------------------|------------------|----------------|------------------|------------|
|                 | Frequency             | Percent of Total | Frequency      | Percent of Total |            |
| 0               | 32                    | 5.44             | 26             | 14.61            | 58         |
| 1               | 6                     | 1.02             | 8              | 4.49             | 14         |
| 2               | 348                   | 59.18            | 54             | 30.34            | 402        |
| 3               | 57                    | 9.69             | 9              | 5.06             | 66         |
| 4               | 39                    | 6.63             | 8              | 4.49             | 47         |
| 5               | 30                    | 5.10             | 6              | 3.37             | 36         |
| 6               | 17                    | 2.89             | 1              | 0.56             | 18         |
| 7               | 16                    | 2.72             | 10             | 5.62             | 26         |
| 8               | 13                    | 2.21             | 4              | 2.25             | 17         |
| 9               | 11                    | 1.87             | 11             | 6.18             | 22         |
| 10              | 2                     | 0.34             | 1              | 0.56             | 3          |
| 11              | 2                     | 0.34             | 6              | 3.37             | 8          |
| 12              | 2                     | 0.34             | 7              | 3.93             | 9          |
| 13              | 1                     | 0.17             | 6              | 3.37             | 7          |
| 14              | 2                     | 0.34             | 11             | 6.18             | 13         |
| 15+             | 10                    | 1.70             | 10             | 5.62             | 20         |
| <b>Total</b>    | <b>588</b>            | <b>100.00</b>    | <b>178</b>     | <b>100.00</b>    | <b>766</b> |



**Figure 14. Number and Percent of Internal Trips Within Trip Tours by Vehicle Classification.**

### SURVEY EXPANSION

Expansion of the commercial vehicle survey data was performed in an indirect manner. Typically, an estimate of the population being sampled is known and the survey data are expanded to represent that population. However, the population of commercial vehicles operating in the Valley area is unknown. Vehicle registration was not considered a viable basis for estimation purposes since vehicles registered in counties outside of The Valley may be operating within the study area.

The methodology utilized for expanding the survey data was vehicle miles of travel estimates from the Highway Performance Monitoring System (HPMS) combined with vehicle classification counts by functional classification. Essentially, an estimate of the commercial vehicle miles of travel is developed from the HPMS data and is then used to expand the vehicle miles of travel observed from sampled commercial vehicles.

HPMS data contains annual average daily traffic (AADT) estimates of the total vehicle miles of travel by functionally classified facilities. Since AADT includes weekend traffic, a correction factor was applied to the data in order to obtain average week day volumes by functional classification (freeway, arterial, collector, and local). As part of an external station motorist intercept survey, 24-hour vehicle classification counts were performed throughout the Rio Grande Valley area. Vehicle classification data were collected at 336 randomly selected locations within the study area. This data provided an estimate of the percentage of vehicles operating on each of the four functionally classified facilities being used in the analysis. Table 30 provides the percent of commercial and non-commercial vehicles by functional classification as determined with the vehicle classification counts performed in 2004.

**Table 30. Vehicle Classification Counts by Functional Classification.**

| <b>Functional Classification</b> | <b>Percentage of Commercial Vehicles</b> | <b>Percentage of Non-Commercial Vehicles</b> |
|----------------------------------|--|--|
| Freeway                          | 11.92                                    | 88.08  |
| Arterial                         | 6.02                                     | 93.98  |
| Collector                        | 4.02                                     | 95.98  |
| Local                            | 2.06                                     | 97.94  |

An assumption is made that the amount of travel on each facility by functional classification is equivalent to the percentage of vehicles counted on that facility. For example, since 6.02 percent of the vehicles counted on arterials were commercial vehicles, it is assumed that 6.02 percent of the vehicle miles of travel on arterials is being made by commercial vehicles. The estimate of commercial vehicle miles of travel within the study area may be developed by multiplying the percentages provided in Table 30 with the 2005 HPMS vehicle miles of travel estimates which are provided in Table 31.

