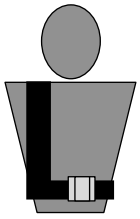
2015
State of Colorado
STATEWIDE
Seat Belt Survey

Colorado Department of Transportation

SEAT BELT STUDY



Colorado State University

COLLEGE OF BUSINESS

Institute of 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 2015.

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 (May 31 through June 13, 2015) 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.

The Institute of Transportation Management (ITM) is pleased to have had the opportunity to work with the Office of Transportation Safety in the conduct of the 2015 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 ITM. The data and the analyses that are submitted to CDOT/OTS are, to the best of my knowledge, accurate and complete.

G. James Francis
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EXECUTIVE SUMMARY

The Institute of Transportation Management (ITM) at Colorado State University conducted a comprehensive seat belt usage study in the State of Colorado from May 31 through June 13, 2015. Trained staff observed vehicles at 715 sites in 29 counties. A total of 117,889 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.

Dr. G.J. Francis served as Principal Investigator, Burt Deines as Project Coordinator, and Felicia Zamora as Field Administrator for the statewide study. James zumBrunnen of the Franklin A. Graybill Statistical Laboratory in the College of Natural Sciences at Colorado State University served as the lead statistician in the analysis of the data. Mr. zumBrunnen and others within the Laboratory assumed major roles in the research design and methodology which gave the statistical analyses independence from the survey process.

Field observers and supervisors were trained by the ITM 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 and the Graybill Statistical Laboratory is planned for future studies. By using these two groups of independent contractors, the Institute 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. Data were then entered into the SAS system database and submitted to the Graybill Statistical Laboratory in the College of Natural Sciences for analysis. Analyses of the data yielded the following seat belt usage results among the various vehicle types:

	Usage	Standard Error
Cars	85.0%	0.7%
Vans	89.2%	0.8%
SUVs	89.9%	0.5%
Trucks	77.6%	0.9%
Commercial	73.9%	1.4%
All Vehicle Types	85.2%	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.

SURVEY DESIGN AND METHODOLOGY

The 2015 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, 29 of the 64 counties accounted for 85% of the fatalities for the period of 2007 to 2009. These counties thus comprise the sample frame and were used as strata for sampling road segments. For 2013, 2014, and 2015, Elbert County was substituted for Alamosa County as the "last" county to be included as part of the top 85%. Any one of four counties could have been selected for the final sampling county as each was approximately the same percentage (.7%) of the state's total fatalities. Elbert County replaced Alamosa County in the study in part because Elbert experienced 13 fatalities from 2009-2011, and Alamosa had 8 fatalities during the same time frame. Also contributing to the decision was the travel time of observers and the cost involved for 11 observation sites.

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 715 sites (road segments) of primary, secondary, and local roads was determined to be a representative sample. Sample size determination was, in large measure, governed by time constraints and the precision requirement of the study since 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 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 715 observational time periods and sites were selected.

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 (May 31 through June 13, 2015). 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 from both 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. The Graybill Statistical Laboratory of the College of Natural Sciences then performed the computer runs to complete the data analysis. The PROC SURVEYMEANS procedure of SAS was used to perform statistical analysis of the survey data. This analytical procedure takes into account the sample design used to select the road segments to be analyzed. The sample design was a complex design which incorporated stratification and unequal weighting. The SURVEYMEANS procedure computes ratio estimates and provides standard errors and confidence intervals for the ratios and for any specified domain analysis, such as road class and speed.

Using this procedure, 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 pre-determined 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 May 31 through June 13, 2015 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 SAS programs for data reduction.

RESULTS

Statewide Survey Results

The 2015 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 715 sites as a multistage, stratified, random sample. As shown in Table 1, the 2015 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 85.2%. A 95% confidence interval constructed with regard to the overall seat belt usage rate is from 84.2% to 86.3%.

