2018
State of Colorado
STATEWIDE
Seat Belt Survey

Colorado Department of Transportation

SEAT BELT STUDY

ATELIOR LLC

Transportation Management

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PREFACE

This report presents the results of a statewide seat belt usage study conducted for the Colorado Department of Transportation (CDOT), Office of Transportation Safety (OTS). The primary objective of this study was to provide an estimate of the seat belt usage rate for the State of Colorado in 2018.

This objective was accomplished by conducting a comprehensive statewide seat belt usage survey at selected observation sites throughout the State. A team of observers was trained in making direct observations of traffic to properly collect and record data during a period of two consecutive weeks (June 3 through June 16, 2018) in order to determine actual seat belt usage among Colorado drivers and outboard front seat passengers. With the data and analyses emanating from this study, CDOT, Office of Transportation Safety, will have current and accurate information upon which to base future transportation safety program decisions.

Atelior is pleased to have had the opportunity to work with the Office of Transportation Safety in the conduct of the 2018 Colorado Statewide Seat Belt Survey. The design of this study takes into consideration the population movements and trends within the State of Colorado and thus provides a realistic projection of actual seat belt usage. With the submission of this report, the project objectives have been completed within the time parameters and budget agreed to by CDOT and Atelior. The data and the analyses that are submitted to CDOT/OTS are, to the best of my knowledge, accurate and complete.

G. James Francis
Principal Investigator, Atelior, LLC

EXECUTIVE SUMMARY

Atelior, LLC conducted a comprehensive seat belt usage study in the State of Colorado from June 3 through June 16, 2018. Trained staff observed vehicles at 763 sites in 31 counties. A total of 132,447 vehicles were observed, including cars, vans, sport utility vehicles (SUVs), pickup trucks, and select commercial vehicles (10,000 pounds and under). Drivers and front seat outboard passengers of the eligible vehicles were observed for seat belt usage at predetermined observation sites throughout the State. There were 14 of the 770 original observation sites that could not be used due to location/traffic issues.

Dr. G. J. Francis served as Principal Investigator, Brenda Ogden as Project Coordinator, and Burt Deines as the Field Coordinator. Todd Tuell of Atelior, LLC was the lead statistician in the analysis of the data.

Field observers and supervisors were trained by the Atelior team in observation and recording methods in order to properly conduct the field survey and collect data. The need for consistency and accuracy in the process of data collection was emphasized in the training and pre-survey phase of the study. Each observer was supplied with data collection sheets, maps, and site locations, as well as safety vests and hard hats.

As in previous seat belt usage surveys conducted by the Institute of Transportation Management, retired Colorado State Highway Patrol Officers were used as observers whenever possible. Because of their familiarity with interstate and state highways, as well as local and

county roads and safety procedures, many potential location and safety problems were minimized. The retired patrol officers have proven to be very conscientious and reliable and have helped strengthen the validity of the results. This staffing arrangement worked very well and the continued use of the patrol officers is planned for future studies. By using independent contractors, Atelior has taken measures to ensure the integrity of the survey and analyses while involving people in the study who have the most relevant skills.

The data collected through the observations were recorded, summarized, and entered into appropriate categories for analyses. Analyses of the data yielded the following seat belt usage results among the various vehicle types:

Table 1: Statewide Seat Belt Usage
by Vehicle Type

	Estimate %	Std Error
Car	86.0	0.6
Van	88.0	0.9
SUV	90.8	0.4
Truck	80.1	0.7
Commercial	74.7	1.6
Overall	86.3	0.5

County usage rates, speed of vehicles, and road classification data will be presented under the "Results" section of this report. A conclusion section will provide an overall summary of the study followed by Appendices which contain examples of the forms and processes used during the survey stage of the study as well as site locations.

SURVEY DESIGN AND METHODOLOGY

The 2018 Colorado Statewide Seat Belt Usage Survey has been designed to meet all of the requirements established by the Uniform Criteria for State Observational Surveys of Seat Belt Use issued by the National Highway Traffic Safety Administration (NHTSA) Final Rule, Federal Register, Vol. 76, No. 63, April 1, 2011.

