

**2004 South Dakota  
Statewide Seatbelt Survey  
Final Report**

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## 2004 South Dakota Statewide Seatbelt Survey

### Summary

A statewide observational survey of seatbelt use on South Dakota (SD) roads was conducted in June of 2004. Seatbelt use and other demographic data were recorded from 12,352 motorists traveling along a selected sample of SD roadways, which included rural and urban highways and interstates in 13 South Dakota counties. Data were recorded from all drivers, right front passengers of any age, and additional children under age 5 in the front or back seat.

Results revealed that 65.1% of all observed occupants were wearing a seatbelt or child restraint. This unweighted percentage was slightly higher than the 2003 unweighted rate of 63.2%. A statewide estimate of 69.4% restraint use was observed for drivers and right front passengers, weighted for road type and vehicle miles traveled at observation sites. This number was slightly lower than the statewide estimate of 69.9% for the summer of 2003. The 2004 weighted statewide estimates for seatbelt use by road type were 67.4% for urban highways (compared to 68.6% for 2003), 62.9% for rural highways (compared to 61.2% in 2003), 78.0% for urban interstates (compared to 75.9% in 2003), and 78.7% for rural interstates (compared to 82.2% in 2003).

Based on unweighted seatbelt rates, the highest use rates were found in the counties of Minnehaha (81.8%), Union (78.5%), and Hughes (76.9%). Intermediate rates were observed in the counties of Pennington (70.2%), Davison (69.5%), Lawrence (68.3), Fall River (62.8%), Beadle (62.6%), and Brown (62.1%). Small rural counties had the lowest rates: Grant (52.8%), Charles Mix (49.9%), Kingsbury (42.6%), and Tripp (32.8%). Seatbelt use rates in 9 of the 13 counties showed increases from the 2003 survey rates.

Unweighted seatbelt use rates varied by estimated age group of occupants. Of a small sample of 65 children who appeared to be under age 5, 72.3% were in a safety restraint. This rate was slightly higher than the 2003 rate of 70.4% for this age group. The 2004 restraint usage rate for 137 children judged to be 5 to 13 years old was 56.2%. This rate was lower than the 2003 rate of 62.5% for children 5 to 13. The rate for 247 teens judged to be between 14 and 17 years old was 44.9%. This rate was higher than the 2003 teen rate of 41.1%. The seatbelt use rate for occupants judged to be 18 years and older was 65.6%, slightly higher than the 2003 rate of 63.9%.

More right front seat passengers (67.3%) than drivers (64.3%) were wearing safety restraints. Seatbelt use also varied by vehicle type. Occupants of sport utility vehicles (70.1%) and cars (68.3%) were more likely to wear safety restraints than were occupants of vans and pickups (58.5%). Finally, it was found that a higher percentage of occupants of out-of-state vehicles (78.7%) wore safety restraints than did occupants of vehicles with South Dakota license plates (62.6%).

## Introduction

Automobile crashes are among the top ten causes of death in the United States (Burayidi, 2003) and were the cause of over 40,000 fatalities and nearly 2 million injuries in the year 2002 alone (FARS, 2002). It is widely recognized that seatbelt usage dramatically reduces the probability of being fatally injured in a motor vehicle crash (Cummings, 2002; Derrig et al., 2002; Glassbrenner, 2003b). According to the NHTSA, deaths and serious disabilities caused by motor vehicle crashes could be reduced by approximately 50% with the use of safety belts and child restraint devices. Despite these figures, a substantial portion of the population do not wear seatbelts.

States have attempted to improve seatbelt use through passage of mandatory seatbelt use laws. In 1996, 49 out of 50 states had some type of statewide legislation mandating safety restraint usage (Derrig, Segui-Gomez, Abtahi, & Liu, 2002). In conjunction with nationwide efforts, the State of South Dakota mandated restraint usage by front seat motor vehicle occupants on January 1, 1995 (DOT, 2002). On July 1, 2001, the State mandated primary enforcement of seatbelt use for all passengers under the age of 18 years. Since 1984, South Dakota has also mandated that child passengers under age 5 or weighing less than 40 pounds must be in a safety restraint.

The U.S. has also exerted considerable efforts in waging seatbelt use enforcement and media campaigns. Click it or Ticket, the largest single effort to increase seatbelt use to date, was initiated in May 2003 (NHTSA, 2003b). NHTSA has credited this campaign, in part, for the nationwide 4% increase in seatbelt usage (from 75% in 2002 to 79% in 2003) estimated in the most recent National Occupant Protection Use Survey (NOPUS) (NHTSA, 2003b). The current nationwide rate of 79% is the highest recorded since NOPUS began. Rates in 1994, when NOPUS was initiated, were a mere 58%, rising to 75% in 2002 (NHTSA, 2002). However, this rate falls far short of meeting the NHTSA's milestone of 90% usage rates for all states, which only four states have met to date (NHTSA, 2004) and motor vehicle injuries and fatalities continue to be a persistent threat to public safety.

Certain segments of the U.S. population are known to have relatively low seatbelt use. Teens are one population with low seatbelt use, especially when they are passengers in vehicles driven by other teenagers (Williams, McCartt, & Geary, 2003). This is particularly problematic because teens also tend to engage in a number of high risk driving behaviors that place them at greater risk of accidents (Wells, Williams, & Frammer, 2002). Gender also plays a role: men are less likely than women to wear seatbelts (Brooke et al., 2001; Wells et al., 2002; Williams, McCartt, & Geary, 2003). Recent efforts to promote seatbelt use have particularly targeted the teen and young male populations and slow but steady progress is being made. The gap appears to be narrowing with the nationwide estimates for male seatbelt increasing from only 67% in 2000 to 72% in 2002 compared to rates of 77% and 79% for females in 2000 and 2002, respectively (Glassbrenner, 2003).

Seatbelt usage rates tend to be significantly lower among lower socioeconomic status populations (Lerner et al., 2001; Wells et al., 2002) and among persons without college degrees (Wells et al., 2002). Seatbelt use rates in rural communities tends to be lower than in urban areas (Zwerling et al., 2001). Nationwide, belt use is lower for motorists traveling in pickup trucks (NHTSA, 2003b) and rates in rural areas remain consistently below urban and suburban area rates. As South Dakota has large rural populations and a high percentage of pickup ownership, the State is at particular risk for low seatbelt use.

These facts and figures emphasize the importance of safety restraint usage at the local level. In response to a national initiative by the NHTSA, the South Dakota Office of Highway Safety commissioned associates of the Human Factors Laboratory (HFL) at the University of South Dakota to conduct a probability-based survey of seatbelt use in the state in the fall of 1998. The annual survey was repeated in the fall of 2000 and 2001, the summer of 2002 and 2003, and currently in the summer of 2004. The purpose of these studies has been to document the level of seatbelt use in a sample of drivers and front seat passengers traveling in noncommercial vehicles on South Dakota roads. This report presents the methods, procedures and results of the 2004 Statewide Seatbelt Survey.

## **Methods**

The methods used in this study were designed and conducted according to federal guidelines established by NHTSA and as implemented in the previous 1998 Statewide Seatbelt Survey. The methods and procedures described below are in compliance with the "Uniform Criteria for State Observational Surveys of Seat Belt Use", published in the Federal Register on September 1, 1998 (63 F.R. 463389). The design was modified in the 2000 survey in an effort to increase the observational rate for children under the age of 5 years.

### **Survey Design: Stage 1**

This study utilized the geographic sampling techniques and road segment sites established in the 1998 survey. The first step was to select geographic areas for sampling of traffic. South Dakota is a state with less than 800,000 citizens residing in 66 counties. The population is not evenly distributed throughout the state, as 50% of the citizens live in eight counties with urban centers. Many of the remaining 58 counties have low populations residing in largely rural areas.

Because it is difficult to sample traffic in all areas of a state with a low population, a "multi-stage cluster approach" was utilized. In this plan recommended by NHTSA guidelines, sampling can be restricted to the counties that account for 85% of the state's population. Therefore, the sampling pool was comprised of the 33 largest counties in South Dakota that account for 85% of South Dakota's population. Table 1 shows the eligible counties in ascending order according to population size.

Table 1: Largest South Dakota Counties Accounting for 85% of the State Population.

County	Population	% of State	Cumulative %
1-33			14.44%
34 Dewey	5668	0.77%	15.21%
35 McCook	5686	0.77%	15.98%
36 Kingsbury	5830	0.79%	16.77%
37 Day	6421	0.87%	17.64%
38 Moody	6538	0.89%	18.53%
39 Tripp	6883	0.93%	19.46%
40 Custer	6966	0.94%	20.40%
41 Fall River	7123	0.97%	21.37%
42 Bon Homme	7677	1.04%	22.41%
43 Spink	7700	1.04%	23.45%
44 Grant	8048	1.09%	24.54%
45 Hutchinson	8102	1.10%	25.64%
46 Turner	8633	1.17%	26.81%
47 Butte	8926	1.21%	28.02%
48 Todd	9296	1.26%	29.28%
49 Charles Mix	9493	1.29%	30.57%
50 Roberts	9973	1.35%	31.92%
51 Lake	10,647	1.44%	33.36%
52 Union	11,959	1.62%	34.98%
53 Shannon	12,010	1.63%	36.61%
54 Clay	15,370	2.08%	38.69%
55 Hughes	15,404	2.09%	40.78%
56 Beadle	17,976	2.44%	43.22%
57 Davison	18,807	2.55%	45.77%
58 Lincoln	20,152	2.73%	48.50%
59 Yankton	21,013	2.85%	51.35%
60 Meade	21,999	2.98%	54.33%
61 Lawrence	22,131	3.00%	57.33%
62 Codington	25,452	3.45%	60.78%
63 Brookings	26,186	3.55%	64.33%
64 Brown	35,701	4.84%	69.17%
65 Pennington	87,190	11.81%	80.98%
66 Minnehaha	140,518	19.04%	100.00%
<b>TOTAL</b>	<b>7,379,733</b>		

Following NHTSA guidelines, a sample of 13 counties could be drawn for a state with at least 85% of the population residing in 30 – 39 counties. The two largest counties in the state were selected and the remaining 11 counties were randomly drawn. Table 2 lists the counties that were selected and their corresponding populations.