**Table 31. 2005 HPMS Estimates of Week Day Vehicle Miles of Travel.**

| <b>Functional Classification</b> | <b>Week Day Vehicle Miles of Travel</b> |
|----------------------------------|---|
| Freeway                          | 4,460,158                               |
| Arterial                         | 9,214,886                               |
| Collector                        | 4,777,336                               |
| Local                            | 2,057,070                               |
| <b>Total</b>                     | <b>20,509,451</b>                       |

An adjustment must be made to these estimates in order to account for intra-zonal and external travel. The HPMS data includes all vehicle miles of travel. However, data from the commercial vehicle survey approximates vehicle miles of travel based on zone to zone distances as measured from the transportation network travel time and distance matrices used for travel demand modeling. Intra-zonal trips in the survey do not have an estimate of vehicle miles of travel because the travel distance associated with these trips via the transportation network is not known. The amount of vehicle miles of travel associated with intra-zonal commercial vehicle trips is not known, and it is assumed to be a relatively small amount. Therefore, for the purpose of this analysis, the vehicle miles of travel attributed to intra-zonal commercial vehicle trips is not removed from the HPMS totals.

The percentages of commercial vehicles by functional classification provided in Table 30 were then multiplied by the vehicle miles of travel by functional classification. The result is the estimated total week day commercial vehicle miles of travel by functional classification. This information is provided in Table 32.

**Table 32. Estimates of Commercial Vehicle Miles of Travel.**

| Functional Classification | Percentage of Commercial Vehicles | Adjusted Vehicle Miles of Travel | Estimated Commercial Vehicle Miles of Travel |
|---------------------------|-----------------------------------|----------------------------------|--|
| Freeway                   | 11.92                             | 4,460,158                        | 531,651                                      |
| Arterial                  | 6.02                              | 9,214,886                        | 554,736                                      |
| Collector                 | 4.02                              | 4,777,336                        | 192,049                                      |
| Local                     | 2.06                              | 2,057,070                        | 42,376                                       |
| <b>Total</b>              |                                   | <b>20,509,451</b>                | <b>1,320,812</b>                             |

However, vehicle miles of travel attributable to external commercial vehicles was removed in order to provide a more accurate estimate of vehicle miles of travel within the study area. In order to ascertain the estimated vehicle miles of travel for external commercial vehicles, the total vehicle miles of travel as determined from the external travel surveys conducted in the Valley was used. The trip tables developed from the external travel survey estimated that there were 377,256 vehicle miles of travel attributed to external commercial vehicles.

The external related commercial vehicle miles of travel (377,256) was removed to provide the total internal vehicle miles of travel attributable to commercial vehicles. The resulting vehicle miles of travel is 943,556.

The next step is the computation of the survey expansion factor. The commercial vehicle survey had a total of 510 respondents with useable data. There was a total of 3,398 trips recorded, of which 3,190 (94 percent) were internal. Of the internal trips, 2,990 (94 percent) were inter-zonal and 200 (6 percent) were intra-zonal. The amount of commercial vehicle miles of travel for surveyed vehicles was determined by summing the distance between all inter-zonal trip ends. Using lengths provided in the transportation network travel distance matrix, a total of 33,752 vehicle miles were attributed to surveyed commercial vehicles. The resulting average vehicle miles traveled per trip was 11.29 miles. To obtain the survey expansion factor, the population



vehicle miles of travel (943,556) is divided by the survey vehicle miles of travel (33,752). The resulting expansion factor is 27.96.

The expansion factor is then applied to the total number of inter-zonal commercial vehicle trips (2,990) to yield a total of 83,600 daily inter-zonal commercial vehicle trips in the Valley area. The expansion factor is assumed to be reasonable for intra-zonal trips also. With approximately six percent of the trips being intra-zonal, a total of 5,592 commercial trips in the study area are estimated to be intra-zonal. The inter-zonal and intra-zonal trips combined amounts to 89,192. Since the average number of trips per commercial vehicle in the Valley area is 6.25, the resulting average number of commercial vehicles operating within the study area on an average week day is 14,271.

## **SURVEY SUMMARY**

The 2005 Valley Commercial Vehicle Survey for the Valley area provides information relative to the operating characteristics of commercial vehicles. Through the analysis of 510 commercial vehicles that participated in the survey, estimates of the total amount of commercial vehicles operating in the study area were developed. Survey data was combined with HPMS data to estimate that 943,556 vehicle miles of travel can be attributed to commercial vehicles operating internally on a daily basis. Additionally, the expansion of the survey data also provides an estimate of 89,192 internal trips and 14,271 commercial vehicles operating within the Valley area each day.