As required by the "Final Rule," the counties that account for 85% of the crash-related fatalities in the State are to be included in the survey sample. As shown in Appendix 1, 31 of the 64 counties accounted for 85% of the fatalities for the period of 2010-2014. These counties thus comprise the sample frame and were used as strata for sampling road segments.

Road segments were selected systematically with probability proportional to size (PPS) from all segments in the stratified counties. The road segments were serpentine sorted by latitude and longitude within counties, which makes the sampling spatially more uniform within counties. The research design therefore involves a stratified system PPS sample of data collection sites.

Roads within the counties were grouped according to the primary, secondary, and local classifications. Classifications are determined by the length of the road and the volume of traffic. All road segments in the sample counties were identified, and a sample of these segments was selected for observation. Definitions for road segments are provided in Appendix 2, and the selected road segments within each

county are listed in Appendix 3. Appendix 4 illustrates the weights of the segments within each county that were used in the calculation of the estimate of the statewide seat belt usage.

Sample Size

A total of 770 sites (road segments) of primary, secondary, and local roads was determined to be a representative sample. However, due to low volumes of traffic and other site location issues, there were 763 usable observation sites included in the survey. Sample size determination was, in large measure, governed by time constraints and the precision requirement of the study. As NHTSA requires the standard error to be <2.5%. A decision as to how many roadways to select and assign for observation during the observation period required a balance between issues of statistical reliability and observer productivity. There was also a practical need to select an optimal number of road segments for study so that observers would not spend inordinate amounts of time traveling from site to site. With all of those issues given consideration as well as the NHTSA requirements and needs of the contracting organizations, a total sample of 763 observational time periods and sites were observed.

Data Collection and Analysis

Observers and quality control monitors were trained in the appropriate procedures for observing seat belt usage and recording data. Scheduling, site locations, and internal operational protocol were included in the training syllabus which also gives an overview of the topics covered during the session (Appendix 5).

For the purposes of this survey, an observational site was defined as a specific road intersection or interstate ramp where observations take

place. Observations were conducted at each site for 40 minutes of each hour between the hours of 7:00 a.m. and 6:00 p.m. during a period of two consecutive weeks (June 3 through June 16, 2018). Twenty minutes were allowed for recording data and moving to the next observation site. Start times and days were staggered in order to have a representative sample of days of the week and peak and non-peak traffic. When possible, traffic was observed, for safety reasons, from inside the sample road segment at or near the point where the traffic was leaving the segment.

Drivers and front seat outboard passengers were observed in cars, vans, pickup trucks, SUVs, and select commercial vehicles (10,000 pounds and under). Observers generally chose one lane of traffic traveling in one direction to observe seat belt usage. The data were recorded as "yes," "no," or "non-observable" for the driver and front seat outboard passenger.

The data were transferred from the field summary sheets to forms placing the data in specific categories for analysis. To maintain continuity with results from prior years, the SAS code from past studies was translated into ratio estimates computed by the R Survey package. The overall usage estimate (percentage) and usage estimates by vehicle type were calculated using the svyratio function. For the usage estimates by the various domains (vehicle type, speed, road class, and county) the svyby function was used. Both the svyratio and svyby functions take into account the design used in selecting the sample. The cv and coef functions were used to calculate the coefficients of variation and 95% confidence interval limits for the estimates.

By applying the processes described above, seat belt usage rates in Colorado were estimated, along with a determination of the standard errors and coefficients of variation. The survey sample size was large

enough to allow estimates of usage rates for various domains of counties, vehicle types, speed, and road class.

In summary, the research design included the following elements that were critical to this study:

1. Samples were probability-based from the population of road segments within each county, yielding unbiased estimates of seat belt usage for the State's driver and outboard front seat passenger population for vehicles falling within the parameters of this study.

2. The sample data were collected through direct observation of seat belt usage at the predetermined sites by qualified and trained observers. Observation times were assigned and rescheduled if weather interfered or other conditions existed which made observations at a particular site unsafe or unproductive.

3. The population of interest was the driver and outboard front seat passenger of cars, vans, SUVs, light trucks, and select commercial vehicles (10,000 pounds and under).

4. Observations were conducted in daylight hours from June 3 through June 16, 2018 between the hours of 7:00 AM and 6:00 PM.

5. Observation start times were staggered in order to obtain a representative sample from rush hour (peak traffic) and non-rush hour (non-peak traffic) time frames.