Table 2: Selected Counties and Their Populations

County	Population
1. Minnehaha	140,518
2. Pennington	87,190
3. Brown	35,701
4. Lawrence	22,131
5. Davison	18,807
6. Beadle	17,976
7. Hughes	15,404
8. Union	11,959
9. Charles Mix	9,493
10. Grant	8,048
11. Fall River	7,123
12. Tripp	6,883
13. Kingsbury	5,830

Although Hutchinson County was initially drawn for the sample, it was learned that the county would be undergoing a local seatbelt survey in the fall of 1998. Therefore, Tripp County was substituted.

### Survey Design: Stage 2

The second stage of the study was to select the sample of road segments to be surveyed within the thirteen counties. According to NHTSA guidelines, road segments must be drawn from roads that have an adequate level of traffic based upon Vehicle Miles Traveled (VMT) estimates. Initially, it was estimated that there were an average number of 50 road segments available for sampling in the South Dakota counties. According to the NHTSA guidelines, 19 road segments can be sampled from a base of 50 road segments per county.

However, assessment of 1998 VMT estimates for South Dakota roadways revealed that only an average number of 27 road segments were available for sampling in the 13 counties. (Relative to other states, South Dakota has a limited number of roadways for which VMT estimates are recorded.) Therefore, permission was received from the regional survey design advisor to sample 17 or fewer road segments per county.

In order to select the road segments, maps of roadways and VMT estimates per roadway segments for the 13 counties were obtained from the South Dakota Department of Transportation, Division of Planning and Engineering. Roadways were divided into four classifications:

Urban Interstate

Urban Highway -- principal and minor highways within designated urban areas  
(5,000 + population)

Rural Interstate

Rural Highways -- principal and minor highways outside of urban areas.

Following recommendations from the regional survey design advisor, road segments for urban interstate and urban highways were measured in one mile units, whereas road segments for rural interstate and rural highways were measured in ten mile units. VMT estimates were calculated for each road segment chosen. Road segments with unacceptably low VMT estimates were excluded. Once all of the roadways in a county were divided into eligible segments, a random numbers program was used to select 17 segments for sampling.

The random selection procedure was restricted by the roadway classification of a segment so that the number of segments chosen would be proportionate to the total VMT traveled on a roadway type for that county. For example, in Minnehaha County, the proportions of total vehicle miles traveled by roadway type were:

23% for Urban Interstate  
43% for Urban Highways  
25% for Rural Interstate  
10% for Rural Highways.

Therefore, the drawing of selected road segments was restricted to:

4 Urban Interstate sites (about 23% of 17 sites)  
7 Urban Highway sites (about 43% of 17 sites)  
4 Rural Interstate sites (about 25% of 17 sites)  
2 Rural Highway sites (about 10% of 17 sites).

The procedure described above was applied individually to the 13 counties for final selection of the 17 road segments. Five counties (Brown, Davison, Grant, Kingsbury, and Tripp) had only 13 to 16 road segments chosen because of a limited number of roadways with VMT data available.

The last step in the road segment selection process was to designate a seatbelt observation site within each of the 205 selected road segments. Whenever possible, the observation site was placed at an intersection in which vehicles slowed or stopped for a traffic signal or sign. This allowed for accurate and safe viewing of seatbelt use by the Observers. See Appendix A for a list of the observation sites by mile marker and probability of selection in counties by the four roadway types.

## **Sampling Time Periods**

Six 90-minute blocks of daylight time were scheduled for seatbelt observations. One observation time period was 40 minutes. Including travel time, six sites could be observed in a single day. A county could therefore be surveyed in a four-day period. To minimize travel time and distance required to conduct the survey, sample sites were grouped into geographic clusters. A day of the week to begin data collection was assigned to a cluster. Within a cluster, each road segment was randomly assigned to the available time slots. The time blocks were:

- 1) 7:30AM - 9:00AM
- 2) 9:00AM - 10:30AM
- 3) 10:30AM - 12 noon
- 4) 12 noon - 1:30PM
- 5) 1:30PM - 3:00 PM
- 6) 3:00PM - 4:30PM

## **Sample Size**

Based on previous observational surveys in South Dakota, it was estimated that approximately 10,000 vehicle observations would be collected from the 205 sites. This sample size allows one to be 95% confident that the numbers reported would be within 1% of the actual values -- an acceptable margin of error according to NHTSA guidelines.

## **Data Collection**

For the 2000 survey, the 1998 data collection form was modified to reflect the inclusion of additional child passengers between 0-4 years of age. This modification was implemented in all subsequent surveys including the current 2004 survey. A copy of this modified form is included on the last page of the Observer Manual in Appendix B. The data collection form was designed for recording seatbelt use (yes or no) by front seat drivers and right-side passengers of each vehicle observed in the survey. The modified form also included instructions for recording additional front seat passengers and back seat passengers who appeared to be under the age of five years.

The form allowed collection of other information of interest to the South Dakota Office of Highway Safety, including child restraint use for all passengers who appeared to be under age five, estimated age of drivers and passengers, vehicle type, and in- or out-of-state license plate of the vehicle. Demographic data were also collected for each vehicular observation period including county, site number, time of day, date, observer initials, and roadway type. Data were collected for all passenger cars, pickups, vans, and sport utility vehicles observed. Commercial trucks and motor homes were excluded.

## **Observers, Observation Procedures, and Observer Training**

Two Observers were assigned to a county. Nearly all of the Observers were members of a retired citizen group who have a background in driver education. Members of this group have been found to be accurate and motivated observers of seatbelt use in previous surveys. Observers received: 1) a list of observation sites and a description and maps of the site locations for their respective counties, 2) a four-day schedule for completing a 40-minute observation period of each site in their county, 3) an instruction manual explaining how to conduct roadside observations, and 4) coding sheets for recording data. In addition, the Office of Highway Safety issued Observers safety vests, clipboards, and additional coding sheets. Observers received training through a series of telephone conference calls with the HFL investigators. Observers were instructed to read the manual and engage in a practice period using local traffic. After the practice period, Observers received a final call from the investigators to review procedures. Nearly all of the Observers (23 of 26) working in the 2004 surveys had participated in earlier surveys. Due to their experience and training, the 2004 Observers were expected to produce reliable data.

Observers were instructed to follow their observation schedules as closely as possible. In the event that Observers could not complete a scheduled site due to weather or problems, they were instructed to call the HFL investigators for reassignment of that site. Observers were asked to stand or park in a safe viewing place when they reached an observation site. They were to station themselves so that they could view traffic traveling in a pre-designated direction on the pre-designated roadway. Observers were instructed to monitor every vehicle if the traffic flow was regular or light, and every other vehicle if the traffic flow was heavy. Observers monitored traffic for 40 minutes of the 90 minute observation period, and used the remaining minutes for travel time and location of a safe observation point.

The data collection procedures are explained in detail in the "Observer Manual – 2004 South Dakota Seatbelt Survey" in Appendix B.

### **Review of Data**

A graduate student in the Human Factors program at USD received University funding to review over 12,000 lines of raw data for unreadable writing, obvious errors, and logical inconsistencies in the coding (e.g., two drivers in a vehicle with the same ID number; a driver with an infant age). When possible, the coding was corrected. If there remained a question as to the validity of the coding, the line was discarded. Once data were encoded, investigator Carryl Baldwin used computer analyses to review the data again for logical errors in coding.

## Results

A total of 12,352 observations from the 13 selected counties were included in the analyses. A small percentage of observations could not be included in individual analyses due to missing data. Of the 12,352 motorists, 8043 or 65.1% were wearing shoulder safety restraints or were placed in a child restraint, while 4309 or 34.9% were not wearing safety restraints. This unweighted seatbelt use rate was slightly higher than the unweighted rate of 63.2% observed in the 2003 survey.