Table 1: 2015 Statewide Seat Belt Usage for Colorado

	Seat Belt Usage Estimate (%)	Standard Error	Lower 95% Conf Int	Upper 95% Conf Int
Cars	**85.0%**	**0.7%**	**83.7%**	**86.4%**
Vans	**89.2%**	**0.8%**	**87.6%**	**90.7%**
SUVs	**89.9%**	**0.5%**	**89.0%**	**90.9%**
Trucks	**77.6%**	**0.9%**	**75.9%**	**79.2%**
Commercial	**73.9%**	**1.4%**	**71.0%**	**76.7%**
All Vehicle Types	**85.2%**	**0.5%**	**84.2%**	**86.3%**

Table 2 illustrates the overall consistency in seat belt usage in the past five years. Although commercial vehicles influence the overall results in a negative fashion, the total usage rate for all vehicles (85.2%) is one of the highest among secondary law states. 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 current levels and to continue making even small gains.

Table 2: Seat Belt Usage Annual Estimates for All Vehicle Types 2011-2015
(Cars, Vans, SUVs, Trucks, and Commercial Vehicles)
*Note: Commercial vehicles 10,000 pounds and under were observed for the first time in 2012.

	2015	2014	2013	2012*	2011
Total	**85.2%**	**82.4%**	**82.1%**	**80.7%**	**82.1%**
Standard Error	**0.5%**	**0.7%**	**0.7%**	**0.6%**	**0.6%**

Each vehicle type had an improved seat belt usage over last year with new "highs" being established in every category. Vans and SUVs remain the highest in usage rates with 89.2% and 89.9%, respectively. Although commercial vehicles had the lowest rate, they had the greatest improvement of all vehicle categories.

Table 3: Seat Belt Usage for Vehicle Types 2011-2015
(Cars, Vans, SUVs, Trucks, and Commercial Vehicles)
*Note: Commercial vehicles 10,000 pounds and under were observed for the first time in 2012.

	2015	2014	2013	2012	2011
Cars	**85.0%**	**83.1%**	**82.6%**	**82.3%**	**83.9%**
Vans	**89.2%**	**87.3%**	**86.9%**	**85.2%**	**88.5%**
SUVs	**89.9%**	**87.1%**	**86.7%**	**84.6%**	**84.4%**
Trucks	**77.6%**	**72.4%**	**73.0%**	**71.7%**	**70.8%**
Commercial*	**73.9%**	**67.5%**	**65.5%**	**65.1%**	

As in the past studies, the results for 2015 demonstrate a strong correlation between speed and seat belt usage. The higher the speed the more likely people are to use their seat belts.

Table 4: Seat Belt Usage by Speed 2011-2015

	2015	2014	2013	2012	2011
0-30 mph	**81.4%**	**77.5%**	**77.5%**	**76.4%**	**73.7%**
31-50 mph	**85.4%**	**82.8%**	**83.3%**	**80.7%**	**81.4%**
50+ mph	**89.1%**	**88.0%**	**88.0%**	**85.5%**	**83.7%**

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. In addition, 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 2011-2015

	2015	2014	2013	2012	2011
Primary	**90.2%**	**89.1%**	**89.6%**	**87.0%**	**82.5%**
Secondary	**86.1%**	**83.7%**	**83.1%**	**82.0%**	
Local	**84.4%**	**81.2%**	**80.8%**	**78.8%**	**79.8%**

Table 6 displays individual county results for 2015. The county data also illustrate the differences in seat belt usage between urban and rural areas of the State. While the more urban counties in the Front Range 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 have a higher proportion of pickup trucks influencing the usage rate in a downward manner. However, in those rural counties that have observation sites along one of the interstate highways, the usage rate is much higher. For example, Garfield County (Glenwood Springs) is only the 12th most populous county, but there are observation sites along Interstate 70, which account for the majority of vehicles miles traveled within the county and contribute to a high seat belt usage of 88.8%.

Of the 29 counties included in the study this year, there were 17 counties with usage rates above the statewide average of 85.2% and 12 below. This is especially impressive given the new, higher rate of 85.2%. Summit County had a slight drop from last year (98.4 to 96.0) but remains the county with the highest usage rate. Other counties over 90.0% include El Paso, Grand, La Plata, Larimer, Logan, and Montezuma. Baca, a rural county in the eastern plains, had the lowest usage rate of 67.1% but the standard error of 5.9% indicates that the number of

observations was relatively low in numbers. Thus, the confidence interval is rather large at 55.4 to 78.7. Baca was the only county below a 70% usage rate.