6. Observational data were recorded on counting sheets and summarized (See Appendix 6). The data were then transcribed to

create a digital record and entered onto field summary forms, which served as input into the R survey package for data reduction.

Sample Characteristics

- 763 of 770 sites observed.
- 132,447 vehicles
- 162,096 occupants (both drivers and passengers) were observed.
- 5,397 occupants were unable to be observed
  5,004 of these were drivers
  Represents 3.3% of all individuals
  (observable and non-observable)

Non-observables by Vehicle Type	2018
Car	3.1%
Van	2.5%
SUV	2.6%
Truck	5.1%
Commercial	3.8%
OVERALL	3.3%

RESULTS

Statewide Survey Results

The 2018 Colorado Statewide Seat Belt Usage Survey was designed to meet all the requirements established by the Uniform Criteria for State Observational Surveys of Seat Belt Use issued by the National Highway Traffic Safety Administration (NHTSA) Final Rule, Federal Register, Vol. 76, No. 63, April 1, 2011.

The statewide survey collected data at 763 sites as a multistage, stratified, random sample. As shown in Table 2, the 2018 statewide seat belt usage for Colorado (cars, vans, SUVs, pickup trucks, and select commercial vehicles 10,000 pounds and under) over the sampling period was 86.3%. A 95% confidence interval constructed with regard to the overall seat belt usage rate is from 85.3 to 87.2%.

Table 2: Historical Statewide Usage Rates (%)

	2018	2017	2016	2015	2014	2013	2012
Total	86.3%	83.8%	84.0%	85.2%	82.4%	82.1%	80.7%
Standard Error	0.5%	0.5%	0.6%	0.5%	0.7%	0.7%	0.6%

Table 2 also shows the overall seat belt usage rate for the past seven years. The table illustrates the relative levels of consistency of usage rates from year to year. Besides an overall improvement of nearly 6% over the past seven years, the table illustrates the relative levels of consistency of usage rates from year to year. The small fluctuations in usage rates are, at least in part, due to the vagaries of vehicle occupant

behaviors in a secondary law state. It should be noted that in secondary law states, such as Colorado, a high seat belt usage rate requires considerable investment in media, and educational efforts must be significant in order to maintain constant usage rates and to make even small gains.

Table 3 provides a seven-year comparison of seat belt usage among the various vehicle types. All vehicle types had higher usage rates this year. Vans and SUVs remain the highest in usage rates with 88.0% and 90.8%, respectively.

Table 3: Seat Belt Usage for Vehicle Types 2012-2018 (Cars,
        Vans, SUVs, Trucks, and Commercial Vehicles)
*Note: Commercial vehicles 10,000 pounds and under were observed
        for the first time in 2012.

	2018	2017	2016	2015	2014	2013	2012
Cars	86.0%	83.7%	83.9%	85.2%	83.1%	82.6%	82.3%
Vans	88.0%	87.2%	89.5%	89.2%	87.3%	86.9%	85.2%
SUVs	90.8%	88.5%	89.2%	89.9%	87.1%	86.7%	84.6%
Trucks	80.1%	76.5%	76.1%	77.6%	72.4%	73.0%	71.7%
Com-mercial*	74.7%	70.8%	68.2%	73.9%	67.5%	65.5%	65.1%

As in past studies, the results for 2018 demonstrate a strong correlation between speed and seat belt usage (see Table 4). The higher the speed, the more likely people are to use their seat belts.

Table 4: Seat Belt Usage by Vehicle Speed (2012-2018).

	2018	2017	2016	2015	2014	2013	2012
0-30 mph	84.6%	82.5%	80.8%	81.4%	77.5%	77.5%	76.4%
31-50 mph	84.9%	83.3%	84.4%	85.4%	82.8%	83.3%	80.7%
50+ mph	89.9%	86.6%	88.2%	89.1%	88.0%	88.0%	85.5%

Seat belt usage by road class is displayed in Table 5.   The differing usage rates for the road classes are in part explained by the speed of the traffic on the roads. For example, the "local" classification has more traffic that is "neighborhood trip" oriented with much slower speeds. The shorter the trip, the less likely people are to wear seat belts.

Table 5: Seat Belt Usage by Road Class (2012-2018).