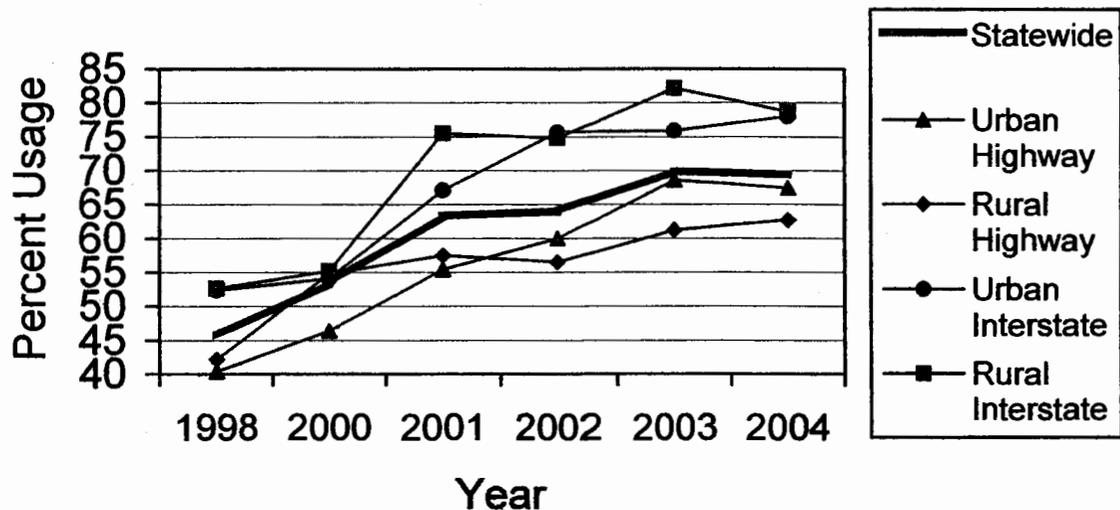
### Estimate of Statewide Seatbelt Use

The statewide estimate of seatbelt use was obtained by finding the percentage of seatbelt use for each of the 205 sites, and then computing a weighted mean for each road type for each county. Then, a weighted average for each road type across counties was found where the weights were the VMT (vehicle miles traveled) for that county on that road type and the sampling weight for the county based on the probability of its selection to be included in the survey. Finally, the estimates for the four road type averages were weighted by the VMT for each road type for the entire state. *The resulting estimate for seatbelt use on all South Dakota roads was 69.4% with a standard error of 0.439.* Thus, it can be said that there is a 95% probability that the true rate of seatbelt use for South Dakota roads ranges between 68.54% and 70.26%. The formulas and weights for calculating the statewide estimate and standard deviation are in Appendix C.

The 2004 statewide estimate was approximately 0.5% lower than the 2003 rate. This difference is statistically significant,  $t(60) = 6.13$ ,  $p < .001$ . The practical significance of this decline, however, may be minimal. By comparison, the statewide estimate increased a solid 6% points between 2002 and 2003. A decline of .5 point in the 2004 statewide estimate may reflect a temporary plateau in the trend of steadily rising seatbelt use rates over the past seven years. This pattern is shown in Table 3 and Figure 1.

Table 3: Weighted Restraint Use by Year and Road Type

Road Type	Year					
	1998	2000	2001	2002	2003	2004
Statewide	45.7	53.4	63.3	64.0	69.9	69.4
Urban Highway	40.4	46.4	55.4	60.0	68.6	67.4
Rural Highway	42.2	54.8	57.5	56.5	61.2	62.7
Urban Interstate	52.4	54.1	75.7	75.7	75.9	78.0
Rural Interstate	52.7	55.2	74.8	74.8	82.2	78.7

**Figure 1: Restraint Use by Year and Roadtype**

#### Estimate of Statewide Seatbelt Use by Road Type

The 2004 weighted statewide estimates for seatbelt use by road type were 67.4% for urban highways, 62.7% for rural highways, 78.0% for urban interstates, and 78.7% for rural interstates. Compared to 2003 rates (see Table 3), seatbelt use decreased on urban highways by 1.2%, increased 1.5% on rural highways, increased 2.1% on urban interstates, and decreased 3.5% points on rural interstates. Given the confidence bounds on these rates of +/- less than 1%, the differences can be considered statistically significant.

#### Seatbelt Restraint Use by County

Table 4 presents a summary of unweighted data regarding overall seatbelt restraint use in each county, as well as the total number of observations per county. Several counties had seatbelt use rates above the national average of 75% observed in the National Occupant Protection Use Survey in 2002 (NHTSA, 2002). These counties were Minnehaha (81.8%), Union (78.5%), and Hughes (76.9%).

The highest 2004 usage rate for South Dakota was observed in Minnehaha County where 81.8% or 899 of the 1099 motorists observed were wearing safety restraints. This rate was slightly higher than the rate of 80.4% observed in the 2003 Survey. The next highest usage rate was observed in Union County with 78.5% or 395 of 503 motorists wearing a restraint. Again, this use rate represented an increase over the 77.0% rate found in the 2003 survey. The next highest rate was observed in Hughes County, where

76.9% or 1083 of 1409 motorists were restrained. The Hughes County rate was slightly higher than its 2003 rate of 75.8%.

Several other South Dakota counties showed strong upward trends in seatbelt use. Davison County had a usage rate of 69.5% or 738 out of 1062 motorists. This rate was substantially higher than the 59.6% observed in the 2003 survey. Grant County also showed a notable increase from a 2003 rate of 45.0% to 52.8% (428 of 811 motorists) in 2004. Beadle County had a similar rise in seatbelt use from a 2003 rate of 55.4% to 62.6% (550 of 879 motorists) in 2004.

Seatbelt use rose modestly in five other counties. Seatbelt use in Pennington County was 70.2% (1015 of 1445 motorists) in 2004 compared to 67.0% in 2003. The 2004 rate for Charles Mix was 49.9% (431 of 863 motorists), slightly higher than the 2003 rate of 48.1%. Fall River had a 2004 rate of 62.8% (268 of 427 motorists), slightly higher than the 2003 rate of 60.1%.

Four counties showed modest decreases in seatbelt use. In 2004, Brown County had a usage rate of 62.1% (918 of 1478 motorists), slightly lower than the 2003 survey rate of 64.9%. Lawrence County's rate decreased from 72.7% in the 2003 survey to 68.3% in the 2004 survey (929 of 1360 motorists). Tripp County had a 2004 usage rate of 32.8% (146 of 445 motorists), a dip from a 2003 rate of 36.8%. Kingsbury County's rate dropped from 48.6% in the 2003 survey to 42.6% (243 of 571 motorists) in the 2004 survey.

**Table 4: Restraint Use by County**

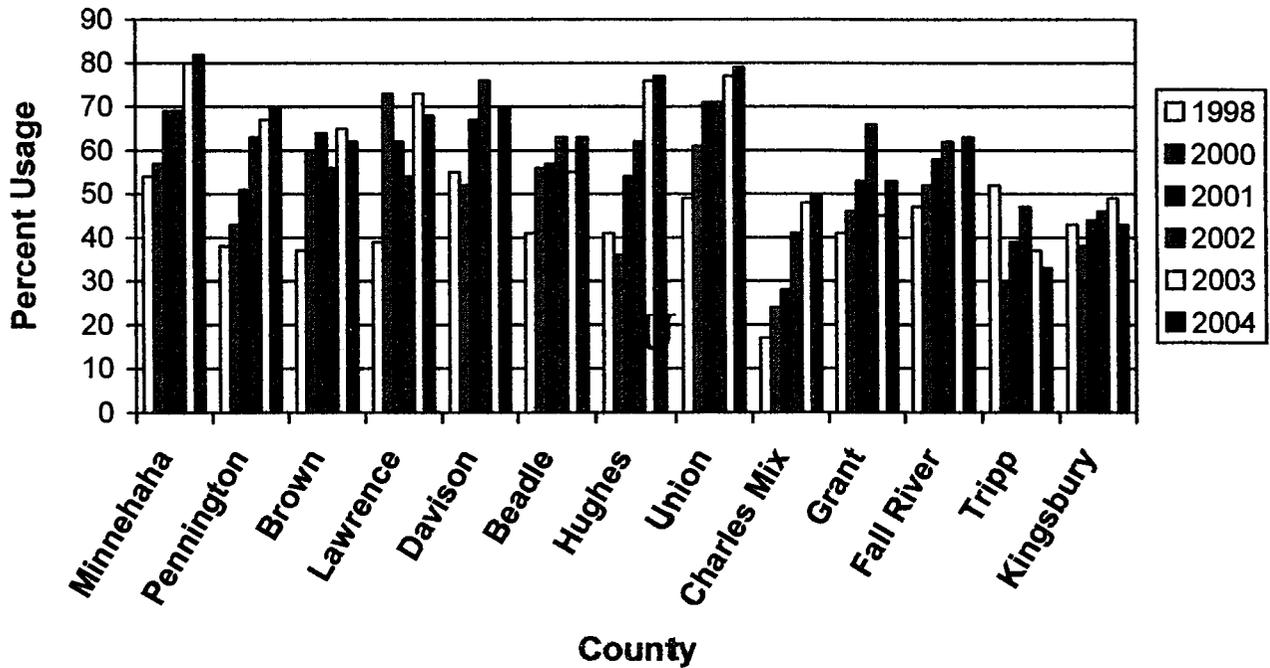
County	Restraint Used		Total
	Yes	No	
Minnehaha	899 81.8%	200 18.2%	1099
Pennington	1015 70.2%	430 29.8%	1445
Brown	918 62.1%	560 37.9%	1478
Lawrence	929 68.3%	431 31.7%	1360
Davison	738 69.5%	324 30.5%	1062
Beadle	550 62.6%	329 37.4%	879
Hughes	1083 76.9%	326 23.1%	1409
Union	395 78.5%	108 21.5%	503
Charles Mix	431 49.9%	432 50.1%	863
Grant	428 52.8%	383 47.2%	811
Fall River	268 62.8%	159 37.2%	427
Tripp	146 32.8%	299 67.2%	445
Kingsbury	243 42.6%	328 57.4%	571
Total	8043	4309	12,352
% of Total	65.1	34.9	

In summary, 9 out of 13 counties showed an increase in seatbelt use rates from the 2003 to the 2004 survey periods. A summary of seatbelt use rates in the 13 South Dakota counties over the past five survey periods can be seen in Table 5 and Figure 2. The data show a steady pattern of increasing seatbelt use in many of the counties. Consistently improving seatbelt use over the past seven years is clearly demonstrated in Minnehaha and Pennington Counties, the two largest population centers of the state. Steady progress is also evident in Hughes, Union, Charles Mix and Fall River Counties. Fluctuating rates in other counties (e.g., Grant and Davison) nonetheless show upward progress. Only two very small rural counties – Tripp and Kingsbury – have shown relatively little change over time.