Table 6: County Results for 2015 Colorado Statewide Seat Belt Survey

County	# Sites	Seat Belt Usage Estimate (%)	Standard Error (%)	Lower 95% Conf Int (%)	Upper 95% Conf Int (%)
Adams	44	86.7	0.7	85.4	88.0
Arapahoe	44	87.7	0.9	85.9	89.5
Baca	11	67.1	5.9*	55.4	78.7
Boulder	44	83.7	0.8	82.2	85.2
Delta	11	70.8	4.5	61.9	79.6
Denver	44	73.7	2.1	69.7	77.8
Douglas	44	89.2	0.8	87.7	90.6
Eagle	11	82.0	1.6	78.8	85.1
Elbert	11	83.9	1.5	80.9	87.0
El Paso	44	92.5	1.6	89.4	95.6
Fremont	11	83.3	1.8	79.8	86.9
Garfield	11	88.8	2.4	84.0	93.5
Grand	11	90.1	1.0	88.1	92.1
Huerferno	11	80.6	3.6	73.4	87.7
Jefferson	44	85.3	1.5	82.3	88.3
La Plata	11	91.1	1.0	89.1	93.0
Larimer	44	92.2	1.0	90.3	94.1
Las Animas	11	85.3	2.1	81.3	89.4
Lincoln	11	87.0	4.0	79.1	94.9
Logan	11	90.1	3.4	83.4	96.8
Mesa	44	86.5	2.1	82.3	90.6
Montezuma	11	91.5	1.0	89.5	93.6
Montrose	11	75.5	2.8	69.9	81.1
Morgan	11	81.2	1.8	77.7	84.8
Park	44	79.8	3.1	73.7	85.8
Pueblo	44	70.8	1.9	67.1	74.4
Routt	11	89.6	1.0	87.6	91.7
Summit	11	96.0	1.2	93.5	98.4
Weld	44	85.3	1.3	82.8	87.9

*Baca County's estimate of seat belt usage, while useful, can be questioned because of the magnitude of the Standard Error. A Standard Error of 5.0 and over is generally suspect; the sample of seat belt usage was quite small.

Non-Observables: The non-observable rate of 1.8% for the study was well below the 10% limit established by NHTSA. Overall, there were fewer than 2110 vehicles for which the use of seat belts could not be determined. Tinted windows, sun reflection, 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	
	2015	2014
Car	2.0%	1.7%
Van	0.8%	0.4%
SUV	1.4%	1.2%
Truck	2.7%	2.9%
Commercial	1.2%	1.6%
Overall	1.8%	1.6%

Given the low non-observable rate and the exceptionally low standard error of 0.5% for the study, the overall seat belt usage rate of 85.2% 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: The following findings demonstrate the differences in seat belt usage when considering some of the variables involved in travel. For example, seat belt usage was higher on primary roads (90.2%) than on local roads (84.4%). Also as demonstrated in previous studies, seat belts are used more at higher speeds than at lower speeds (see below). Both the road class and vehicle speed showed statistical significance ($p<0.05$) in the differences in seat belt usage.

- Road Class*: Primary 90.2%
  Secondary 86.1%
  Local 84.4%

  *Definitions of road classes are included in Appendix 2.

- Speed observations: 0-30 mph 81.4%
  31-50 mph 85.4%
  50+ mph 89.1%

CONCLUSIONS

The 715 observation sites included in this study were surveyed during the two-week period from May 31 through June 13, 2015. Total observations of 117,889 vehicles yielded a statewide estimate of 85.2%. Statistically, the results for the past five years have been relatively constant with four of the five years in the 82.1-85.2% range. In 2012 at 80.7% was the only year 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 2013, trucks were at an all-time high of 73.0%. This year SUVs had an all-time best usage rate of 89.9%. Except for one "bump" upward in 2010, cars have had usage rates in the 82.3 to 85.0% range. In the current year, cars were at an 85.0% usage rate. Vans were the second highest of all vehicle types improving from 87.3% in 2014 to 89.2% in 2015.