	2018	2017	2016	2015	2014	2013	2012
Primary	90.8%	90.4%	89.4%	90.2%	89.1%	89.6%	87.0%
Second-ary	87.0%	85.7%	84.6%	86.1%	83.7%	83.1%	82.0%
Local	85.7%	82.8%	83.2%	84.4%	81.2%	80.8%	78.8%

Table 6 displays individual county results for 2018. The county data also illustrate the differences in seat belt usage between some of the urban and rural areas of the State. While the more urban counties in the Front Range, such as Douglas and Larimer, generally have higher usage rates,

these counties also tend to have a more balanced number of vehicle types (cars, SUVs, vans, pickup trucks, and select commercial vehicles 10,000 pounds and under). The more rural counties on the Western Slope and Eastern Plains, such as Mesa and Cheyenne, have a higher proportion of pickup trucks, which influences the usage rate in a downward manner. However, in those rural counties that have observation sites along one of the interstate highways, like Garfield and Summit, the usage rate is much higher.

Of the 31 counties included in the study this year, there were 12 counties with usage rates at or above the statewide average of 86.3%. Of these 19 counties below 86.3%, there were 11 between 81.0% and 86.3%. Two rural counties had the lowest usage rates (Cheyenne at 65.0% and Delta at 75.3%). Adams County which is a mix of rural and urban was 69.97%. Douglas County had the highest usage at 94.6%. Other counties over 90.0% include Larimer at 92.9% and Las Animas at 92.1% and Moffatt at 91.4%, respectively.

Table 6: County Results for 2018 Colorado Statewide Seat Belt Survey.

County	# Sites	Seat Belt Usage Estimate (%)	Standard Error (%)	Lower 95% Conf Int (%)	Upper 95% Conf Int (%)
Adams	44	69.9	4.1	62.0	77.9
Alamosa	11	88.7	0.8	87.1	90.3
Arapahoe	44	89.1	1.6	85.9	92.2
Boulder	44	88.6	0.9	86.9	90.3
Chaffee	11	77.4	2.0	73.5	81.3
Cheyenne	11	65.0	7.7	50.0	80.1
Clear Creek	44	84.5	2.4	79.7	89.3
Delta	11	75.3	2.3	70.8	79.7
Denver	44	89.0	1.0	87.0	91.0
Douglas	44	94.6	0.9	93.0	96.3
Eagle	11	85.8	2.6	80.6	90.9
El Paso	44	85.3	1.1	83.2	87.4
Fremont	11	83.5	1.7	80.2	86.8
Garfield	11	86.2	2.2	81.9	90.4
Gunnison	11	84.0	1.5	81.0	87.0
Jefferson	44	86.5	1.6	83.4	89.6
Kit Carson	11	83.6	7.1	69.8	97.5
La Plata	11	75.8	2.6	70.8	80.8
Larimer	44	92.9	0.8	91.3	94.6
Las Animas	11	92.1	1.7	88.7	95.5
Lincoln	11	83.8	4.4	75.3	92.4
Mesa	44	79.6	2.1	75.4	83.8
Moffat	11	91.4	1.7	88.0	94.7
Montezuma	11	77.4	2.6	72.3	82.5
Montrose	11	81.0	3.1	74.9	87.0
Morgan	11	82.8	3.5	75.9	89.8
Otero	11	84.3	1.6	81.1	87.5
Park	37	86.4	1.0	84.4	88.4
Pueblo	44	85.7	1.0	83.8	87.7
Summit	11	86.8	1.4	84.1	89.6
Weld	44	89.7	2.1	85.6	93.9

Estimates for Cheyenne and Kit Carson are likely not as accurate due to the magnitude of the standard error. A standard error of 5.0 and higher is generally caused by the small sample size which makes the estimate somewhat suspect.

Non-Observables: The non-observable rate of 3.3% for the study was well below the 10% limit established by NHTSA. Overall, there were 5,397 vehicles for which the use of seat belts could not be determined. Tinted windows, sun reflection, the height of some trucks and commercial vehicles, and color of clothing/seat belts were among the reasons for the non-observable designation. Below are the non-observable rates by vehicle types:

Vehicle Type	Non-Observable Vehicles		
	2016	2017	2018
Car	2.4%	2.6%	3.1%
Van	1.1%	2.3%	2.3%
SUV	1.7%	2.4%	2.6%
Truck	3.9%	4.5%	4.5%
Commercial	1.8%	3.6%	3.6%
OVERALL	2.3%	2.9%	3.33%

Vehicle Type	Non-Observable Vehicles
Car	1113
Van	95
SUV	801
Truck	1057
Commercial	165
OVERALL	3231

Given the low non-observable rate and exceptionally low standard error pf 0.5% for the study. The overall seat belt usage rate of 86.3% appears, statistically, to be quite sound.