Table 5: Unweighted Percent Restraint Use by County by Year

County	Year					
	1998	2000	2001	2002	2003	2004
Minnehaha	54	57	69	69	80	82
Pennington	38	43	51	63	67	70
Brown	37	60	64	56	65	62
Lawrence	39	73	62	54	73	68
Davison	55	52	67	76	60	70
Beadle	41	56	57	63	55	63
Hughes	41	36	54	62	76	77
Union	49	61	71	71	77	79
Charles Mix	17	24	28	41	48	50
Grant	41	46	53	66	45	53
Fall River	47	52	58	62	60	63
Tripp	52	30	39	47	37	33
Kingsbury	43	38	44	46	49	43

Figure 2: Restraint Use by County by Year



### **Age of Motorist**

Observers estimated the age of drivers and passengers to the best of their ability. If the Observer was unable to determine age, these few instances were excluded from the age by restraint use analyses. As in all previous surveys since 1998, Observers always recorded data for the driver and a right front passenger, irrespective of age. In subsequent years (2000, 2001, 2002, 2003 and the 2004 surveys), data were also recorded for additional passengers between 0-4 years of age present in the front seat (e.g., on the right front passenger's lap or in the middle of the seat). Data were also recorded for any child between 0-4 years of age riding in the back seat. This new protocol was adopted in order to increase the sample size of child passengers age 0-4 years for better estimates of child restraint use.

Due to a misunderstanding of instructions, some of the Observers in 2004 recorded seatbelt/restraint usage for any person under the age of 18 observed riding in the middle or back seat passenger positions. Because these data did not follow the prescribed protocol, they were not included in any of the overall analyses. However, because the data represented actual cases and included a substantial number of youths aged 14 to 17, the data were analyzed and are reported in Table 6 in Appendix D.

Child restraint use was defined as a passenger restrained by a child carrier. If children under the age of 5 years were observed riding in the front or back seat of a vehicle unrestrained, this was recorded as no restraint used. If a child under five years of age was observed riding in the front or back seat wearing a shoulder restraint but not seated in a child carrier, then restraint use was recorded as a "yes". Note however, that according to South Dakota law, all children under the age of 5 years should be restrained in an approved child safety restraint unless they weigh more than 40 pounds. Table 7 illustrates the total number of observations and restraint use by each age group including the use of child restraints.

Table 7: Unweighted Restraint Use by Age

Age	Restraint Use			Total
	Belt	Child Restraint	None	
0 - 4 years	22 33.8%	25 38.5%	18 27.7%	65
5 -13 years	75 54.7%	2 1.5%	60 43.8%	137
14 - 17 years	111 44.9%		136 55.1%	247
18 & over	7808 65.6%		4095 34.4%	11903
Total	8016 64.9%	27 .2%	4309 34.9%	12,352

A total of 65 children between 0-4 years of age were observed. Of these, a total of 72.3% were observed in some type of safety restraint: 38.5% (25 of 65) were buckled in a child safety restraint and 33.8% (22 of 65) were wearing a shoulder restraint, but not seated in a child safety seat. The remaining 27.7% (18 of 65) were not wearing any type of safety restraint. These rates have risen slightly over the past two years. The child restraint use rate was 70.4% in 2003 and 67.1% in 2002.

A total of 137 children between 5 to 13 years of age were observed. Of these, 75 or 54.7% were wearing a seatbelt and an additional 2 were in a child safety seat for a total of 56.2% rate of safety restraint usage. This rate is slightly lower than the 62.5% rate observed in 2003, but higher than the 2002 rate of 53.5%.

A total of 247 motorists were estimated to be the teen-age category of 14 to 17 years. Of these, 111, or 44.9% were wearing a safety restraint. This rate is up slightly from the rate of 41.1% observed in the 2003 survey, but lower than 2002 rate of 48%.

As in previous years, the majority of observed motorists (a total of 11,903) were estimated to be in the age group of 18 years and older. Of these, 7808 (65.6%) were wearing a restraint. The adult rate represents steadily increasing usage rates over the survey years. In past surveys, the adult use rates were 63.9% in 2003, 61.6% in 2002, 56.5% in 2001, and 53.2% in 2000.

### Drivers versus Passengers

According to guidelines, data were recorded for all drivers and right front seat passengers. Data for additional passengers were only recorded if the additional passenger was under the age of 5 years (0-4 years). Unweighted data for restraint use by occupant position in the vehicle are presented in Table 8. Restraint use was somewhat higher for passengers than for drivers. Of the 9234 drivers observed, 5933 or 64.3% were wearing a safety restraint. This rate represents a modest increase relative to the rate of 62.5% in the 2003 Survey. Of the 3,074 right front seat passengers observed, 2069 or 67.3% were wearing shoulder restraints, with an additional 6 or .2% in a child safety seat.

According to federal and state guidelines, children 0-4 years of age should be placed in a child safety restraint in the back seat, where possible. As indicated in Table 8, 85.3% (29/34) of the 0-4 year age children seated in the back seat were in fact observed in some type of safety restraint. However, the rate of children age 0-4 placed in a back seat child restraint is still low at 52.9% or 18 of 34.

Data from 10 additional child front seat passengers were recorded. Of these 10, 6 or 60% were wearing some type of safety restraint, with 3 (30%) observed to be in a child safety seat and the remaining 4 (40%) were not using any type of restraint. This overall restraint rate of 60% is down slightly from the rate of 62.5% observed in the 2003 survey. However, due to the low number of observations for children under 5 years observed in the additional front seat and back seat positions, the comparisons of seatbelt use rates between years may not be reliable.

Table 8: Unweighted Restraint Use for Drivers versus Passengers.

Occupant Type	Restraint Use			Total
	Yes	Child Restraint	None	
Drivers	5933 64.3%		3301 35.7%	9234
Right-Front Passengers	2069 67.3%	6 .2%	999 32.5%	3074
Additional Child Front Passenger	3 30.0%	3 30.0%	4 40.0%	10
Child Passenger Back Seat	11 32.4%	18 52.9%	5 14.7%	34
Total	8016 64.9%	27 .2%	4309 34.9%	12352

## Vehicle Type

Only non-commercial vehicles were observed. Vehicles were categorized into three classifications: cars; vans, mini-vans, pickups and station wagons; and Sport Utility Vehicles (SUVs). Table 9 presents a summary of data regarding restraint use in each vehicle category. The ratio of restraints worn per motorist is considerably higher in categories of cars (68.3%) and Sport Utility Vehicles (70.1%) than the rate observed for vans/pickups (58.5%). This pattern of rates is consistent with the rates observed in prior surveys dating back to 1998.

Table 9: Unweighted Restraint Use by Vehicle Type

Vehicle Type	Restraint Use			Total
	Yes	Child Restraint	None	
Cars	3847 68.3%	13 .2%	1770 31.4%	5630
Vans/Pickups	2734 58.5%	9 .2%	1931 41.3%	4674
SUVs	1435 70.1%	5 .2%	608 29.7%	2048
Total	8016 64.9%	27 .2%	4309 34.9%	12,352

## In-State versus Out-of-State Vehicles

Observers recorded whether or not the vehicles included in the observation had in or out-of-state license plates. The overwhelming majority of observations were of vehicles with in-state license plates (85.5% or 10,540 out of 12,329). As illustrated in Table 10, vehicles with out-of-state license plates tended to have higher rates of seatbelt restraint use (78.8% for seatbelts and child safety restraints combined) than did motorists traveling in vehicles with in-state license plates (62.6%).

Table 10: Unweighted Restraint Usage Observed for In- and Out-of-State License Plates

License Plates	Restraint Use			Total
	Yes	Child Restraint	None	
In-State	6594 62.6%	24 .2%	3922 37.2%	10,540
Out-of-State	1408 78.7%	3 .2%	378 21.1%	1,789
Total	8002 64.9%	27 .2%	4300 34.9%	12,329

## Discussion

Results of the current survey established that the weighted, statewide estimate of restraint use for South Dakota in year 2004 was 69.4%. This weighted, statewide estimate was statistically lower than the 2003 rate of 69.9%. However, the practical significance of this slight drop is limited in comparison to the robust 6% increase in the statewide estimate in the previous year. Over the past seven years, statewide estimates of seatbelt use in South Dakota have steadily risen from a rate as low as 46% to one approaching 70%. The 2004 statewide estimate of 69.4% may represent only a temporary plateau in this upward trend. This interpretation is bolstered by the finding that the unweighted rate of seatbelt use of 65.1% for all observed occupants in 2004 was higher than the comparable rate of 63.2% in 2003.

South Dakota seatbelt rates have demonstrated a positive upward trend over the past seven years. This trend has been consistently demonstrated in South Dakota's two most populated counties – Minnehaha and Pennington. South Dakota's overall trend of improvement in seatbelt use mirrors a general nationwide trend. Nationwide seatbelt use rates have been rising steadily from 68% in 1996, 68.9% in 1998, 71% in 2000, 73% in 2001, 75% in 2002, to 79% in 2003 according to NHTSA records. South Dakota's seat belt usage rate is comparable to other states in the region. The 2003 safety belt usage rate observed in a Kansas survey was 64% for all motorists and 79% for children 0-4 years of age (Kansas Department of Transportation, 2004).