The improvement of over 3% in overall seat belt usage is significant and has been the result of a concentrated educational effort by the Occupant Safety and Protection Program of the Office of Transportation Safety. This is by far the biggest improvement in recent years and places Colorado in the top five of secondary law states.

The required change in methodology has had an impact upon the reported seat belt usage rate. The inclusion of select commercial vehicles (10,000 pounds and under) lowered the overall seat belt usage as the commercial usage rate of 73.9% is well below the 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 an all-time high usage rate of 77.6%. While higher than the commercial usage rate, it is still well below the other vehicle types. In agricultural states, secondary road traffic is likely to have more pickup trucks that travel at lower speeds on local roads. All of these factors contribute to lower seat belt usage rates.

This was the fourth 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 1.8%. Trucks had the highest rate at 2.7%.

The challenges of maintaining a high seat belt usage rate in a secondary law state will likely continue, but 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 savings, makes the effort one of the most important endeavors for the State of Colorado.

APPENDICES

APPENDIX 1

Colorado Average Motor Vehicle Crash-Related Fatalities by County 2007-2009*

County	FIPS	Average Fatality Counts (2007-2009)	Fatality Percentage Within Colorado	Cumulative Fatality Percentage
WELD	123	43.7	8.2	8.2
EL PASO	041	42.7	8.0	16.2
DENVER	031	40.3	7.6	23.8
ARAPAHOE	005	36.3	6.8	30.7
JEFFERSON	059	35.3	6.6	37.3
ADAMS	001	33.3	6.3	43.6
LARIMER	069	26.0	4.9	48.5
PUEBLO	101	23.7	4.5	52.9
MESA	077	20.0	3.8	56.7
BOULDER	013	19.0	3.6	60.3
DOUGLAS	035	15.7	2.9	63.2
GARFIELD	045	14.3	2.7	65.9
LA PLATA	067	12.3	2.3	68.2
DELTA	029	8.7	1.6	69.8
EAGLE	037	8.7	1.6	71.5
MONTROSE	085	6.7	1.3	72.7
PARK	093	6.7	1.3	74.0
FREMONT	043	6.0	1.1	75.1
ROUTT	107	6.0	1.1	76.2
LAS ANIMAS	071	5.7	1.1	77.3
MONTEZUMA	083	5.3	1.0	78.3
HUERFANO	055	5.0	0.9	79.2
GRAND	049	4.7	0.9	80.1
LINCOLN	073	4.7	0.9	81.0
MORGAN	087	4.7	0.9	81.9
SUMMIT	117	4.7	0.9	82.8
BACA	009	4.0	0.8	83.5
LOGAN	075	4.0	0.8	84.3
ALAMOSA**	003	3.7	0.7	85.0

*Fatality data from the Fatality Analysis Reporting System (FARS) 2007-2009

**Elbert was substituted for Alamosa in 2013, see page 4 of this report.

APPENDIX 2

Codes for Road Segment File

Code	Road Class	Definition
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 Segments Population (N), Total Length, and Number of Segments Selected (n)

County		MTFCC Code			Total
		Primary: S1100	Secondary: S1200	Local: S1400	
ADAMS	N	1010	1476	28868	31354
	Length(mi)	134	159	2945	3238
	n	15	16	13	44
ARAPAHOE	N	419	784	30488	31691
	Length	77	79	2575	2731
	n	11	7	26	44
BACA	N		33		33
	Length		155		155
	n		11		11
BOULDER	N	1	1998	21514	23513
	Length	1	239	1894	2134
	n		28	16	44
DELTA	N		732		732
	Length		122		122
	n		11		11
DENVER	N	622	812	25307	26741
	Length	49	56	1921	2026
	n	15	9	20	44
DOUGLAS	N	411	554	19308	20273
	Length	87	91	2043	2221
	n	15	12	17	44
EAGLE	N	503	608		1111
	Length	114	86		200
	n	4	7		11
ELBERT	N	95	215	4497	4807
	Length	52	69	1413	1534
	n		11		11
EL PASO	N	384	1880	51310	53574
	Length	78	213	4378	4669
	n	2	21	21	44
FREMONT	N		858		858
	Length		160		160
	n		11		11
GARFIELD	N	544	654		1198
	Length	126	99		225
	n	6	5		11
GRAND	N		722		722
	Length		166		166
	n		11		11
HUERFANO	N	175	533		708
	Length	59	112		171
	n	3	8		11