In addition to providing expanded results related to vehicle miles of travel and number of commercial vehicles operating in the area, the survey provided valuable insight into the composition of the fleet, types of trips being made, and cargo related information. The average vehicle age was 6.3 years and the average reported odometer reading was 281,837. The average number of internal trips per day per truck was 7.25. A majority of the trips (53 percent) were non-base trips, over three-quarters of the vehicles (77 percent) made four or fewer internal trips per day, and 59 percent of the vehicles made only one trip tour on the survey day. Additionally, the average trip length was 11.29 miles and the average travel time per trip was 14.94 minutes.

While the information provided in this analysis summarizes responses from a portion of the commercial vehicles operating within the study area, it is possible to presume that the results can be viewed as representative of the commercial fleet as a whole. However, due to unique characteristics of the Valley area, the survey results are not applicable to other study areas. Each urbanized area needs to have an individual analysis conducted in order to ascertain the amount and characteristics of commercial vehicles in that area.

## **APPENDIX**



**Record Type 20  
COMMERCIAL VEHICLE SURVEY  
PART 1: VEHICLE INFORMATION**

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

Vehicle ID#: \_\_\_\_\_

Vehicle License # : \_\_\_\_\_

Survey Location (zone): \_\_\_\_\_

SIC Code: \_\_\_\_\_

Travel Day: \_\_\_\_\_  
Month / Day

Company or Name of Owner (name on registration):  
\_\_\_\_\_

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

(Street Address or Nearest Intersection)

City \_\_\_\_\_ State \_\_\_\_\_ ZIP \_\_\_\_\_

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

Vehicle Info: Make \_\_\_\_\_; Model: \_\_\_\_\_; Year: \_\_\_\_\_

Vehicle Fuel Type:      1)  Leaded Gas   2)  Unleaded Gas   3)  Diesel   4)  Propane  
5)  Other \_\_\_\_\_(Specify)

Vehicle Classification:

- 1)  Single Unit 2-axle (6 wheels)
- 2)  Single Unit 3-axle (10 wheels)
- 3)  Single Unit 4-axle (14 wheels)
- 4)  Semi (all Tractor-Trailer combinations)
- 5)  Other \_\_\_\_\_

Gross Vehicle Weight: \_\_\_\_\_ pounds

Beginning Odometer Reading: \_\_\_\_\_ Number of Trips Total: \_\_\_\_\_

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

(Example Only)

# COMMERCIAL VEHICLE SURVEY

## PART 2: Travel Log

VEHICLE LICENSE #: \_\_\_\_\_

**THE PLACE MY TRAVEL BEGAN TODAY WAS:**

At Work / Base Location?     - YES     - NO    What Type of Place is This? (See Options Below) \_\_\_\_\_

\_\_\_\_\_  
(Street address or nearest intersection for place travel began)

TRAVEL DATE \_\_\_\_\_

Month / Day

\_\_\_\_\_  
(City, state, zip co)

DEPARTURE TIME: \_\_\_\_\_ am  
pm

When you left the above location was you vehicle:     Fully Loaded     Partially Loaded     Empty  
If loaded, what is the weight of the cargo being transported? \_\_\_\_\_ (pounds/lbs.)