Another important finding of the survey is that child restraint use continues to improve. Of 65 children who appeared to be under age 5, 72.3% were wearing a safety restraint. This rate was slightly higher than the 70.4% rate observed in 2003. In contrast, children who appeared to be age 5 to 13 were less protected than younger riders. The 2004 rate of seatbelt use for children in this age group was 56%, a figure that was down from the rate of 62% in 2003. Finally, as found in other research (Williams et al., 2003), teenagers also had relatively low seatbelt use rates. The 2004 seatbelt use for riders who appeared between 14 and 17 was only 45%. However, this low rate was an improvement over the 41% use rate for teens in the 2003 survey. These figures suggest that while high percentages of adult citizens of South Dakota are protecting themselves and their very young children with seatbelt use, substantial numbers of older children remain at risk.

Finally, the survey provided some useful information on older children riding in back seats -- a population seldom studied in seatbelt surveys. The seatbelt rates presented above were for children 5 – 13 and 14 – 17 who were riding in the front passenger position. Going beyond their instructions, Observers also provided seatbelt information on 184 children in these age groups who were riding in the back seat. Interestingly enough, older children in the back seat had relatively higher rates of restraint use than older children in the front seat. The back seat seatbelt use rate for children 5 to 13 was 64%, compared to 56% for front seat children. The backseat rate for teens was 72% compared to 45% for front seat teens. It may be worthwhile to further investigate this disparity of seatbelt use in future surveys.

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## Appendix A

### List of Observation Sites by Roadway Type

#### Urban Interstate

County	Road	Mile	Site #	Probability of Selection for County
Minnehaha	29N	77	2	.31
Minnehaha	29N	98	3	.31
Minnehaha	229	3	4	.31
Minnehaha	229	5	5	.31
Minnehaha	229	7	6	.31
Pennington	90E	56	11	.18
Pennington	90E	60	12	.18
Lawrence	90	13	2	1.00
Davison	90	330	8	1.00
Davison	90	333	10	1.00
Union	29S	.98	1	1.00

#### Rural Interstate

Minnehaha	90	379	13	.19
Minnehaha	90	390	14	.19
Minnehaha	90	412	15	.19
Pennington	90E	66	13	.31
Pennington	90E	90	14	.31
Pennington	90E	98	15	.31
Pennington	90W	55	16	.31
Pennington	90W	62	17	.31
Lawrence	90	12	1	1.00
Lawrence	90E	15	3	1.00
Lawrence	90E	27	4	1.00
Lawrence	90W	12	5	1.00
Lawrence	90W	15	6	1.00
Lawrence	90W	24	7	1.00
Davison	90	319	6	1.00
Davison	90	325	7	1.00
Davison	90	332	9	1.00
Union	29N	1	2	1.00
Union	29N	18	3	1.00
Union	29N	27	4	1.00
Union	29S	42	5	1.00
Grant	29	201	16	1.00

**Urban Highway**

Minnehaha	115	84	7	.70
Minnehaha	115	87	8	.70
Minnehaha	115	88	9	.70
Minnehaha	11	79	10	.70
Minnehaha	42	363	11	.70
Minnehaha	42	367	12	.70
Minnehaha	38	365	17	.70
Pennington	16	69	2	.18
Pennington	16B	68	3	.18
Pennington	16B	70	4	.18
Pennington	79	80	6	.18
Pennington	44	40	7	.18
Pennington	44	49	8	.18
Brown	12	289	4	1.00
Brown	12	290	5	1.00
Brown	12	292	6	1.00
Brown	12E	289	8	1.00
Brown	281	193	9	1.00
Brown	281N	197	14	1.00
Lawrence	14A	9	14	.13
Lawrence	14A	10	15	.13
Davison	37	74	3	.60
Davison	37	76	4	.60
Davison	38	300	12	.60
Beadle	37	125	13	1.00
Beadle	37	127	14	1.00
Beadle	37	128	15	1.00
Hughes	14E	230	3	1.00
Hughes	14W	232	5	1.00
Hughes	14	229	6	1.00
Hughes	14	230	7	1.00
Hughes	14B	95	11	1.00
Hughes	14B	96	12	1.00
Hughes	34	209	13	1.00
Hughes	34	210	14	1.00

**Rural Highway**

Minnehaha	19	64	1	.07
Minnehaha	38	349	16	.07
Pennington	16	45	1	.10
Pennington	16A	59	5	.10
Pennington	44	87	9	.10
Pennington	44	107	10	.10
Lawrence	385	122	8	.66

Lawrence	85	28	9	.66
Lawrence	14A	29	10	.66
Lawrence	14A	35	11	.66
Lawrence	14A	37	12	.66
Lawrence	14A	41	13	.66
Lawrence	14A	41	16	.66
Lawrence	14A	50	17.	.66
Brown	10	279	1	.55
Brown	10	282	2	.55
Brown	10	297	3	.55
Brown	12	309	7	.55
Brown	281	214	10	.55
Brown	281	214	11	.55
Brown	281S	185	12	.55
Brown	281N	185	13	.55
Brown	37	207	15	.55
Brown	37	208	16	.55
Brown	37	208	17	.55
Hughes	83	138	1	.69
Hughes	1804	256	2	.69
Hughes	14	139	4	.69
Hughes	14	246	8	.69
Hughes	14	251	9	.69
Hughes	14	263	10	.69
Hughes	34	212	15	.69
Hughes	34	232	16	.69
Hughes	34	245	17	.69
Davison	37	62	1	.83
Davison	37	72	2	.83
Davison	37	76	5	.83
Davison	42	302	11	.83
Davison	38	302	13	.83
Beadle	14	333	1	.83
Beadle	14	354	2	.83
Beadle	14	354	3	.83
Beadle	14	363	4	.83
Beadle	14	316	5	.83
Beadle	14	326	6	.83
Beadle	14	326	7	.83
Beadle	14	331	8	.83
Beadle	28	269	9	.83
Beadle	28	283	10	.83
Beadle	28	298	11	.83
Beadle	281	117	12	.83
Beadle	37	133	16	.83
Beadle	37	145	17	.83
Union	46	365	6	.88

Union	46	366	7	.88
Union	46	380	8	.88
Union	46	371	9	.88
Union	11	9	10	.88
Union	11	23	11	.88
Union	11	35	12	.88
Union	11	35	13	.88
Union	50	423	14	.88
Charles Mix	50	337	1	.88
Charles Mix	50	329	2	.88
Charles Mix	50	314	3	.88
Charles Mix	50S	299	4	.88
Charles Mix	50N	299	5	.88
Charles Mix	50	273	6	.88
Charles Mix	1804	90	7	.88
Charles Mix	1804	120	8	.88
Charles Mix	44	298	9	.88
Charles Mix	44	305	10	.88
Charles Mix	44	306	11	.88
Charles Mix	45	27	12	.88
Charles Mix	46	277	13	.88
Charles Mix	46	288	14	.88
Charles Mix	46	290	15	.88
Grant	20	439	1	1.00
Grant	20	439	2	1.00
Grant	20	446	3	1.00
Grant	158	439	4	1.00
Grant	12	377	5	1.00
Grant	12	388	6	1.00
Grant	12	390	7	1.00
Grant	12	390	8	1.00
Grant	12	399	9	1.00
Grant	123	172	10	1.00
Grant	15	160	11	1.00
Grant	15	167	12	1.00
Grant	15	174	13	1.00
Grant	15	174	14	1.00
Grant	15	175	15	1.00
Fall River	18	62	1	.65
Fall River	18	11	2	.65
Fall River	18	12	3	.65
Fall River	18	24	4	.65
Fall River	471	7	5	.65
Fall River	471	21	6	.65
Fall River	471	27	7	.65
Fall River	89	29	8	.65
Fall River	71	1	9	.65

Fall River	71	2	10	.65
Fall River	71	7	11	.65
Fall River	71	27	12	.65
Fall River	71	35	13	.65
Fall River	385	39	14	.65
Fall River	79	26	15	.65
Fall River	385	12	16	.65
Fall River	385	13	17	.65
Tripp	53	26	1	1.00
Tripp	183S	5	2	1.00
Tripp	183S	19	3	1.00
Tripp	183N	43	4	1.00
Tripp	183N	61	5	1.00
Tripp	49	18	6	1.00
Tripp	49	27	7	1.00
Tripp	49	42	8	1.00
Tripp	18	242	9	1.00
Tripp	18	252	10	1.00
Tripp	18	252	11	1.00
Tripp	18	273	12	1.00
Tripp	44	237	13	1.00
Tripp	44	270	14	1.00
Kingsbury	25	114	1	1.00
Kingsbury	25	120	2	1.00
Kingsbury	81	116	3	1.00
Kingsbury	81	119	4	1.00
Kingsbury	81	125	5	1.00
Kingsbury	14	363	6	1.00
Kingsbury	14	365	7	1.00
Kingsbury	14	378	8	1.00
Kingsbury	14	378	9	1.00
Kingsbury	14	383	10	1.00
Kingsbury	14	387	11	1.00
Kingsbury	14	390	12	1.00
Kingsbury	14	400	13	1.00
Kingsbury	25	113	14	1.00

## **Appendix B**

**Observer Manual – 2004 South Dakota Seatbelt Survey**

# **Observer Manual**

**2004 South Dakota  
Seatbelt Survey**

# INSTRUCTIONS FOR USING THE SOUTH DAKOTA SEATBELT SURVEY FORM

## South Dakota Statewide Seatbelt Survey

June, 2004

### OVERVIEW

The South Dakota Seatbelt Survey Form has been designed so that a large amount of information can be efficiently collected about seatbelt use on our state roads. The form allows for collection of seatbelt use data for all drivers and right front passengers in non-commercial vehicles, as well as children age four and under **anywhere** in the car. The form is constructed so that each driver and passenger (when present) receives one full line of data -- 22 columns across the page.