JEFFERSON	N	498	1781	35498	37777
	Length	78	211	3082	3371
	n	6	20	18	44
LA PLATA	N		996		996
	Length		156		156
	n		11		11
LARIMER	N	293	1945	31878	34116
	Length	78	266	3397	3741
	n	3	22	19	44
LAS ANIMAS	N	221	393		614
	Length	78	170		248
	n	7	4		11
LINCOLN	N	175	382		557
	Length	59	162		221
	n	2	9		11
LOGAN	N	117	599		716
	Length	92	161		253
	n	3	8		11
MESA	N	477	893	15317	16687
	Length	129	181	2064	2374
	n	6	21	17	44
MONTEZUMA	N	3	1384		1387
	Length(mi)	0.2	229		229.2
	n		11		11
MONTROSE	N		908		908
	Length		190		190
	n		11		11
MORGAN	N	188	653		841
	Length	72	146		218
	n	3	8		11
PARK	N		663	11386	12049
	Length		161	2215	2376
	n		25	19	44
PUEBLO	N	443	1380	18557	20380
	Length	94	216	2261	2571
	n	6	24	14	44
ROUTT	N		496		496
	Length		109		109
	n		11		11
SUMMIT	N	164	411		575
	Length	46	75		121
	n	6	5		11
WELD	N	343	2151	25488	27982
	Length	127	466	4288	4881
	n	3	28	13	44

APPENDIX 4

Weights for the Colorado State Seat Belt Usage Observational Survey

County	MTFC	Sampling Weight	Selection Probability
Adams	S1100/S1200	93	0.0108
Adams	S1400	1673	0.0006
Arapahoe	S1100/S1200	66	0.0152
Arapahoe	S1400	1185	0.0008
Baca	S1200	31	0.0325
Boulder	S1200	73	0.0138
Boulder	S1400	1307	0.0008
Delta	S1200	67	0.0150
Denver	S1100/S1200	65	0.0155
Denver	S1400	1162	0.0009
Douglas	S1100/S1200	46	0.0216
Douglas	S1400	834	0.0012
Eagle	S1100/S1200	101	0.0099
Elbert	S1200	29	0.0350
El Paso	S1100/S1200	116	0.0086
El Paso	S1400	2092	0.0005
Fremont	S1200	78	0.0128
Garfield	S1100/S1200	109	0.0092
Grand	S1200	66	0.0152
Huerfano	S1100/S1200	64	0.0155
Jefferson	S1100/S1200	97	0.0104
Jefferson	S1400	1739	0.0006
La Plata	S1200	91	0.0110
Larimer	S1100/S1200	91	0.0110
Larimer	S1400	1640	0.0006
Las Animas	S1100/S1200	56	0.0179
Lincoln	S1100/S1200	51	0.0197
Logan	S1100/S1200	65	0.0154
Mesa	S1100/S1200	50	0.0198
Mesa	S1400	909	0.0011
Montezuma	S1200	126	0.0079
Montrose	S1200	83	0.0121
Morgan	S1100/S1200	76	0.0131
Park	S1200	29	0.0340
Park	S1400	530	0.0019
Pueblo	S1100/S1200	65	0.0154
Routt	S1200	45	0.0222
Summit	S1100/S1200	52	0.0191
Weld	S1100/S1200	89	0.0113
Weld	S1400	1600	0.0006

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: _____

__ First Week **__ Second Week** **Page ____ of ____**

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																				
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Non-Observ-ables	**Total:**		**Total:**		**Total:**		**Total:**		**Total:**		**Total:**		**Total:**		**Total:**		**Total:**		**Total:**	