Successes: While it is difficult to track the impact of any one specific program or effort, the following list of possible explanations undoubtedly worked in concert to maintain the relatively high levels of seat belt usage in the State of Colorado.

1. The success of the educational efforts of CDOT and the Department of Public Health and Environment to inform the public of the dangers of not using seat belts.
2. An improvement in the general knowledge of the public of the need for the use of seat belts by vehicle operators and front seat passengers.
3. The "Click It or Ticket" program may have impacted drivers and front seat occupants enough to improve usage rates.
4. Enforcement efforts have impacted drivers and vehicle passengers and caused more awareness of the need to use seat belts.

Travel Variables: As was shown in Tables 3 and 4, the travel variables of road class and speed impact seat belt usage. As stated earlier, seat belt usage was higher on primary roads (90.8%) than on local roads (85.7%), and as demonstrated in this year's results as well as in previous studies, seat belts are used more frequently at higher speeds than at lower speeds. Both the road class and vehicle speed showed statistical significance ($p < 0.05$) in the differences in seat belt usage. Weather as a travel variable did not appear to be a factor in seat belt usage.

CONCLUSIONS

The 763 observation sites included in this study were surveyed during the two-week period from June 3 through June 16, 2018. Total observations of 132,447 vehicles yielded a statewide estimate of 86.3%. Statistically, the results for the past seven years have been relatively constant with six of the seven years in the 82.1-85.2% range. The usage rate of 80.7% in 2012 and the 86.3% in 2018 were the only years outside these parameters. The last five years represent a major improvement over previous five-year blocks.

To further demonstrate the improvement in rates, the overall 2001 seat belt usage in Colorado was 72.1%. Trucks were at 57.4% and SUVs were the highest at 78.3%. In 2006, the rates improved to 80.3% overall with 68.7% for trucks and 87.1% for SUVs. In 2015, trucks were at an all-time high of 77.6% and are even higher this year at 80.1%. Except for one "bump" upward in 2010, cars have had consistent usage rates in the 82.3 to 85.2% range. In the current year, cars were at an 86.0% usage rate (a 2.3 improvement over last year). SUVs and vans were the highest of all vehicle types this year at 90.8% and 88.0%.

The inclusion of select commercial vehicles (10,000 pounds and under) has had a downward influence on the overall seat belt usage rate. The commercial usage rate of 74.7% this year is a significant improvement over last year but still well below the 86.3% statewide average. As was the case last year, it is generally the "local" commercial vehicles whose drivers and passengers are out of compliance.

Pickup trucks had a usage rate of 80.1%. While higher than the commercial usage rate, it is still lower than the other vehicle types. In agricultural areas secondary road traffic is likely to have more pickup

trucks that travel at lower speeds on local roads, which generally are factors contributing to lower seat belt usage rates.

This was the seventh year wherein "non-observables" were officially recorded. By rule, if observers are not able to see whether or not a driver or front seat occupant is buckled up, it is to be recorded as "non-observable." The overall non-observable rate for the study was 3.3%. Trucks had the highest rate at 5.1%. The height of the cabs on some of the pickup trucks contributed to a higher non-observable rate.

An overall seat belt usage rate of 86.3% is the result of a concentrated educational effort by the Occupant Safety and Protection Program of the Office of Transportation Safety. While the challenges of maintaining a high seat belt usage rate in a secondary law state will likely continue, the investment in education and enforcement are proving worthwhile. The value of the return on investment, in terms of lives saved and social and economic saving, makes the effort one of the most important endeavors for the State of Colorado. Perhaps the only way to make even more significant improvements in seat belt usage in the future would be the passage of a primary seat belt law. States that pass primary seat belt laws typically realize improvements in the range of 5 to 10% over previous usage rates while under secondary laws.