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

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

# COMMERCIAL VEHICLE TRAVEL SURVEY (con't)

VEHICLE LICENSE #: \_\_\_\_\_

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

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

# COMMERCIAL VEHICLE TRAVEL SURVEY (con't)

VEHICLE LICENSE #: \_\_\_\_\_

| RECORD the following information about each place<br><i>NAME of Place:                      Address including city, state, and zip<br/>OR<br/>Nearest street intersection or Landmark</i> |  | What time did you arrive and depart this location?<br><small>(record exact times)</small> | Activity – What are you doing at this location?<br><small>(see options below)</small> | Is this the work / base location for this vehicle?              | What type of place is this?<br><small>(see options below)</small> | Type of Cargo<br><br>What is it? | Cargo Weight<br><br>(in pounds/lbs)        |
|---|--|---|---|---|---|----------------------------------|--|
| PLACE 10<br>PLACE 11<br>PLACE 12<br>PLACE 13<br>PLACE 14<br>PLACE 15  |  | Arrive: _____ am/pm<br>Depart: _____ am/pm  |   | <input type="checkbox"/> - YES<br><input type="checkbox"/> - NO |   |                                  | _____<br>Picked-Up<br>_____<br>Dropped-Off |
|   |  | Arrive: _____ am/pm<br>Depart: _____ am/pm  |   | <input type="checkbox"/> - YES<br><input type="checkbox"/> - NO |   |                                  | _____<br>Picked-Up<br>_____<br>Dropped-Off |
|   |  | Arrive: _____ am/pm<br>Depart: _____ am/pm  |   | <input type="checkbox"/> - YES<br><input type="checkbox"/> - NO |   |                                  | _____<br>Picked-Up<br>_____<br>Dropped-Off |
|   |  | Arrive: _____ am/pm<br>Depart: _____ am/pm  |   | <input type="checkbox"/> - YES<br><input type="checkbox"/> - NO |   |                                  | _____<br>Picked-Up<br>_____<br>Dropped-Off |
|   |  | Arrive: _____ am/pm<br>Depart: _____ am/pm  |   | <input type="checkbox"/> - YES<br><input type="checkbox"/> - NO |   |                                  | _____<br>Picked-Up<br>_____<br>Dropped-Off |
|   |  | Arrive: _____ am/pm<br>Depart: _____ am/pm  |   | <input type="checkbox"/> - YES<br><input type="checkbox"/> - NO |   |                                  | _____<br>Picked-Up<br>_____<br>Dropped-Off |

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



# COMMERCIAL VEHICLE TRAVEL SURVEY (con't)

VEHICLE LICENSE #: \_\_\_\_\_

| PLACE # | RECORD the following information about each place  | What time did you arrive and depart this location? | Activity – What are you doing at this location? | Is this the work / base location for this vehicle?              | What type of place is this? | Type of Cargo | Cargo Weight                               |
|---------|--|--|---|---|-----------------------------|---------------|--|
|         | <i>NAME of Place:                      Address including city, state, and zip<br/>OR<br/>Nearest street intersection or Landmark</i> | (record exact times)                               | (see options below)                             |   | (see options below)         | What is it?   | (in pounds/lbs)                            |
|         |  | Arrive: _____ am/pm<br>Depart: _____ am/pm         |   | <input type="checkbox"/> - YES<br><input type="checkbox"/> - NO |                             |               | _____<br>Picked-Up<br>_____<br>Dropped-Off |
|         |  | Arrive: _____ am/pm<br>Depart: _____ am/pm         |   | <input type="checkbox"/> - YES<br><input type="checkbox"/> - NO |                             |               | _____<br>Picked-Up<br>_____<br>Dropped-Off |
|         |  | Arrive: _____ am/pm<br>Depart: _____ am/pm         |   | <input type="checkbox"/> - YES<br><input type="checkbox"/> - NO |                             |               | _____<br>Picked-Up<br>_____<br>Dropped-Off |
|         |  | Arrive: _____ am/pm<br>Depart: _____ am/pm         |   | <input type="checkbox"/> - YES<br><input type="checkbox"/> - NO |                             |               | _____<br>Picked-Up<br>_____<br>Dropped-Off |
|         |  | Arrive: _____ am/pm<br>Depart: _____ am/pm         |   | <input type="checkbox"/> - YES<br><input type="checkbox"/> - NO |                             |               | _____<br>Picked-Up<br>_____<br>Dropped-Off |
|         |  | Arrive: _____ am/pm<br>Depart: _____ am/pm         |   | <input type="checkbox"/> - YES<br><input type="checkbox"/> - NO |                             |               | _____<br>Picked-Up<br>_____<br>Dropped-Off |
|         |  | Arrive: _____ am/pm<br>Depart: _____ am/pm         |   | <input type="checkbox"/> - YES<br><input type="checkbox"/> - NO |                             |               | _____<br>Picked-Up<br>_____<br>Dropped-Off |

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