The first four columns are used to record the occupant's vehicle identification number and the type of vehicle. The next three columns are for occupant information, including whether the person is a driver, a right front seat passenger (of any age), an additional child 0-4 years in the front, or a child 0-4 years in the back seat. The most important information is whether the occupant has on a seatbelt or is in a child restraint. Age of the occupant is guessed at to determine restraint use for children and teenagers. Finally, the vehicle license plate is recorded as being either in state or out of state.

The remaining 13 columns are used for recording "demographic" information about the observation such as county, site number, time of day, and road type. Whereas the vehicle and occupant information must be recorded immediately as the vehicle passes, the demographic information only has to be written once on the first line of the first coding form used for a 40-minute observation period. When the coding sheets are processed, the demographic information will be automatically duplicated for all persons recorded during that observation session.

**The observer procedures described in this manual are identical to those in the 2003 manual. If you did the survey last year, you will do the same thing this year! However, watch out for these common mistakes made in past surveys.**

- **Remember to start with Vehicle ID Number "001" for every new observation period. In past surveys, some Observers started with the number from the previous survey period. For example, if they ended up with 45 vehicles during the first period, they started with number "046" for the second period and continued upwards for every new period.**
- **Remember to give an "extra" child passenger (0 – 4 years of age) who is sitting in the middle of the front seat or on the lap of a right front seat passenger the special Driver/Passenger/Extra code of "3". Remember to give any child 0 – 4 years sitting in the back seat the special Driver/Passenger/Extra code of "4".**

**Remember that we are only interested in “extra “ child passengers (those sitting in the middle of the front seat or in the back seat) who appear to be less than 5 years old. If an “extra”child appears older than are five, don’t record any data for this child.**

- **In past surveys, some vehicles were assigned two drivers – code “1”. We are not sure if the Observers coded a passenger as “1” instead of “2”, or if there were two vehicles with different drivers who were accidentally assigned the same vehicle ID number. Please check your work to correct for this.**
- **In the past surveys, there were some drivers who were assigned the age category of 1 (0 – 4 years) making them too young to be driving!**
- **Remember to use the Road Type code number for a site that appears in the description in the site list. These are the correct codes according to definitions used by the Department of Transportation. Even though a highway runs through an intersection in town, it is still considered a “rural highway” if the town has less than 5,000 people.**
- **Do not “double sample” any site by having two Observers recording data on two different streams of vehicles at or near the same site. It is acceptable for Observers to share recording duties or to take turns recording data on one stream of vehicles during a 40-minute period. But, do not split up and watch two streams of vehicles that are going different directions or are at slightly different locations at the same site.**
- **Remember to stop observing vehicles at the end of the 40 minute period, no matter if you have 0 vehicles or a 100!**

## **1) Materials**

Observers will be provided an Observer Site Schedule that will show the time and place to observe traffic over a 4-day period. A few extra days are listed as alternative dates. They will receive an Observation Site List that contains the numbers and descriptions of the observation sites. Maps of the observation sites will also be provided. Sites include road segments between mile markers that are located along urban and rural highways and interstates. Each site will be monitored for a 40-minute session during one of 6 time slots spread over the 4-day period. The observations are conducted according to the following steps.

## **2) Preparation for the Observation Session:**

Observers should wear an orange safety vest issued by the SD Office of Highway Safety to increase their visibility to passing traffic. Observers should carry their observation sheets on a clipboard and use a number 2 pencil for recording information. Do not use ink or flair pens. It is very important that Observers write numbers clearly so that they can be entered correctly into the computer. Cross "7"s so that they can be distinguished from "1"s.

### 3) Arrival on Site and selection of an Observation Area:

Observers should reach their observation site a few minutes before they plan to begin the observation session. Note that scheduled time periods are 1½ hour periods and the observation session is only for 40 minutes. This will give Observers some leeway in start and stop times. Make sure you allow plenty of time to finish and get to the next site on time.

Before the observation session begins, the Observer should record the demographic information in columns 9 - 22 on the first row of the observation sheet. Most of the codes for the demographic information are on the top of the observation form. Information about "Road Type" is on the Site List. This information only has to be coded once for each 40-minute observation session.

Observers will then choose a position at the site that provides the best view of occupants in vehicles. For urban road sites, choose sites that allow observation of vehicles that have stopped for a red light or stop sign, or slowed for a yield sign. The best position is usually on the curb next to a right-hand turn lane on urban sites. For rural segments, intersections or junctions provide the best observation position.

Observers should stand at the safest possible position either on the curb or well to the side of the road which allows them a good view inside the front seat of cars/vans/trucks and sport utility vehicles which will be stopping or slowing at the site. Observers must be careful not to step into the roadway and endanger themselves as they attempt to look inside passing vehicles. It is better to be safe and guess about some information than it is to put oneself at risk for a close look. Do not observe in stormy weather with lightning.

### 4) Selection and Coding of the First Vehicle:

When the Observer is ready to record data, he/she will observe the first non-commercial car, mini-van, van, pickup-truck, or sport utility vehicle (SUV) to stop at the site. **IMPORTANT: Commercial vehicles of any type (cars, station wagons, mini-vans, vans, pickup trucks, and large trucks) will not be included in the survey.** Commercial vehicles are those with commercial license plates and/or commercial signing or lettering of any kind on the vehicle.

Information about the vehicle will then be coded. The first vehicle is assigned the sequence number "001" and marked as either a car, a truck/van/mini-van/station wagon or as an SUV. The next code indicates the position of the person in the vehicle (driver or a passenger). Then the drivers' seat belt use is coded. If there is a right front vehicle passenger, the next line of the form is used to code passenger information. This line also begins with a sequence number of "001" because it is the same vehicle. If there is a child 0-4 years of age in addition to the right seat passenger, (e.g., one who is sitting or standing on the right front seat passenger's lap or in the center front seat), record information about the child on the next line starting with the same vehicle number "001". If there are any children 0-4 years in the back seat, code information about each child on a separate line starting with the same vehicle number.

Observers may not always be able to record accurately all information about the vehicle. The best strategy is to record the most important information first: **drive/pass, seat belt use and age**. Then, move to other categories such as vehicle type (car versus van/pick-up versus SUV). Record the state of license plate last, skipping it if you must.

#### **5) Selection of Vehicles Throughout the Observation Session:**

If traffic flow is heavy (an average of more than 1 vehicle per minute), observe **every other** vehicle that stops or slows down. For example, after the first car or van/truck has been coded as Vehicle ID "001", the Observer should let one car or van/truck stop and leave and then code data on the next vehicle that stops as Vehicle ID Number "002". Repeat the pattern throughout the 40-minute period.

If the traffic flow is lighter such that less than one vehicle stops every minute, Observers should record data on **every** car/van/truck/SUV that stops or slows down. If a vehicle containing several children takes a lot of time to code, skip the next one or two vehicles until you are ready to code again.

#### **6) Completing the Observation Session:**

At the end of the 40-minute observation session, Observers should go to the box in the lower right corner of the first survey form used for the session and check whether every car or every other car was observed. Then, Observers should record the **total number of cars/vans/trucks and Sport Utility Vehicles** observed for the session. **Note that the total number should match the highest Vehicle ID Number for the session - be careful not to count vehicles with passengers more than once.** Scan handwriting and correct unreadable numbers. The survey forms should be clipped together in correct order, and stored in a safe, dry place until they are mailed back to Cindy Struckman-Johnson.

#### **7) Starting the Next Observation Session:**

At the Observer's next 40 minute observation session, he/she should begin with a **new survey form** and the **Vehicle ID numbers should begin again with "001"**. Demographic information for this site should be recorded on the first line of the coding sheet.

### **DESCRIPTIONS OF CATEGORIES AND CODES**

Observers should use the codes exactly as described. One common mistake is to forget to fill in "0"'s for double or triple digit codes. For example, for the first vehicle observed, record "001" instead of a "1" followed by two blanks in the columns for vehicle ID number. See Appendix A for an explanation of some sample coding.

### Vehicle ID Number

During each observation session, the Observer will assign a sequential "Vehicle ID number" to each vehicle that is sampled (selected for observation). The sequential ID's should start with "001" each session. ID numbers for an observation session in heavy traffic will probably run from 001 through 090. The same Vehicle ID Number is assigned to the driver of a vehicle and the passengers. In other words, if a vehicle has only a driver, only one line of the coding form will be used for the vehicle. If the vehicle has a driver and passengers, two or more lines of the coding form will be used for the vehicle and all will have the same Vehicle ID Number. Each child 0-4 years of age in addition to the right front passenger will be coded on a separate line with the same vehicle ID number.

### Vehicle Type

Non-commercial passenger cars are coded as "1". All other non-commercial vehicles (mini-vans, station wagons, vans, pickup trucks, etc.) **except** sport utility vehicles are coded as "2". Sport Utility Vehicles of all types are coded as "3". **Remember, commercial vehicles of any type are not to be included in the survey.**

### Driver/Passenger/Extra Children Age 0 - 4

Drivers are coded as "1". Passengers of any age, child or adult, in the right front seat are recorded as "2". **IMPORTANT: Extra children (0-4 years) in the front who are sitting or standing on the lap of the right front passenger or are sitting or standing in the center are recorded as "3". Children (0-4 years) anywhere in the backseat are recorded as "4".**

### Seatbelt Use \*\*\* Most Important Information of the Survey \*\*\*

As soon as a vehicle stops or slows, Observers should immediately determine whether the driver and right front passenger or any children 0 – 4 years of age are wearing a safety restraint. A "1" means a seatbelt was present. A "2" means it was not present. A "3" is used for the special case when a child passenger is in a child restraint device or car seat.

Seatbelt use is determined by the **shoulder strap of the seatbelt or by the use of a child restraint.** Using a shoulder strap as an indicator is a procedure that the National Highway Traffic Safety Administration has standardized for seatbelt surveys across the country. It has been determined to be more accurate than trying to see inside of cars to check for lap belts.

For the driver, code "1" if a shoulder strap is in use. Code "2" if the shoulder strap is not in use.

If there is a right front passenger of any age, start a new line of code with the same vehicle sequence number used for the driver on the previous line. For the right front passenger code "1" if a shoulder strap is in use. Code "3" if a child restraint (car safety seat, infant carrier, special harness to supplement the standard lap/shoulder belt, etc.) is in use. Code "2" if NEITHER the shoulder strap nor a child restraint is in use.

If there is a child 0-4 years of age in the front seat **in addition** to the right front seat passenger (Driver/Passenger/Extra Child code "3"), give a Seatbelt Use code of "3" if a child restraint is in use. Code "2" if a child restraint is not in use. Code "1" in the event that the child 0-4 years of age is restrained by only a shoulder belt, but not a child restraint. Use the same Seatbelt Use codes for children 0-4 years of age in the backseat (Driver/Passenger/Extra Child code "4").

### Age

Observers should pay special attention to judging the age of child occupants.

If the occupant is an "infant" to 4 years old, code "1".

If the occupant appears to be 5 to 13 years old, code "2".

If the occupant appears to be 14 to 17 years old, code "3".

If the occupant appears to be 18 years old or older, code "4".

If it is absolutely impossible to determine the age of a vehicle occupant, code "5" for unknown. You should not use this category when you are uncertain about the exact age of an occupant, e.g., you are not sure if an occupant is 13 or 14. If you are uncertain, make your best guess. The unknown category is used only for cases when you can not determine age at all, e.g., large hat obscuring face of vehicle occupant.

### Lic State

This column is used to indicate whether or not the license plate on the observed vehicle is from South Dakota or another state. Code "1" for a South Dakota plate (regardless of county of origin). Code "2" for any out of state plate. Code "3" if you absolutely cannot determine whether or not the plate is in-state or out of state.

THE REMAINING CODES ARE RECORDED ONLY ONCE ON THE FIRST LINE OF THE FIRST FORM USED AT A SITE.

### County

Code the appropriate number for the thirteen counties listed on the Observer Form.

### Site

Observers will be given an "Observation Site List" which will list all observation sites in the county and a two-digit Site Number for each site. Observers should code the appropriate Site Number for each 40-minute observation session.

Time

The Time category refers to the time of day that the observation session is scheduled.

- 1 = 7:30 to 9:00 A.M.
- 2 = 9:00 to 10:30 A.M.
- 3 = 10:30 to 12 noon
- 4 = 12 noon to 1:30 P.M.
- 5 = 1:30 to 3:00 P.M.
- 6 = 3:00 to 4:30 P.M.

Month/Day/Year

Record the full date of the observation day --including "0"s --in these six spaces. For example, June 8, 2004 would be recorded as "060804".

Observer

Each Observer will enter his or her first and last initial initials on the coding sheet for identification purposes.

Road Type

The Observation Site List provided to all observers will have a "Road Type" code for each site. **REMEMBER TO USE THE ROAD TYPE NUMBER ASSIGNED IN THE SITE LIST. The sites have been assigned the codes of 1 (Urban Highway), 2 (Rural Highway), 3 (Urban Interstate) and 4(Rural Interstate) based on Department of Transportation definitions.**

Returning Data

When you are finished observing all of your sites, put the completed survey forms in the return-addressed envelope in your supplies packet and mail it back to Cindy Struckman-Johnson. Use the enclosed money to send the package **PRIORITY** rate with a green **DELIVERY CONFIRMATION** sticker. Cindy will reimburse you if the cash is not enough! .

**Please send the orange vests and any expense information to your coordinator, John Hirsch.**

\*\*\*\*\* **IMPORTANT** \*\*\*\*\*

**If you have any questions about this manual or any of the survey procedures, call Cindy Struckman-Johnson in the Human Factors Lab at the University of South Dakota at (605) 677-5295 or (605) 677-5098 in the afternoon or 605-624-8858 in the mornings and evenings. If Cindy is not available, please leave a message with a number and a good time to call you and she will return your call. Cindy's e-mail is cindysj@usd.edu.**

## APPENDIX A

### SEATBELT SURVEY FORM EXAMPLES

The last page of this appendix contains an example of a partially completed survey form. It contains coding for 5 vehicles at a hypothetical observation site in Brown County. What follows is an explanation of why the codes shown on the sample form have been used. These examples have been selected to demonstrate many of the things you will commonly encounter while observing as well as some things you need to be careful about.

#### **Vehicle 001 – Driver Only**

There is only a single line with the vehicle ID 001, so this vehicle did not have a passenger. Note that vehicle 1 is coded "001" not "1". The vehicle type is coded as "1" so this vehicle must have been a non-commercial car. The third thing that is coded is "1" for Drive/Pass/Extra. This line of entries describes a driver. The next column indicates the driver's belt use. Because this is coded as "1", a shoulder belt was in use. Age is coded "4" meaning that the driver is 18 years of age or older. The "1" in the Lic State column means the vehicle plate was from South Dakota.

The remaining columns of information apply to all the vehicles coded on this sheet, so only one line of data needs to be entered for the entire sheet. County is coded "03" because this example takes place in Brown County. Note that the 7 is crossed so the data entry person will have no difficulty telling the difference between 1's and sloppy 7's. The next 2 columns are the code for the particular site within Brown County. Each observer will be provided with a list of codes for all sites at which he/she will be observing. Time is coded as "2" meaning that the observation is taking place between 9:00 and 10:30 A.M. The next six columns code the month, day and year of the observation in that order. The next two columns are for the first and last initials of the observer. In this example, Donna Smith was observing so "D" and "S" are recorded in these two columns. The next column indicates the type of road on which the observation is taking place. Because the observation site is a highway that runs through a city, the correct road type is urban highway and code "1" is entered. Please do not guess at the road type. Instead, use the road type code that appears on the site list. The definitions of road type were determined by the Department of Transportation and may not fit our idea of an urban or rural highway.

#### **Vehicle 002 – Driver /Right front passenger (Child -0-4 years)**

Vehicle 002 is a car and has two lines of code and a "3" in the Veh Type column indicating an SUV with a driver and passenger. The driver line indicates a shoulder belt was used (Seat belt use code = "1") and that driver was at least 18 years old. The car has South Dakota plates.

The passenger line for Vehicle 002 indicates that the passenger was a child 0-4 years of age in the right front seat (Drive/Pass/Extra = "2") in a child restraint (Seat belt use = "3"). It is extremely important to the survey that child restraint use be coded correctly. If a passenger is USING a child restraint, "3" is the correct code for the Belt use column. Do NOT code "1" (shoulder belt used) even if a shoulder belt is being used to hold the child restraint in place.

Finally, do NOT use code "3" if an empty child restraint is present in the front seat. The age is coded as "1" indicating that the passenger was between 0 and 4 years of age. The final column for the Vehicle 002 passenger line repeats the South Dakota license plate code "1".

**Vehicle 003 – Driver /Right front passenger/ Child 0-4 in front/ Non-recorded older child**

Vehicle 003 has three lines of code indicating a driver and more than one passenger. The Veh Type column for vehicle 003 is coded as "2" indicating that the vehicle was a pickup, van or station wagon. The driver line (code "1" in Drive/Pass/Extra) has an entry for Belt Use indicating that the driver was not wearing a seat belt (code = "2"). Note that the same code value is used to indicate a vehicle occupant is not wearing a shoulder harness or using a child restraint for all vehicle types. The remaining codes for the driver of vehicle 003 indicate that the driver is 18 years old or older and that the pickup, van, or station wagon had out-of-state license plates, coded "2".

The next line of information for the first passenger of vehicle 003 duplicates the Vehicle ID Number and Veh Type codes. The Drive/Pass column is coded "2" to indicate a right front seat passenger. The Belt Use column is coded "1" indicating that the passenger was wearing a seat belt. The next column of the passenger information records age. Code "5" is entered in this example. Code "5" stands for "Unknown". In this example, the age is unknown because the child on her lap blocked the passenger's face from view. This is one of the few situations in which code "5" is appropriate. Code "5" should not be used in cases when you are not sure whether a person is 4 or 5, 13 or 14, or 17 or 18. If you are not sure about age category, make your best guess. Use code "5" only in those cases when you can't tell age at all. The final column of the first passenger data duplicates the out of state license code from the previous line for this vehicle.

The third line of information for vehicle 003 again duplicates the Vehicle ID Number and the Veh Type codes. The Drive/Pass column is coded as "3" indicating that there was a child 0-4 years of age in the front seat in addition to the right front passenger coded on the previous line. (In this case the child 0-4 years of age had been seated on the right front passengers' lap.) The Belt Use column is coded as "2" indicating the child was not in a child restraint device. The Age column indicates that the child was 0-4 years of age. The Lic State code duplicates the "2" indicating an out of state license plate as recorded on the previous two lines for vehicle 003.

A fourth child was present in the center of the seat. However, no information was recorded for this child because the child was estimated to be in the age category of 5-13 years.

**Vehicle 004 – Driver /Two backseat passengers (0-4 years)**

Vehicle 004 is a car with three lines of code and a "1" in the Veh Type column indicating a car with a driver and at least two passengers. The driver line indicates a shoulder belt was used (code "1") and that driver was at least 18 years old. The car has South Dakota plates.

The second line for Vehicle 004 indicates that a child 0-4 years of age was seated in the back seat

(passenger code 4) in a child restraint (code = "3"). The age is coded as "1" indicating that the passenger was 0-4 years of age. The final column for the Vehicle 004 passenger line repeats the South Dakota license plate code "1".

The third line for Vehicle 004 indicates that a second child (0-4 years of age) was present in the back seat (Drive/Pass/Extra is coded as "4"). This child 0-4 years old was not in a child restraint as indicated by the Seat Belt Use code "2". Age is coded as "1" and the License plate information is repeated as "1" indicating a vehicle with SD license plates as recorded on the previous two lines.

#### **Vehicle 005 – Driver /Backseat passenger (0-4 years)**

Vehicle 005 has two lines of code. A "1" in the Vehicle Type column indicates this was a car. The driver was wearing a seat belt (Seat belt use code = "1") and was between 14 and 17 years of age (Age code = "3"). The vehicle had South Dakota license plates.

The second line of code for vehicle 005 repeats the vehicle type information. The Drive/Pass/Extra code of "4" indicates that there was a child 0-4 years of age in the back seat. The Seat belt use code is "1" for this passenger indicating that the child 0-4 years was wearing a shoulder belt but was not in a child restraint device.

#### **Observation Session Summary Boxes**

The observation session summary box in the lower right hand corner of the sample form would be completed if this were the first page of information collected at a site. Because this example starts with Vehicle ID Number 001, this is a first sheet.

The upper half of the box indicates whether every vehicle was observed (normal traffic conditions) or every other vehicle was observed (heavy traffic conditions). The "Every Car Observed" line is checked because traffic was obviously light enough for this strategy.

A lower box indicates the total number of vehicles observed during the 40-minute observation session. There were a total of 5 vehicles. At the end of an observation session, you will need to count vehicles on ALL forms used during that session, but you should only enter the totals on the first sheet.

The lowest box is used for recording a verbal description of the actual location used for observation. Terminology similar to that used on the site list is expected. For this example the Observer was located at the interchange of Hwy. 281 and Hwy. 12 observing all traffic turning onto Hwy. 281.

**Remember:** Use a number 2 pencil so that you may erase and clarify coding information written unclearly when the observation period is over.

VCXXVCXX v zzz STAY SAFE AND GOOD LUCK!

# South Dakota Seatbelt Survey Form

**Vehicle Type**

- Car = 1
- Pickup/Van = 2
- Sport Utility = 3

**Seatbelt Use**

- Used = 1
- Not Used = 2
- Child Restraint Used = 3

**License State**

- South Dakota = 1
- Other State = 2
- Unknown = 3

**County**

- Minnehaha = 01
- Pennington = 02
- Brown = 03
- Lawrence = 04
- Davison = 05
- Beadle = 06
- Hughes = 07
- Union = 08
- Charles Mix = 09
- Grant = 10
- Fall River = 11
- Tripp = 12
- Kingsbury = 13

**Site Number**

- Check County Site List
- Time
- 7:30 - 9:00 am = 1
- 9:00 - 10:30 am = 2
- 10:30 - noon = 3
- noon - 1:30 pm = 4
- 1:30 - 3:00 pm = 5
- 3:00 - 4:30 pm = 6

**Road Type**

- Urban Highway = 1
- Rural Highway = 2
- Urban Interstate = 3
- Rural Interstate = 4
- (Check County Site List)

**Driver/Passenger/Extra**

- Driver = 1
- Right Front Passenger = 2
- Extra Child Front = 3
- Child Rear = 4

Vehicle ID Number	Veh Type	Drive Pass or Extra	Seat Belt Use	Age	Lic State	County	Site Number	Time	Month	Day	Year	Observer	Road Type
001	1	1	1	4	1	03	03	2	06	07	03	05	1
002	3	1	1	4	1								
002	3	2	3	1	1								
003	2	1	2	4	2								
003	2	2	1	5	2								
003	2	3	2	1	2								
004	1	1	1	4	1								
004	1	4	3	1	1								
004	1	4	2	1	1								
005	1	1	1	3	1								
005	1	4	1	1	1								

Check One

Every vehicle observed

Every other vehicle observed

---

Total vehicles observed in 40 minutes 5

Describe your observing location at this site:

Inter section of 281 & 12 -

Stood on the North Corner by

Stopsign - turning onto 281

## Appendix C

### Computation of Mean Seat Belt Use for South Dakota

The computation of the mean seatbelt use for in South Dakota was a three-stage process. Stage 1 consisted of computing mean seat belt use for each road type in each county. For purposes of this calculation, only drivers and right front seat passengers were considered to retain compatibility to prior year values and Federal reporting requirements. In this computation, the vehicle miles traveled value (VMT) for a particular site was computed by averaging the VMT values for each of the subsegments in the road segment the selected site represented. These VMT values were then used to compute a weighted average for all sites for a particular road type in a particular county. This weighted mean seatbelt use rate for a particular road type in a particular county is designated

$\hat{P}_{ij}$  where  $i$  denotes road type (from 1 to 4) and  $j$  denotes county (from 1 to 13).

The second stage of the computation consisted of computing weighted means for each road type across counties based on the vehicle miles traveled (VMT) on that road type in each county and on the sampling weight for the county based on probability of selection for surveying for that county. The mean seatbelt use for a road type is

$$\hat{P}_i = \frac{\sum_{j=1}^{13} W_{.j} V_{ij} \hat{P}_{ij}}{\sum_{j=1}^{13} W_{.j} V_{ij}}$$

Where  $\hat{P}_i$  = the seat belt use estimate for road type  $i$

$W_{.j}$  is the county weight for county  $j$  (1 for Minnehaha and Pennington, 31/11 for the remaining 11 counties)

$V_{ij}$  is the VMT for road type  $i$  in county  $j$

$\hat{P}_{ij}$  is the seatbelt use rate estimated for road type  $i$  and county  $j$  in stage 1.

The final stage of the estimate consisted of computing the weighted average of the across county road type estimates for a statewide estimate. Weights were based on the proportion of the state's VMT on each road type.

The formula for computing the statewide estimate is

$$\hat{P} = \frac{\sum_{i=1}^4 V_i \hat{P}_i}{\sum_{i=1}^4 V_i}$$

Where  $\hat{P}$  = the statewide seat belt use estimate

$V_i$  is the proportion of VMT for road type  $i$  in the state

$\hat{P}_i$  is the rate estimated for road type  $i$  in the state stage 2.

In the 2004 South Dakota Survey, the following values were obtained

Urban Highway:	$w_1 = 0.18323$	$\hat{P}_1 = 67.35$
Rural Highway:	$w_2 = 0.44819$	$\hat{P}_2 = 62.68$
Urban interstate:	$w_3 = 0.05521$	$\hat{P}_3 = 77.98$
Rural interstate:	$w_4 = 0.31336$	$\hat{P}_4 = 78.68$

Thus, statewide seat belt use is estimated as **69.40%**.

### Computation of Variance and Confidence Bounds for Mean Seat Belt Use for South Dakota

Computational formula for the variance of  $\hat{P}$ , using the terms as defined in the computation of the weighted use estimate above, is

$$\hat{Var}(P) = \frac{\sum_{i=1}^4 \sum_{j=1}^{13} (W'_{ij})^2 * (\hat{P}_{ij} - \hat{P})^2}{n^* - 1}$$

where  $n^*$  = the number of county-road type groups

The  $W'_{ij}$  in the formula are weights applied to the deviations based on the formula below

$$W'_{ij} = \frac{W_{.j} * V_{ij}}{\sum_{i=1}^4 \sum_{j=1}^{13} W_{.j} W_{ij}}$$

where the  $W$ 's and  $V$  in the formula are as define previously in discussion of the second stage of the analysis.

Using these formulas, the variance of  $\hat{P}$  is 0.193. The sampling error is then 0.439%.

Now, the 95% confidence bounds can be computed as the:

$$(\text{statewide mean}) \pm (1.96)(0.439).$$

Thus, the 95% confidence bounds on our mean estimate are:

$$69.40\% \pm (1.96)(0.439) \text{ or } p(68.54\% < \text{Statewide Use} < 71.26\%) = .95$$

## Appendix D: Additional Analyses

### Children Aged 5 to 17 in the Middle Front or Back Seat Passenger Positions

As previously mentioned, due to an inadvertent misunderstanding, data from all children under the age of 18 were recorded in the front middle and back seat passenger positions in some instances. Because these data was not specified in the design, it was not included in any of the previous analyses in the 2004 survey report. However, since the data both represents actual observed cases and specifically represents an age group of interest that tends to be under-represented in the statewide survey, a decision was made to include an additional analysis to examine this data. As indicated in Table 7, a total of 184 additional motorists were observed in the two age categories of 5-13 years and 14-17 years. For the age group of 5-13 years, 63.5% (101 of 159) were observed wearing a seatbelt. For the age group 14-17 years, 72.0% were wearing seatbelts. This represents a substantial increase over the observed 2003 rate of 59.3% for this age group.

Table 6: Restraint Use by Age for Additional Middle Front and Back Seat Passengers

Age	Restraint Used		Total
	Yes	No	
5 -13 years	101 63.5%	58 36.5%	159
14 - 17 years	18 72.0%	7 28.0%	25
Total	119 64.7%	65 35.3%	184