APPENDICES

APPENDIX 1

Colorado Average Motor Vehicle Crash-Related Fatalities by County 2010-2014

State	County	Average fatality counts for 5 years	Fatality percentage within the state	Cumulative fatality percentage
FARS (2010-2014) State=Colorado			
Colorado	EL PASO	48.6	10	10
Colorado	WELD	41.2	8.5	18.5
Colorado	DENVER	38.2	7.9	26.4
Colorado	JEFFERSON	36.8	7.6	34
Colorado	ADAMS	30	6.2	40.2
Colorado	ARAPAHOE	25.2	5.2	45.4
Colorado	LARIMER	21	4.3	49.7
Colorado	PUEBLO	20.6	4.2	54
Colorado	BOULDER	18.2	3.8	57.7
Colorado	MESA	15.6	3.2	60.9
Colorado	DOUGLAS	13.8	2.8	63.8
Colorado	LA PLATA	10.2	2.1	65.9
Colorado	GARFIELD	8.4	1.7	67.6
Colorado	FREMONT	7.2	1.5	69.1
Colorado	DELTA	6.4	1.3	70.4
Colorado	MORGAN	6.2	1.3	71.7
Colorado	EAGLE	6	1.2	72.9
Colorado	MONTEZUMA	5.8	1.2	74.1
Colorado	LAS ANIMAS	5.2	1.1	75.2
Colorado	LINCOLN	5	1	76.3
Colorado	KIT CARSON	4.8	1	77.2
Colorado	PARK	4.6	0.9	78.2
Colorado	OTERO	4.2	0.9	79.1
Colorado	CHEYENNE	4	0.8	79.9
Colorado	SUMMIT	4	0.8	80.7
Colorado	ALAMOSA	3.8	0.8	81.5
Colorado	MONTROSE	3.8	0.8	82.3
Colorado	MOFFAT	3.8	0.8	83
Colorado	CHAFFEE	3.6	0.7	83.8
Colorado	GUNNISON	3.6	0.7	84.5
Colorado	CLEAR CREEK	3.5	0.7	85.3
Colorado	ELBERT	3.4	0.7	86
Colorado	WASHINGTON	3.4	0.7	86.7
Colorado	LOGAN	3.2	0.7	87.3
Colorado	BACA	3	0.6	87.9
Colorado	ROUTT	3	0.6	88.6
Colorado	HUERFANO	2.8	0.6	89.1
Colorado	PROWERS	2.8	0.6	89.7
Colorado	YUMA	2.8	0.6	90.3
Colorado	COSTILLA	2.5	0.5	90.8
Colorado	DOLORES	2.5	0.5	91.3
Colorado	SAGUACHE	2.5	0.5	91.8
Colorado	SAN MIGUEL	2.5	0.5	92.4
Colorado	BLOOMFIELD	2.4	0.5	92.8
Colorado	RIO GRANDE	2.4	0.5	93.3
Colorado	CONEJOS	2.3	0.5	93.8

Colorado	ARCHULETA	2.2	0.5	94.3
Colorado	GRAND	2.2	0.5	94.7
Colorado	TELLER	2.2	0.5	95.2
Colorado	LAKE	2	0.4	95.6
Colorado	PHILLIPS	2	0.4	96
Colorado	PITKIN	2	0.4	96.4
Colorado	RIO BLANCO	2	0.4	96.8
Colorado	SAN JUAN	2	0.4	97.2
Colorado	SEDGWICK	2	0.4	97.6
Colorado	CUSTER	1.8	0.4	98
Colorado	BENT	1.7	0.3	98.3
Colorado	KIOWA	1.5	0.3	98.7
Colorado	OURAY	1.5	0.3	99
Colorado	CROWLEY	1	0.2	99.2
Colorado	GILPIN	1	0.2	99.4
Colorado	HINSDALE	1	0.2	99.6
Colorado	JACKSON	1	0.2	99.8
Colorado	MINERAL	1	0.2	100

APPENDIX 2

Codes for Road Segment File

S1100	Primary Road	Primary roads are generally divided, limited-access highways within the interstate highway system or under state management, and are distinguished by the presence of interchanges. These highways are accessible by ramps and may include some toll highways.
S1200	Secondary Road	Secondary roads are main arteries, usually in the U.S. Highway, State Highway or County Highway system. These roads have one or more lanes of traffic in each direction, may or may not be divided, and usually have at-grade intersections with many other roads and driveways. They often have both a local name and a route number.
S1400	Local Neighborhood Road, Rural Road, City Street	These are generally paved non-arterial streets, roads, or byways that usually have a single lane of traffic in each direction. Roads in this feature class may be privately or publicly maintained. Scenic park roads would be included in this feature class, as would (depending on the region of the country) some unpaved roads.

APPENDIX 3

Roadway Functional Strata by County, Road Segment Population (N), Total Length, and Number of Segments Selected (n)

County		Primary: S1100	Secondary: S1200	Local: S1400	Total
		MTFCC Code			
ADAMS	N	895	1574	27168	29637
	Length (mi)	130	177	2945	3252
	n	10	17	17	44
ALAMOSA	N	0	319	0	319
	Length (mi)	0	95	0	95
	n	0	11	0	11
ARAPAHOE	N	351	1008	28185	29544
	Length (mi)	83	113	2560	2756
	n	5	16	23	44
BOULDER	N	0	1943	21288	23231
	Length (mi)	0	243	1975	2218
	n	0	26	18	44
CAPPENDIX HAFFEE	N	0	520	0	520
	Length (mi)	0	96	0	96
	n	0	11	0	11
CHEYENNE	N	0	267	0	267
	Length (mi)	0	133	0	133
	n	0	11	0	11
CLEAR CREEK	N	284	278	2780	3342
	Length (mi)	66	65	409	540
	n	17	19	8	44
DELTA	N	0	734	0	734
	Length (mi)	0	136	0	136
	n	0	11	0	11
DENVER	N	636	1226	25194	27056
	Length (mi)	62	101	1940	2103
	n	8	18	18	44
DOUGLAS	N	231	744	17995	18970
	Length (mi)	63	129	2070	2262
	n	6	15	23	44
EAGLE	N	479	533	0	1012
	Length (mi)	120	87	0	207
	n	6	5	0	11
EL PASO	N	409	1498	52918	54825
	Length (mi)	94	227	4788	5109
	n	5	14	25	44
FREMONT	N	0	810	0	810
	Length (mi)	0	165	0	165
	n	0	11	0	11
GARFIELD	N	490	799	0	1289
	Length (mi)	131	140	0	271
	n	4	7	0	11

County	Metric				
GUNNISON	N	0	696	0	696
	Length (mi)	0	191	0	191
	n	0	11	0	11
JEFFERSON	N	291	2057	34115	36463
	Length (mi)	49	278	3177	3504
	n	3	23	18	44
KIT CARSON	N	129	302	0	431
	Length (mi)	120	126	0	246
	n	3	8	0	11
LA PLATA	N	0	1006	0	1006
	Length (mi)	0	164	0	164
	n	0	11	0	11
LARIMER	N	284	1903	30277	32464
	Length (mi)	78	280	3575	3933
	n	1	24	19	44
LAS ANIMAS	N	194	656	0	850
	Length (mi)	78	225	0	303
	n	3	8	0	11
LINCOLN	N	143	385	0	528
	Length (mi)	61	168	0	229
	n	3	8	0	11
MESA	N	436	1250	15185	16871
	Length (mi)	132	227	2172	2531
	n	9	22	13	44
MOFFAT	N	0	946	0	946
	Length (mi)	0	250	0	250
	n	0	11	0	11
MONTEZUMA	N	0	1141	0	1141
	Length (mi)	0	177	0	177
	n	0	11	0	11
MONTROSE	N	0	937	0	937
	Length (mi)	0	210	0	210
	n	0	11	0	11
MORGAN	N	167	599	0	766
	Length (mi)	76	149	0	225
	n	3	8	0	11
OTERO	N	0	1271	0	1271
	Length (mi)	0	230	0	230
	n	0	11	0	11
PARK	N	0	615	11412	12027
	Length (mi)	0	165	2402	2567
	n	0	23	21	44
PUEBLO	N	438	1405	18184	20027
	Length (mi)	95	243	2317	2655
	n	7	21	16	44
SUMMIT	N	152	453	0	605
	Length (mi)	48	81	0	129
	n	3	8	0	11
WELD	N	307	2040	23880	26227
	Length (mi)	129	478	4389	4996
	n	4	25	15	44

APPENDIX 4

Weights for the Colorado State Seat Belt Usage

Study

Observational Survey

County	MTFCC	Sampling Weight	Selection Probability
ADAMS	S1100/S1200	77	0.0131
ADAMS	S1400	1377	0.0007
ALAMOSA	S1200	25	0.0408
ARAPAHOE	S1100/S1200	56	0.0178
ARAPAHOE	S1400	1012	0.0010
BOULDER	S1200	60	0.0166
BOULDER	S1400	1082	0.0009
CHAFFEE	S1200	40	0.0250
CHEYENNE	S1200	21	0.0487
CLEAR CREEK	S1100/S1200	14	0.0726
CLEAR CREEK	S1400	248	0.0040
DELTA	S1200	56	0.0177
DENVER	S1100/S1200	63	0.0159
DENVER	S1400	1129	0.0009
DOUGLAS	S1100/S1200	38	0.0263
DOUGLAS	S1400	684	0.0015
EAGLE	S1100/S1200	78	0.0128
EL PASO	S1100/S1200	93	0.0107
EL PASO	S1400	1678	0.0006
FREMONT	S1200	62	0.0160
GARFIELD	S1100/S1200	99	0.0101
GUNNISON	S1200	54	0.0187
JEFFERSON	S1100/S1200	82	0.0123
JEFFERSON	S1400	1469	0.0007
KIT CARSON	S1100/S1200	33	0.0302
LA PLATA	S1200	77	0.0129
LARIMER	S1100/S1200	74	0.0134
LARIMER	S1400	1339	0.0007
LAS ANIMAS	S1100/S1200	65	0.0153
LINCOLN	S1100/S1200	41	0.0246
MESA	S1100/S1200	49	0.0206
MESA	S1400	876	0.0011
MOFFAT	S1200	73	0.0137
MONTEZUMA	S1200	88	0.0114
MONTROSE	S1200	72	0.0139
MORGAN	S1100/S1200	59	0.0170

OTERO	S1200	98	0.0102
PARK	S1200	24	0.0416
PARK	S1400	432	0.0023
PUEBLO	S1100/S1200	55	0.0182
PUEBLO	S1400	988	0.0010
SUMMIT	S1100/S1200	47	0.0215
WELD	S1100/S1200	71	0.0142
WELD	S1400	1272	0.0008

APPENDIX 5

Training Syllabus

Welcome and distribution of equipment

Survey overview

Data collection techniques
      Definitions of belt/booster seat use, passenger vehicles
      Observation protocol
      Weekday/weekend/rush hour/non-rush hour
      Weather conditions
      Duration at each site

Scheduling and rescheduling
      Site Assignment Sheet
      Daylight
      Temporary impediments such as weather
      Permanent impediments at data collection sites

Site locations
      Locating assigned sites
      Interstate ramps and surface streets
      Direction of travel/number of observed lanes
      Non-intersection requirement
      Alternate site selection

Data collection forms
      Cover sheet
      Recording observations
      Recording alternate site information

Assembling forms for shipment

Safety and security

Timesheet and expense reports

Field practice at ramps and surface streets

APPENDIX 6

Data Collection Form

colorado Seat Belt Usage – Field Survey Form – Survey: _____

County No.:	County:		Site No:		Observer(s):	
# Lanes Available:	**Weather** 1 = clear 2 = rain 3 = snow 4 = fog	**Speed** 1 = 0-30 MPH 2 = 31-50 MPH 3 = >50 MPH	Site Location:		Date (Month/Day/Year):	Day of Week: Sun Mon Tues Wed Thurs Fri Sat

# Lanes Observed:					Start Time: 	
					      a.m.
					p.m.
						End Time:
						      a.m.
						p.m.

Line #	CARS				VANS				SUVs				LIGHT TRUCKS				COMMERCIAL			
	Driver		Passenger		Driver		Passenger		Driver		Passenger		Driver		Passenger		Driver		Passenger	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1																				
2																				
3																				
4																				
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14																				
15																				
Page Total																				

Site Total																				
Non-																				

Observables	Total:	Total:	Total:	Total:	Total:	Total:	Total:	Total:	Total:	Total: