

# SEAT BELT USE IN NORTH DAKOTA



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Thank you to North Dakota Tourism and Gerald Blank for the use  
of the North Dakota picture on the cover.

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## EXECUTIVE SUMMARY

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North Dakota's seat belt use study provides statistically reliable data from which generalizations, comparative analyses and recommendations can be developed. The National Occupant Protection Use Survey (NOPUS) provides the North Dakota Department of Transportation (NDDOT) with a system to monitor seat belt use rates within the state. The National Highway Traffic Safety Administration (NHTSA) funds NOPUS through the NDDOT's Traffic Safety Office.

The sampling methodology for this study was developed in 2001 with guidance from NHTSA. Other than to update the site and county vehicle miles travelled (VMT) to the latest NDDOT estimates for the 2009 through 2011 surveys, there was little change in the counties and sites that made up the sample. In April 2011, NHTSA issued new Uniform Criteria for the state observational survey of seat belt use to improve the survey's representativeness. One of the main changes NHTSA implemented was to focus county selection using crash-related fatalities data, as reported by the Fatality Analysis Reporting System (FARS), instead of the population-based exclusion criterion used in the past. The revised criteria, implemented for the 2012 survey and outlined in the Federal Register Vol. 76 No. 63, resulted in changes to the county selection, sites, road type classifications and weighting procedures.

To choose the survey counties, all 53 counties in North Dakota were listed in descending order based on the average number of motor vehicle crash-related fatalities from 2006 to 2010. The top 27 counties accounted for at least 85% of the state's total crash-related fatalities. These 27 counties were then stratified by region based on statistical differences in seat belt use observed in prior surveys between the counties in the western and eastern parts of the state. Therefore, the 27 counties in the sampling frame were stratified according to geographical region with 14 counties in the west and 13 counties in the east. Eight counties were selected from each region using probability proportional to size (PPS) sampling with vehicle miles traveled (VMT) as the measure of size (MOS).

Road segments within each county were then stratified by the MAF/TIGER Feature Class Code (MTFCC) road type and sorted by segment length. A random, systematic sample of 20 road segments was selected using PPS with road segment length by road segment type within each sampled county as the MOS. This represents the second stage of sample selection. This process resulted in the selection of 320 road segments (16 counties x 20 sites per county). Additional sites were also selected for use as alternate sites.

The 2014 survey followed the revised criteria and methodology implemented in 2012. During the week of June 2-8, trained observers visited each site in their assigned counties to collect seat belt use data as prescribed in the handbook they received at training. Drivers and right front seat passengers in vehicles with a gross vehicle weight up to 10,000 lbs. were observed for seat belt use.

For the 2014 statewide survey, observers tracked seat belt use for 22,203 drivers and 5,515 right front-seat passengers, for a total of 27,718 vehicle occupants. The estimates of seat belt use were 78.3% for drivers, 83.8% for passengers, and an overall unweighted estimate of 79.4% belted for drivers and passengers combined. Adjusting the raw state rate for the survey design and weights resulted in a weighted state rate of 81.0%.

Males were less likely than females to wear seatbelts (73.9% vs. 89.0%). Male rates were observed to be anywhere from 8% to 27% lower than female use rates for counties surveyed. This trend of higher female seat belt use rates holds for each vehicle type as well – female use ranged from 85.7% to 92.6% over the four vehicle types, while male use ranged from 67.2% to 82.5%. Van occupants had the highest seat belt use rate at 87.2% followed by SUVs (86.4%), cars (83.9%), and pickups (69.9%).

Although drivers outnumbered passengers by a ratio of 4:1, passengers buckled up at a rate of 83.8% compared to drivers at 78.3%. This may be mainly due to the fact that drivers are more likely to be men than women (69.8% vs. 30.2%), and their seat belt use rates are much lower than women – 74.4% compared to 87.4% respectively. For passengers, the reverse is true. Women represented 61.8% of the passengers with a use rate of 92.1%, while men represented 38.2% of the passengers with a use rate of 70.6%.

Rates by region indicate occupants in the east are more likely to buckle up (82.7%) than those in the west (76.3%). Regional differences in seat belt use are also reflected by road type. Occupants from the east half of the state had a greater propensity for seat belt use on primary, secondary and local roads.

NHTSA reports the national average seat belt use rate was 87% in 2013. North Dakota falls below this average with a weighted rate of 81.0%. In general, the findings in the 2014 North Dakota statewide survey are consistent with the findings of previous surveys. However, comparisons to years prior to 2012 should be made with caution because of changes in the sampling methodology implemented that year.

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## INTRODUCTION

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The Upper Great Plains Transportation Institute (UGPTI), a research and education center at North Dakota State University (NDSU) located in Fargo, ND, was contracted by the North Dakota Department of Transportation (NDDOT) to conduct a field survey of seat belt use in 2014. The study replicates the sampling methodology previously revised and approved by the National Highway Transportation Safety Administration (NHTSA) and the NDDOT for the 2012 survey. Requirements for conducting statewide seat belt surveys are published in the Federal Register, Vol. 76 No. 63, April 1, 2011, Rules and Regulations, pp. 18042 – 18059. The methodology was designed to yield a more statistically valid estimate of the current seat belt use rate on all roadways in North Dakota.

## OBJECTIVE

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The objective of this study was to determine the rate of seat belt use of drivers and right front-seat passengers in the state of North Dakota.

Additional analyses determined seat belt use rates in the following categories:

- Occupant (driver, passenger)
- Gender (male, female)
- Type of vehicle (car, van, sport utility vehicle, pickup/small truck)
- Region of state (east, west)
- Roadway type (primary, secondary, local)

A description of the tasks involved in conducting the statewide seat belt survey is provided in this report which also includes general information about the methods and protocols. Table 1 summarizes the 2014 survey.

**Table 1: Summary of the Seat Belt Use Survey**

<b>Methodology</b>	Multistage Stratified Cluster Design with Probability Proportional to Size Sampling
<b>Source of Samples</b>	2011 revised methodology, approved by NDDOT and NHTSA; Westat* supplied list of road segments using 2010 TIGER data developed by the U.S. Census Bureau based on the MAF/TIGER Feature Class Code (MTFCC); three classifications: 1) Primary Roads, 2) Secondary Roads, and 3) Local Roads
<b>Geographic Coverage</b>	State of North Dakota
<b>Identified Regions</b>	East West
<b>Selected Counties</b>	<u>East Region:</u> Barnes, Cass, Grand Forks, Pembina, Ramsey, Richland, Stutsman, Traill <u>West Region:</u> Billings, Burleigh, McLean, McKenzie, Morton, Pierce, Stark, Ward
<b>Number of Sites</b>	320
<b>Survey Period</b>	June 2-8, 2014
<b>Observation Duration Per Site</b>	60 minutes
<b>Sample Size</b>	22,306 vehicles (includes all vehicles where either the driver or passenger or both had a known protection status)

\*A research and statistical survey organization

## METHODOLOGY OVERVIEW

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From 1998 to 2000, the methodology for the observational seat belt survey in North Dakota was based on simple random sampling of 12 counties followed by random sampling of intersections within those selected counties. As a result, the sample produced a strong rural bias by excluding some of the most populous counties with higher traffic density and vehicle miles traveled. Following the 2000 survey, the NDDOT concluded that a new sampling methodology was needed to obtain results that were more representative of traffic patterns and the distribution of drivers and passengers in North Dakota. The NDDOT worked with research methodology experts at NHTSA to review the process.

The methodology from 2001 to 2011 included 16 counties, representing the quadrants of the state, and 319 sites, with approximately half above and half below the mean vehicle miles traveled within each county. This methodology could therefore be described as stratified random sampling modified by the inclusion of what are referred to in the federal guidelines as “certainty” counties. The certainty counties represented about three-fourths of North Dakota’s population and approximately two-thirds of the vehicle miles traveled in the state.

On April 1, 2011, NHTSA published revised Uniform Criteria for the state observational seat belt surveys to guide occupant protection programs. The new rule changed many aspects of the survey design. One of these changes was to include counties in the sampling frame based on fatality-based inclusion criterion as opposed to the population-based criterion of the past.

It was determined that 27 counties accounted for at least 85% of North Dakota’s total crash-related fatalities from 2006 to 2010. A subsample of 16 counties was selected for the survey of seat belt use in North Dakota. Counties represent the primary sampling unit. Half of the counties were selected from the western part of the state and the other eight were selected from the eastern half. Within each of those 16 counties a sample of 20 sites were selected providing a total of 320 site locations across the state. In the event that any original sites could not be observed due to unforeseen circumstances, a reserve sample of sites was also selected. The sites within the counties are the secondary sampling unit. The sites were stratified by road types, identified within three MAF/TIGER Feature Class Code (MTFCC) classifications: primary roads, secondary roads, and local roads.

The formulas contained in this report use the following definitions.

$g$  – denotes the strata (east or west)

$c$  – denotes the county

- $h$  – denotes the road segment strata (primary, secondary, or local)
- $i$  – denotes the road segment
- $j$  – denotes the time segment
- $k$  – denotes the vehicles direction of travel
- $l$  – denotes the lane of observation
- $m$  – denotes the vehicle
- $n$  – denotes the front-seat occupant (driver or passenger)

Within each stratum, east and west, counties were selected with probability proportional to size (PPS) with the measure of size (MOS) being vehicle miles traveled (VMT). If we let  $g = 1,2$  be the first stage strata,  $v_{gc}$  be the VMT for county  $c$  in stratum  $g$ , and  $v_g = \sum_{all\ c\ in\ g} v_{gc}$  be the total VMT for all counties in first stage stratum  $g$ , then the primary sampling unit (PSU) inclusion probability is:  $\pi_{gc} = n_g v_{gc} / v_g$ , here  $n_g$  is the PSU sample size for first stage stratum  $g$  that was allocated. First each strata was analyzed to identify if any certainty counties existed. A county was selected with certainty if its MOS was equal to or exceeded  $v_g / n_g$ . Each certainty county identified was set aside and the stratum MOS was reduced by that county's VMT and  $n_g$  was reduced by one. This process was repeated until no county's MOS was equal to or greater than  $v_g / n_g$  based on the reduced values for  $v_g$  and  $n_g$ . The probabilities of selection for the remaining counties in the stratum were calculated based on the new values for  $v_g$  and  $n_g$ . Three certainty counties were identified in each region. Burleigh, Ward, and Morton counties were selected with certainty from the west region, while Cass, Grand Forks, and Stutsman counties were selected with certainty from the east region. The remaining counties for each region were selected using the SAS 9.2 procedure PROC SURVEYSELECT based on the re-calculated probabilities of selection.

Next, road segments within each county were implicitly stratified by its MTFCC - primary, secondary and local. The list of eligible road segments within each county was then sorted by segment length within each MTFCC group to obtain an ordered list. Road segments were selected with PPS using length as the MOS. The same procedure that was used to identify certainty counties was used to identify any certainty sites. With no certainty road segments being identified, a sampling interval (I) was calculated as the total length across all remaining road segments within the county divided by the number of road segments to select within each county (i.e. 20 less the number of certainty sites). A random starting point (RS) was selected between 0 and I, which determined the first road segment selected. Subsequent road segments selected were determined by adding multiples of I to RS until the desired number of road segments was selected and/or the end of the sorted list was reached.

Once the sites were chosen, a random order of the sites to observe within each county was constructed. One of the sites in each county was randomly chosen as the starting site. This site was then randomly assigned to one of the 77 one-hour time slots within the week as mandated by the Uniform Criteria. The time slots cover Monday through Sunday from 7 a.m. to 6 p.m. Once the initial site was selected and assigned to a time slot, the remaining sites were clustered and arranged within the county to achieve administrative and economic efficiencies. After each site was identified, the direction of travel was chosen randomly as either N/W or S/E. The lane of traffic was chosen as the closest lane to where the observer could find a suitable and safe place to make observations.

Under the stratified multistage sample design, the inclusion probability for each observed vehicle is the product of selection probabilities at all stages:

$\pi_{gc}$  for county,  $\pi_{hi|gc}$  for road segment,  $\pi_{j|gchi}$  for time segment,  $\pi_{k|gchij}$  for direction,  $\pi_{l|gchij}$  for lane, and  $\pi_{m|gchijl}$  for vehicle.

So the overall vehicle inclusion probability is:

$$\pi_{gchijklm} = \pi_{gc}\pi_{hi|gc}\pi_{j|gchi}\pi_{k|gchij}\pi_{l|gchij}\pi_{m|gchijl}.$$

The sampling weight (design weight) for vehicle  $m$  is:

$$w_{gchijklm} = \frac{1}{\pi_{gchijklm}}$$

Noting that all front-seat occupants were observed and letting the driver/passenger seat belt use status be:

$$y_{gchijklmn} = \begin{cases} 1, & \text{if belt used} \\ 0, & \text{otherwise} \end{cases}$$

Then the seat belt use rate estimator is a ratio estimator calculated as follows:

$$\rho = \frac{\sum_{\text{all } gchijklmn} w_{gchijklm} y_{gchijklmn}}{\sum_{\text{all } gchijklmn} w_{gchijklm}}.$$

This estimator captures traffic volume and vehicle miles traveled through design weights (which will include nonresponse adjustment factors) at various stages and it does not require knowledge of VMT/DVMT.

The weighted average seat belt use rate for North Dakota calculated using this estimator was found to be 81.0% for 2014. This compares to the weighted rate of 77.7% in 2013, and 80.9% in 2012.

## Standard Error and Confidence Intervals

The standard error of the state seat belt use rate measures the amount of random sampling error in the survey results. The smaller the standard error, the more accurate the seat belt use rate when compared to the true, but unknown, seat belt use rate for North Dakota. Assuming the design of the survey accurately measures the variable of interest, the larger the survey sample the more accurate the results.

The estimated standard error for the state seat belt use rate is found by taking the square root of the variance, so

$$SE(\hat{p}_s) = \sqrt{V(\hat{p}_s)}$$

Where:

$SE(\hat{p}_s)$  = the estimated standard error for the state seat belt use rate

$V(\hat{p}_s)$  = the estimated variance for the state seat belt use rate

$\hat{p}_s$  = the estimated state seat belt use rate

Using SAS callable SUDAAN statistical software, the standard error for the state seat belt use was calculated to be 0.75%. From this, we can build a 95% confidence interval for the state seat belt use. The 95% confidence interval formula is  $\hat{p}_s \pm 1.96 * SE(\hat{p}_s)$ , where each of the terms has the meaning above and the value 1.96 is the tabled value from the standard normal distribution for a 95% confidence interval.

**Table 2: Confidence Interval**

95% Confidence Interval and Estimated Standard Error for the 2014 State Seat Belt Use				
Occupants	State Rate	Standard Error	95% CI Lower Limit	95% CI Upper Limit
27,718	81.0%	0.75%	79.5%	82.5%

The 95% confidence interval means that statistically there is only a 5% chance that the actual statewide seat belt percentage falls outside the range of 79.5% to 82.5%.

## Nonresponse Rate

A factor that could potentially bias the results and invalidate the survey is exceedingly high nonresponse rates. A nonresponse occurs when the observer tries but cannot determine an occupant's seat belt use. As

stipulated in NHTSA's guidelines, the nonresponse rate (5.12%) did not exceed 10% over the entire survey. Had the rate exceeded the allowable maximum, individual counties that registered above the 10% threshold would have been revisited to observe additional vehicles.

## Protocols

### Observers

Observers were contracted to conduct the 2014 seat belt survey and were required to participate in in-house training and accuracy testing prior to conducting the field observations. In previous survey years, observers were also required to complete Institutional Review Board (IRB) training, required by North Dakota State University for Human Subjects Research. Supplementary information clarifying survey protocols was provided to the IRB, and the board subsequently ruled this research project exempt in accordance with federal regulations. As a result, IRB training certification was not necessary for observers in the 2014 survey. All observers were required to have a current license with proof of adequate vehicle insurance, and were required to wear seat belts while conducting observations.

### Observational Protocols

The observational protocols used in the 2014 study adhere to the recent changes to the Uniform Criteria as outlined in the Federal Register.

Observations were conducted Monday through Sunday. The day of the week and time of day were randomly chosen for one site within each county. The remaining sites within each county were arranged based on the first site to minimize travel and costs. This predetermined order of observation sites to be visited each day was provided to each observer at training. A complete list of county observation sites are found in Appendix A of this report. The traffic direction of vehicles to be observed was randomly chosen in advance and was limited to one direction.

An 11-hour block of daylight, from 7 a.m. to 6 p.m., was identified as the observational period. Observations at each site occurred in a predetermined time slot, requiring a 60-minute observation period, which began at the start of the pre-determined time slot or the first 5-minute interval after arrival at the site if the observer was delayed, and ending exactly 60 minutes later.

## **Traffic Conditions and Data Collection Problems**

Observers were trained to cope with traffic problems in the following manner:

- When traffic was heavy and there were too many vehicles to count visually, recording was done as long as possible and then stopped until the observer could catch up with observations. Some vehicles were, of necessity, outside the sample. When this occurred, counting resumed after no more than a one-minute pause. Once an observer's eyes were locked on a vehicle, a count of that vehicle was required on the observation form.
- At sites with more than one lane of traffic in the predetermined direction, observations were made from the lane closest to the observer.

## **Site Accessibility Problems**

Field observers could terminate observations at a preselected site if any of the following circumstances arose: (1) weather conditions that would hinder the accuracy of the observations; (2) heavy traffic flow that might endanger the safety of the observer; or (3) road conditions that rendered observations unfeasible, such as road construction, detoured traffic, or a crash site. In these circumstances, observers were directed to contact the project coordinator immediately for assignment of an alternate site if a suitable vantage point could not be established.

## **Observed Vehicles**

All vehicles with a gross vehicle weight up to 10,000 lbs. were observed and classified on the observation form as cars, vans, sport utility vehicles, and pickups (includes other small trucks, i.e. flatbed, utility service, and small box trucks, etc.) Large trucks (semi or large box), large emergency vehicles (ambulance/fire), and RVs/motor homes were not included in the survey.

## **Observations**

Type of vehicle, gender characteristics and seat belt use for both drivers and right front seat passengers were recorded. Observations occurred from within the observer's vehicle whenever possible. The observer was parked as close as possible to the road for accurate observation without compromising observer safety. If observations could not be conducted from within the vehicle, the observer was allowed to stand off the roadway. Observers were required to wear an ANSI-approved Type-2 safety vest at all times to enhance the visibility of the observer.

## **Problems Encountered by Observers**

No alternate sites were assigned due to traffic, safety, or construction issues. However, occasional problems were encountered related to road construction and weather conditions that hindered on-time site arrival. These delays did not seriously impede schedules. Hour-long observations were fulfilled as described in the protocol, and on-time arrival at subsequent sites was not impacted. Detailed site information is found in Appendix A.

## **QUALITY ASSURANCE**

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### **Observers**

Observer training sessions were held at two sites, with observers required to attend one of the two sessions. All observers were required to participate in the classroom instruction and field training. Each observer was tested through participation at two observation test sites to acquire an inter-observer agreement rate.

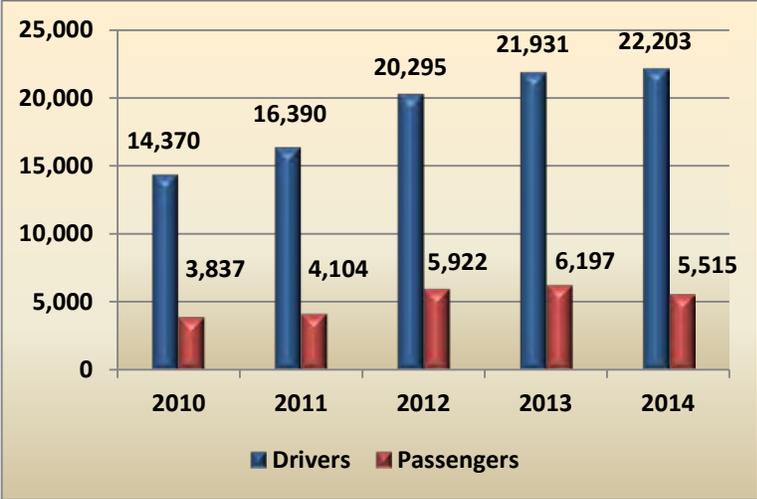
Test sites were selected to represent the types of sites and situations observers could expect to encounter in the field. No actual sites in the sample of roadway segments were used as test sites. During field training, observers recorded data independently on separate observation forms. Each observer documented vehicle type, gender, and seat belt use of both drivers and right front seat passengers. Individual observations were then compared to the group to calculate the agreement rate. All agreement rates were sufficiently high and no additional training was required.

### **Data Entry**

Steps were taken to ensure quality control with respect to data entry. Each site packet was checked to ensure the number of observation sheets submitted was the same as that noted by the observers. Database records were verified to match the number of observations. An accuracy check was done on a systematic sample of records and was measured at greater than 99.9% for every field. Errors discovered during quality assurance checks were corrected prior to completion of all analyses.

# RESULTS

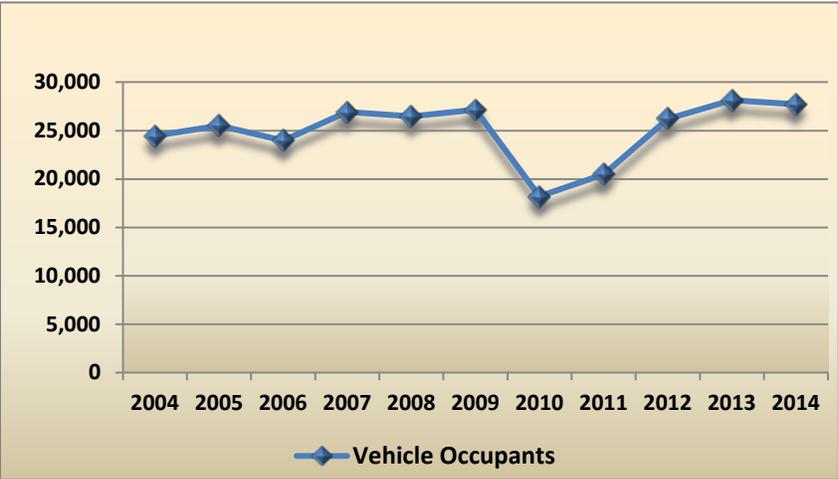
## Sample Size by Year



**Figure 1: Driver & Passenger Observations, 2010-2014**

The 2014 sample size remained fairly stable compared to prior survey years shown in Figure 1. Prior to 2012, observation times were thirty minutes at each site. An extension of an additional one-half hour of observation time was implemented at all sites in 2012 to coincide with the application of new federal rules. The increased sample size reflected in 2012 and forward was the result of this time extension.

It provides a larger sample size to help comply with standard error stipulations. Even with extended observation times, several individual sites capture only a limited number of observed vehicles. However, these sites are still important to the aggregate measurement of statewide and county seat belt use, and therefore are captured each year. Complete details on numbers of observations and use by site are found in Appendix E. The sample size of each annual seat belt survey from 2003 to 2014 is found in Figure 2.



**Figure 2: Vehicle Occupants, 2004 - 2014**

## Statewide Results

The overall unweighted results of the 2014 statewide survey indicate 79.4% of vehicle occupants were observed wearing seat belts on North Dakota roads. Because the survey employs a two-stage stratified random sampling scheme, a more appropriate estimate of the seat belt use rate is found by weighting the



**Figure 3: Statewide Results, 2012-2014, Weighted**

unadjusted rate using the formulas from the methodology section. Using those formulas, the overall weighted seat belt use rate in North Dakota was 81.0% for 2014. Figure 3 shows a comparison of years of seat belt use since implementation of the amended methodology.

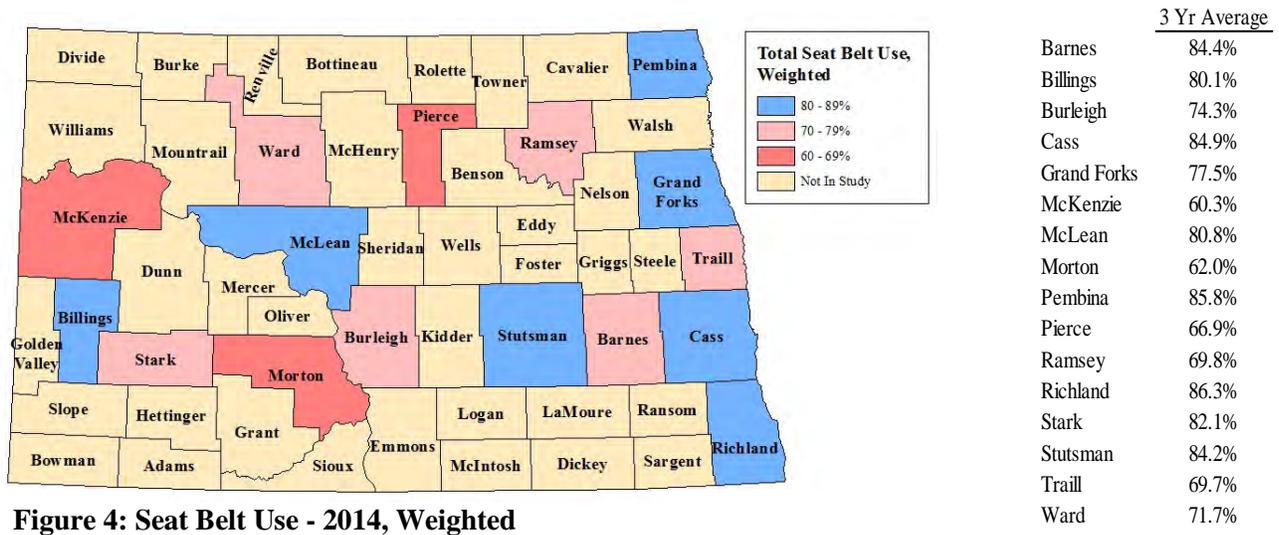
Driver to passenger ratios can influence overall use rates. Similar driver to passenger ratios were seen in 2012 and 2013 - 3.4 and 3.5 respectively. In the 2014

survey, the ratio was slightly higher at 4.0 drivers for every passenger (Table 3).

**Table 3: Driver Passenger Ratio, 2012-2014**

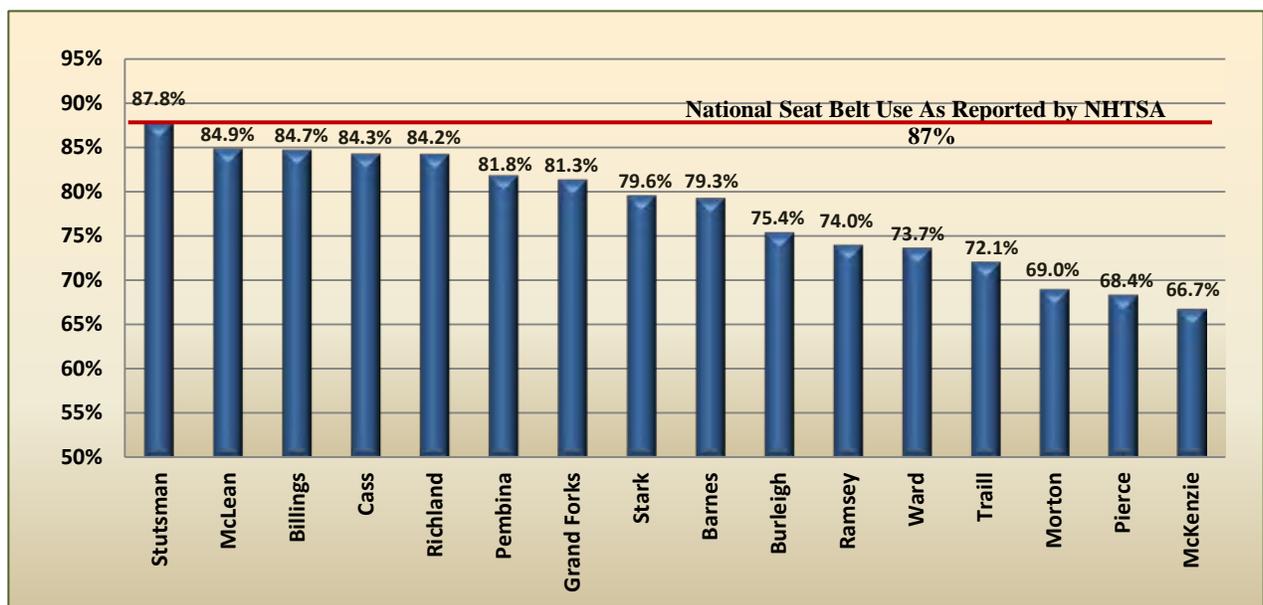
	2012	2013	2014	Difference Baseline (2012) to Current Year
<b>Ratio</b>				
Drivers:Passengers	3.4	3.5	4.0	+0.6
Drivers as % of Sample	77.4%	78.0%	80.1%	+2.7%

## County Results



**Figure 4: Seat Belt Use - 2014, Weighted**

Weighted seat belt use rates for all vehicle occupants in the 16 counties included in the sample are mapped in Figure 4, with the adjacent table providing a three-year average of the weighted rates. Figure 5 shows the counties by descending order of use. Belt use ranged from a high of 87.8% in Stutsman County to a low of 66.7% in McKenzie County. Use rates can vary considerably from year-to-year and it is best to be cautious in interpreting changes from one year to the next at the county level. The changes can often represent sampling difference and are not likely to be statistically significant, especially for counties where there are few total observations. However, even the rates for counties with more observations may be volatile from year-to-year.

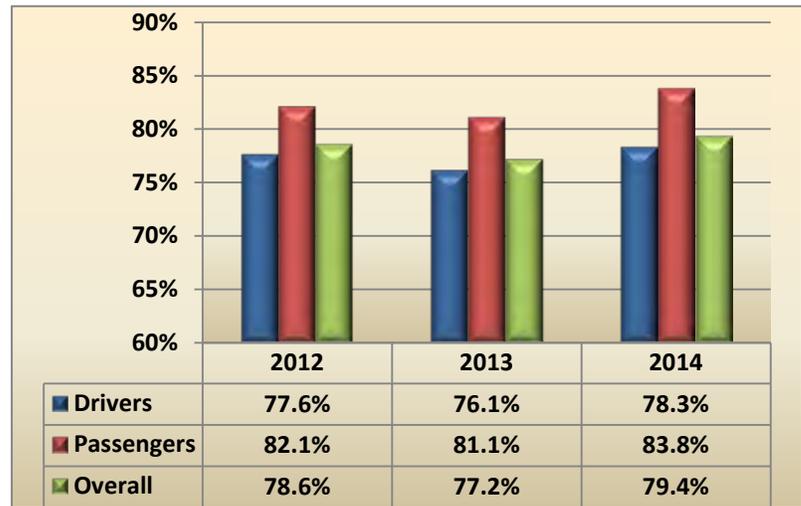


**Figure 5: Seat Belt Use by County - 2014, Weighted**

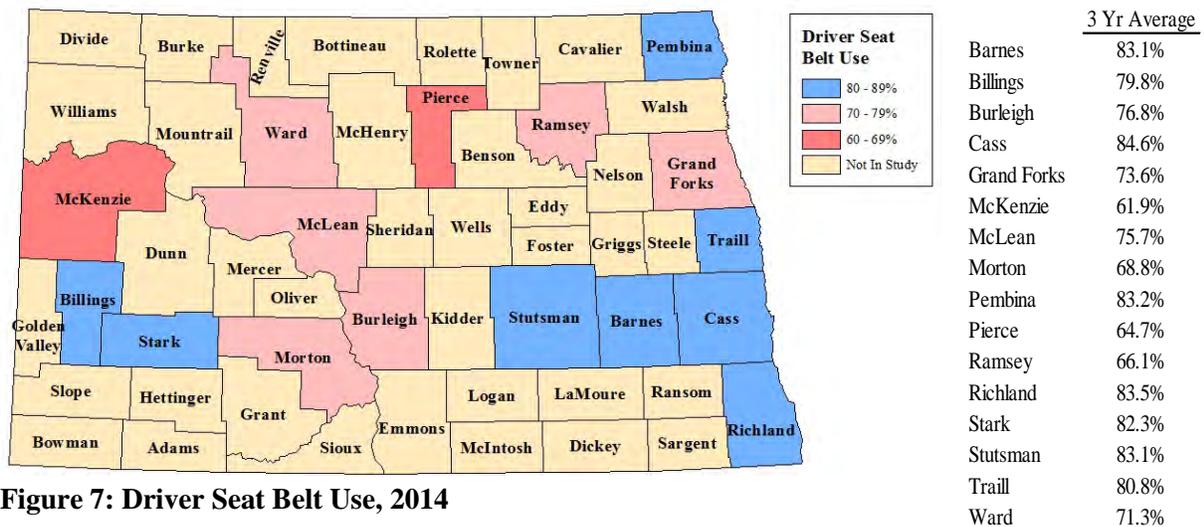
## Results for Vehicle Occupants

The unweighted estimates of seat belt use in 2014 are 78.3% for drivers, 83.8% for passengers, with an overall estimate of the seat belt use rate of 79.4% for drivers and passengers combined (Figure 6).

In 2014, driver seat belt use was highest in Stutsman County at 87.9%. In addition to Stutsman, several other counties had driver use above 80%, see Figure 7. McKenzie and Pierce counties lagged in driver use with rates less than 70%.

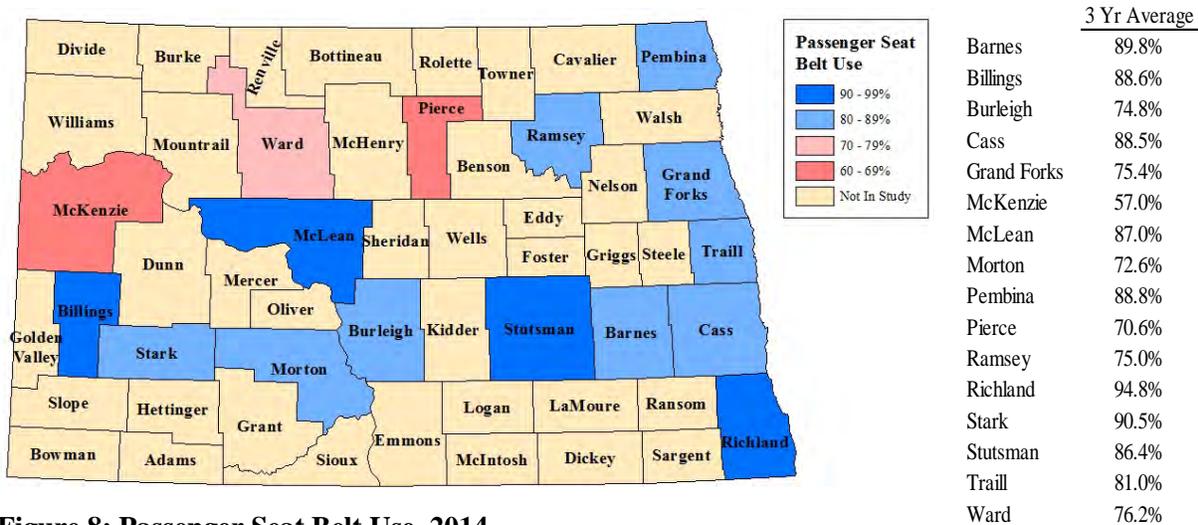


**Figure 6: Percent Belted by Vehicle Occupant, Unweighted**



**Figure 7: Driver Seat Belt Use, 2014**

Passenger use outpaced driver use in all counties surveyed, with the exception of McKenzie. Passenger rates range from a low of 64.7% in McKenzie County to a high of 95.5% in Richland County (Figure 8).



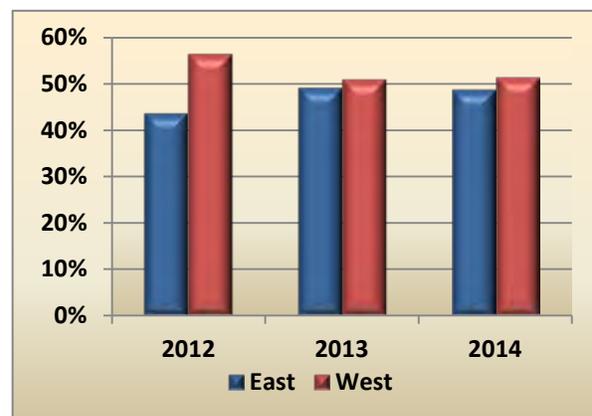
**Figure 8: Passenger Seat Belt Use, 2014**

Considerable effort has been made to address seat belt use in North Dakota. Although an increase in use was measured during this year’s survey over 2013, 81.0% compared to 77.7%, the rate continues to be lower than the national average of 87% reported by NHTSA (2013). Experiences from other states would suggest that some impetus to cause a major shift will be necessary to achieve significant increases in seat belt use. One possibility would be enactment of a primary seat belt law which NHTSA suggests would change seat belt use rates by 10% to 15%. Another related possibility is heightened enforcement across the state.

Some factors that may be useful in discussions about increasing seat belt use in North Dakota are found in the remainder of this report, which focuses on differences in seat belt use among regions of the state, gender, vehicle type, and roadway type.

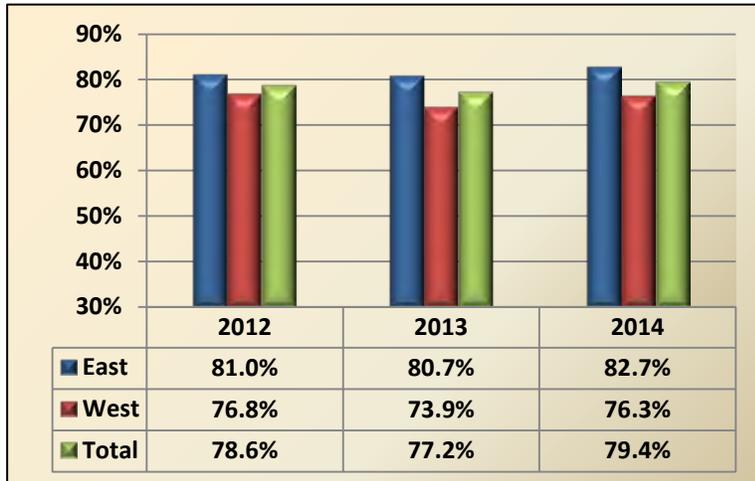
## Results by North Dakota Regions

The survey sampling methodology groups the state into an east/west regional division. Both east and west regions contain three “certainty” counties and five additional counties selected from the remaining counties in each region.<sup>1</sup> The results for the 2014 survey indicated a relatively even



**Figure 9: Percent of Sample by Region**

<sup>1</sup> See the discussion of the sampling methodology for details on certainty counties and the selection processes.



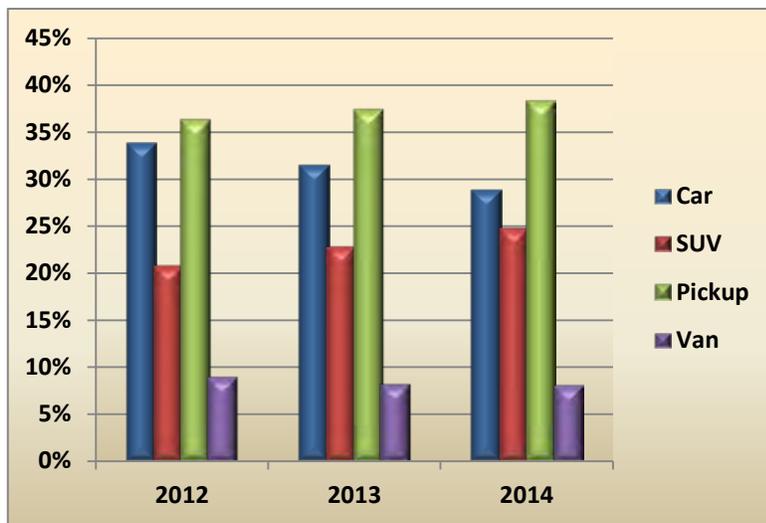
**Figure 10: Percent Belted by Region, Unweighted**

distribution of observations with 14,222 collected in the west and 13,496 in the east. The sample distribution by region is shown in Figure 9.

Rates within each region were fairly consistent with prior years. Seat belt use has traditionally been higher in the east than the west as shown in Figure 10.

## Results by Vehicle Type

Beginning with the 2012 statewide seat belt survey, North Dakota incorporated the expanded Uniform Criteria vehicle eligibility which included all passenger vehicles with a gross vehicle weight up to 10,000 pounds. This change necessitated the inclusion of various small trucks (e.g. flatbed, utility service, and small box trucks, etc.) These additional truck observations are hereafter included in the “pickup” category to prevent confusion with larger truck activity.

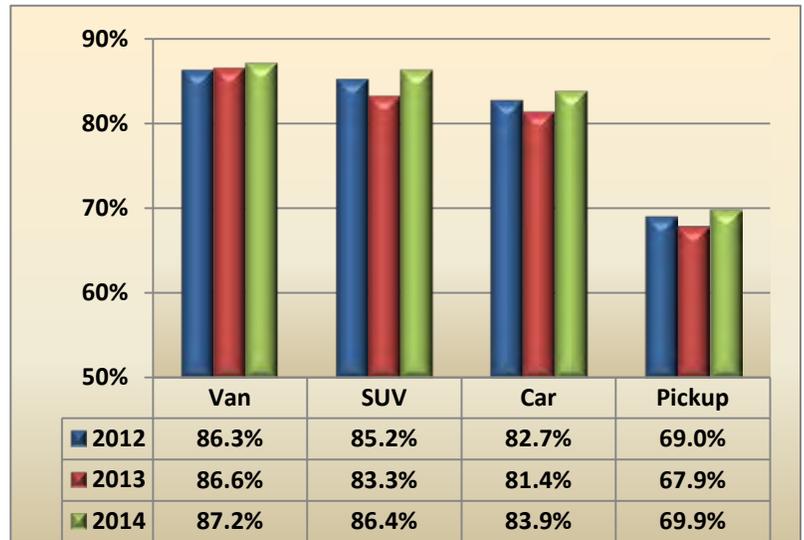


**Figure 11: Composition of Sample by Vehicle Types**

In general, vehicle distribution in the 2014 sample was consistent with the survey years that previously incorporated the changes to vehicle eligibility. Only marginal variations in share were noticed with slight increases in pickups and SUVs, and a corresponding decrease in cars. Pickup observations represented the largest share of vehicle type (38.3%) in the sample (Figure 11). This departure in the historical sample distribution of vehicles where

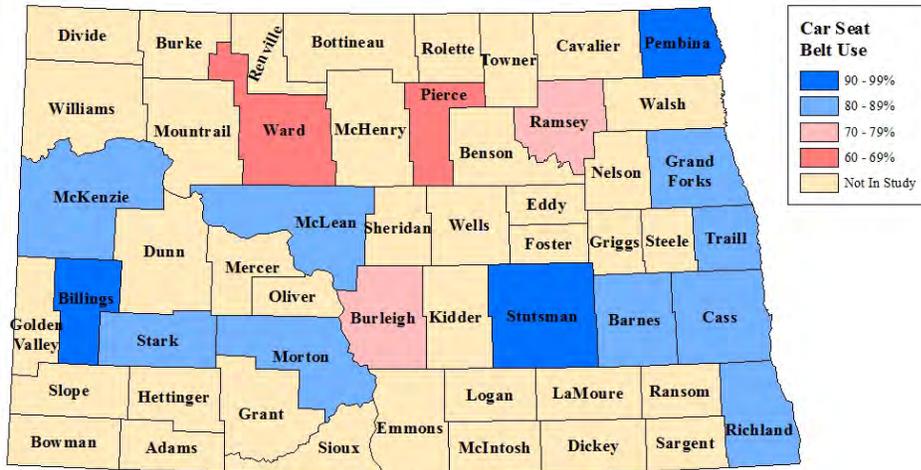
traditionally cars held the largest share is likely explained by the continued development of the oil industry, and the increased number of pickup observations in that region. Whereas the east/west regions held an approximately equal share of the overall sample in 2014, pickups represented 46.5% of vehicles in the west, and only 29.6% in the east. At the county level, this disproportionate share of pickups in the West region was most noticeable in McKenzie County which lies in the middle of the oil patch and recorded 81.0% pickups.

Seat belt use in all vehicle types was stable from 2012 to 2014 with only slight differences observed. Use rates for all vehicle types except pickups were higher than the unweighted 2014 statewide rate of 79.4%. Pickup occupants' observed seat belt use rates were considerably lower than the rates in other vehicle types, and 12% lower than the overall unweighted state rate. This demographic (pickups) typically demonstrates lower seat belt use and this use rate, coupled with its share of the sample, can reduce the overall rate. These 2014 results are consistent with long-term trends for seat belt use in North Dakota and other states that are largely rural and have a high proportion of pickup trucks.



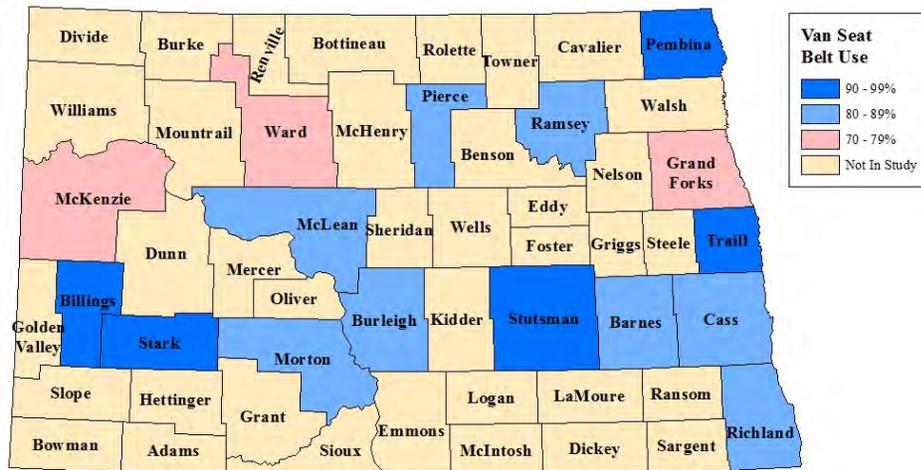
**Figure 12: Percent Belted by Vehicle Type for All Occupants, Unweighted**

The results for overall seat belt use by vehicle type are presented in Figure 12. Maps detailing seat belt use by county and vehicle type are found in Figures 13 through 16.



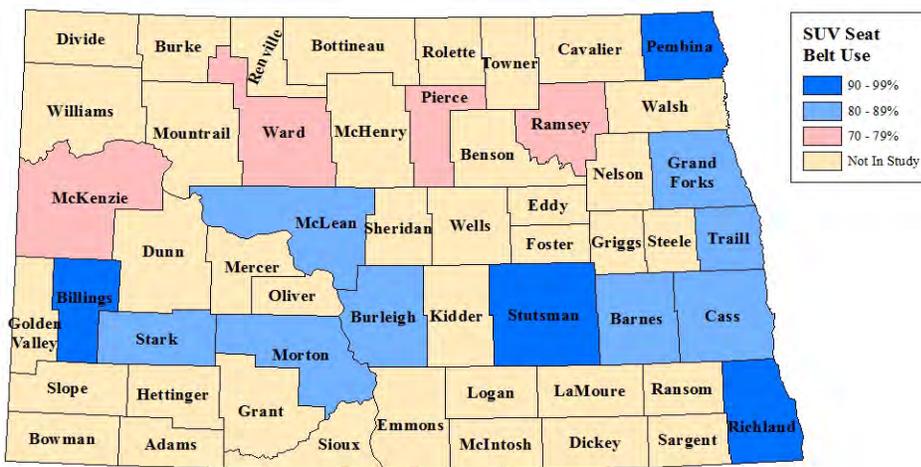
	<u>3 Yr Average</u>
Barnes	89.0%
Billings	89.0%
Burleigh	79.2%
Cass	86.3%
Grand Forks	71.9%
McKenzie	72.1%
McLean	81.9%
Morton	73.8%
Pembina	91.7%
Pierce	72.4%
Ramsey	71.5%
Richland	89.5%
Stark	85.9%
Stutsman	88.3%
Traill	82.0%
Ward	71.6%

**Figure 13: Car Seat Belt Use, 2014**



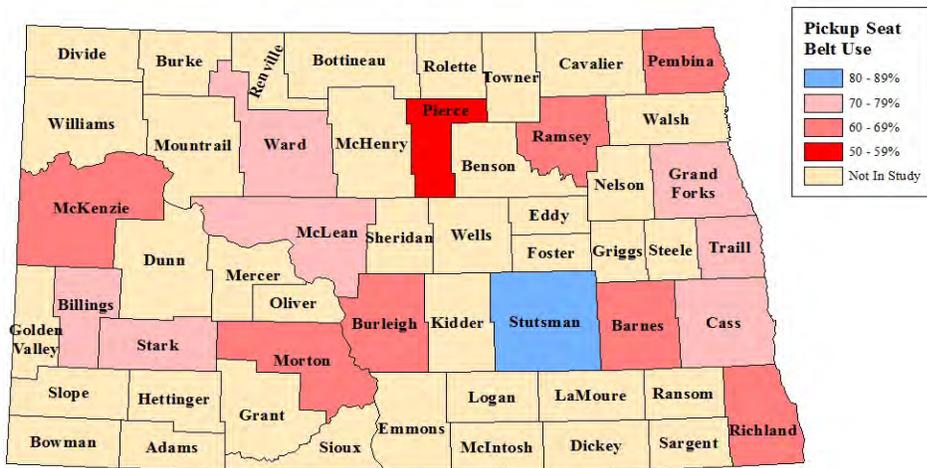
	<u>3 Yr Average</u>
Barnes	89.4%
Billings	89.8%
Burleigh	84.7%
Cass	87.3%
Grand Forks	81.0%
McKenzie	67.7%
McLean	87.1%
Morton	83.1%
Pembina	92.6%
Pierce	83.5%
Ramsey	84.1%
Richland	89.0%
Stark	91.3%
Stutsman	88.7%
Traill	89.3%
Ward	76.9%

**Figure 14: Van Seat Belt Use, 2014**



	<u>3 Yr Average</u>
Barnes	90.5%
Billings	90.1%
Burleigh	83.8%
Cass	89.3%
Grand Forks	77.7%
McKenzie	73.6%
McLean	84.9%
Morton	78.4%
Pembina	92.9%
Pierce	78.7%
Ramsey	74.1%
Richland	92.8%
Stark	88.2%
Stutsman	89.2%
Traill	83.1%
Ward	78.8%

**Figure 15: SUV Seat Belt Use, 2014**

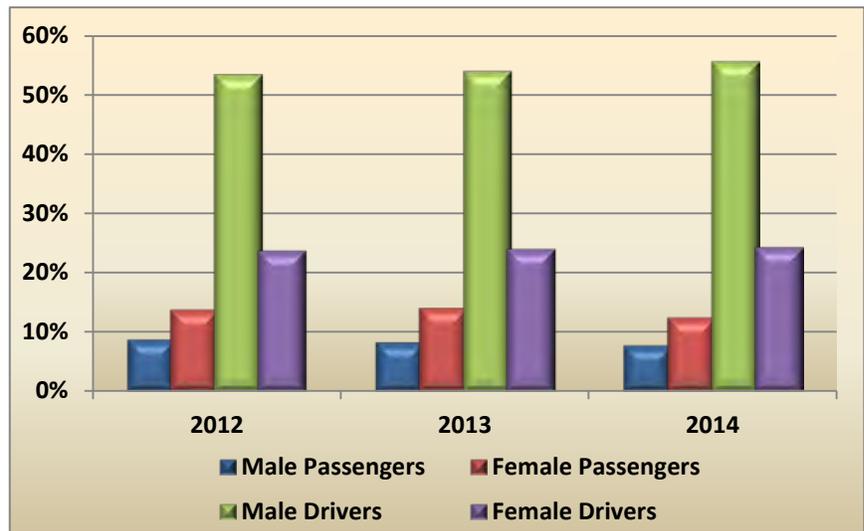


	<u>3 Yr Average</u>
Barnes	71.2%
Billings	71.5%
Burleigh	61.1%
Cass	77.0%
Grand Forks	70.6%
McKenzie	57.4%
McLean	71.4%
Morton	55.5%
Pembina	70.8%
Pierce	51.0%
Ramsey	59.7%
Richland	73.7%
Stark	78.5%
Stutsman	73.2%
Traill	72.9%
Ward	68.7%

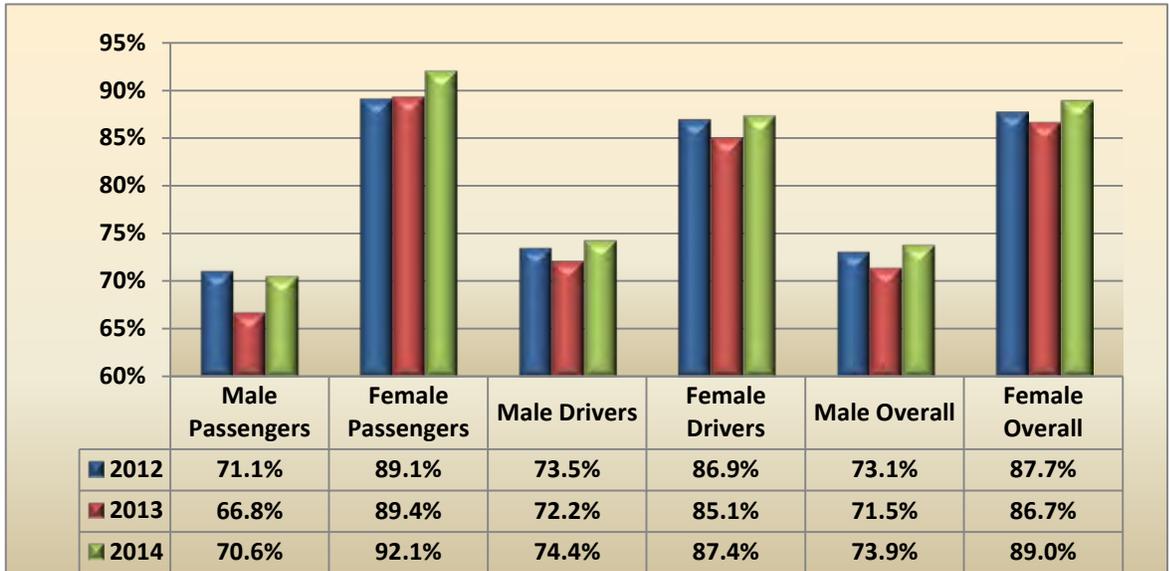
**Figure 16: Pickup Seat Belt Use, 2014**

## Results by Gender and Seat Belt Use

Overall, males represented 63.4% and females 36.5% of the sample. When considering occupant position, drivers were more than twice as likely to be male than female (Figure 17). In a small percentage of observations, occupant gender was unable to be determined, but occupant protection was still recorded. These cases are included in all of the analyses except where gender is one of the variables of interest. Removing these observations for these parts of the analyses has no effect on the overall numbers, but is mentioned here for comprehensive reporting.

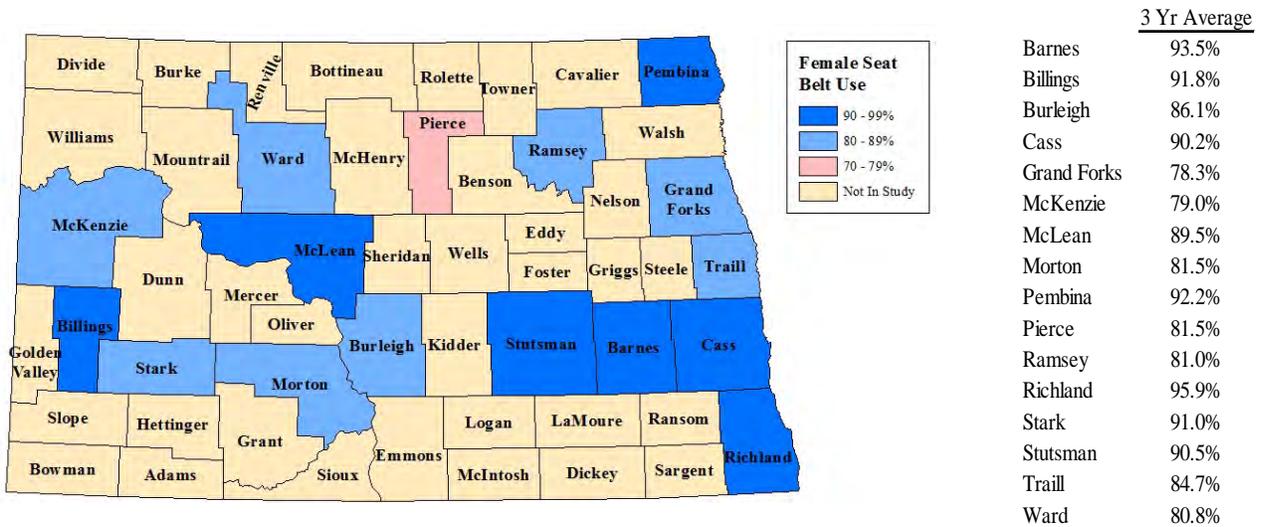


**Figure 17: Percent of Sample by Gender & Vehicle Occupant**



**Figure 18: Percent Belted by Gender & Vehicle Occupant**

The results for gender seat belt use in 2014 were consistent with the results of prior surveys. Females, regardless of occupant position, consistently demonstrated greater rates of use than males (Figure 18). In 2014, female passengers led seat belt use rates (92.1%) followed by female driver use of 87.4%. Male belt use was considerably less – 70.6% for passengers and 74.4% for drivers. When considering seat belt use



**Figure 19: Female Seat Belt Use, 2014**

by gender and county, roughly half the counties statewide showed female use above 90%, with only one county less than 80% (Figure 19); while males demonstrated belt use below 70% in approximately one-third of survey counties (Figure 20). Both genders exhibited greater seat belt use in the eastern half of the state. However, disparity in belt use by gender was also observed within regions.

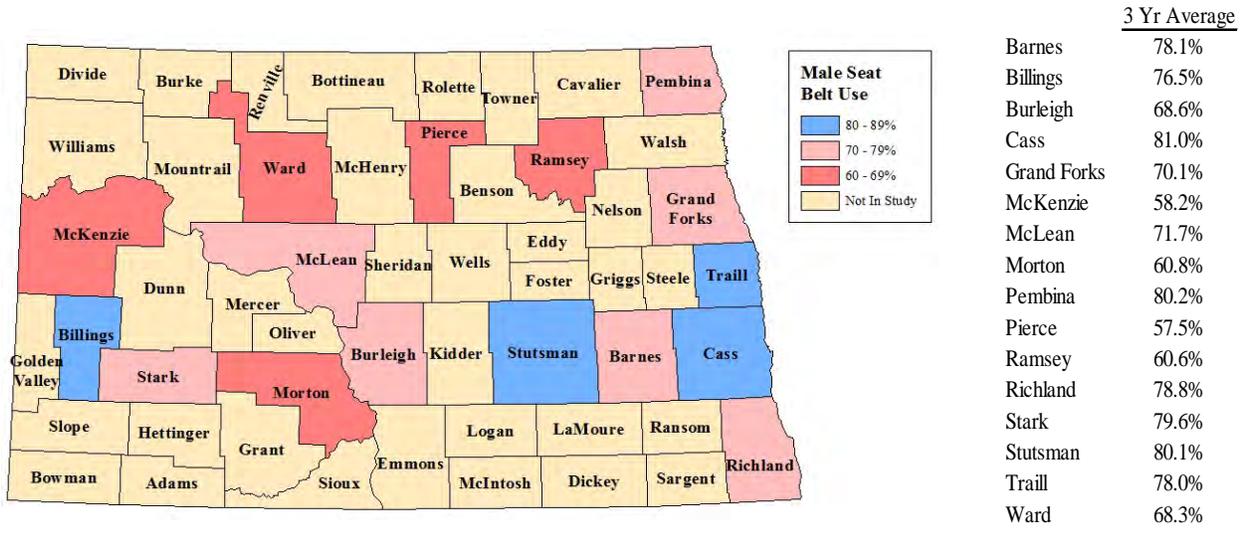


Figure 20: Male Seat Belt Use, 2014

### Results by Gender and Vehicle Type

When considering the results without respect to the driver/passenger demographic, males had lower representation in SUVs only. The greatest disparity showed males with a larger than 85% share of the sample in the pickup vehicle type. The gender breakdown of the other vehicle types was more uniform. The distribution of vehicle occupants by gender, expressed as percentages of the sample, are illustrated in Figure 21.

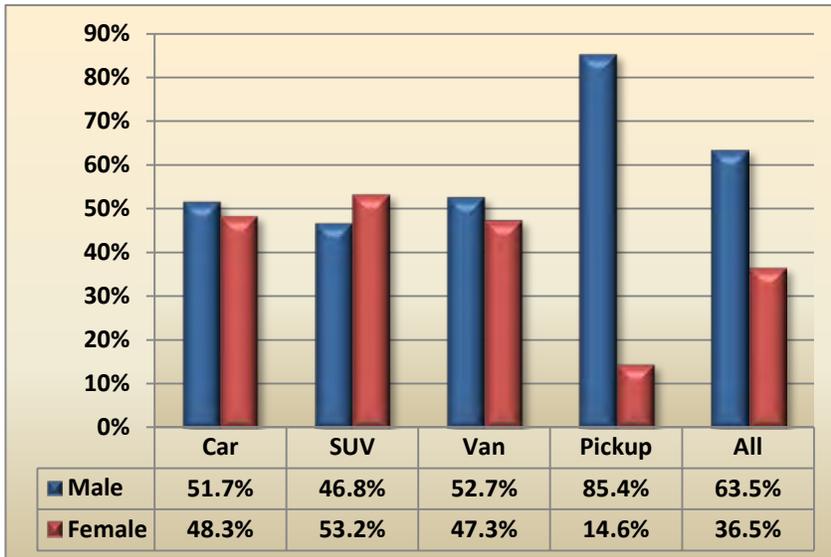
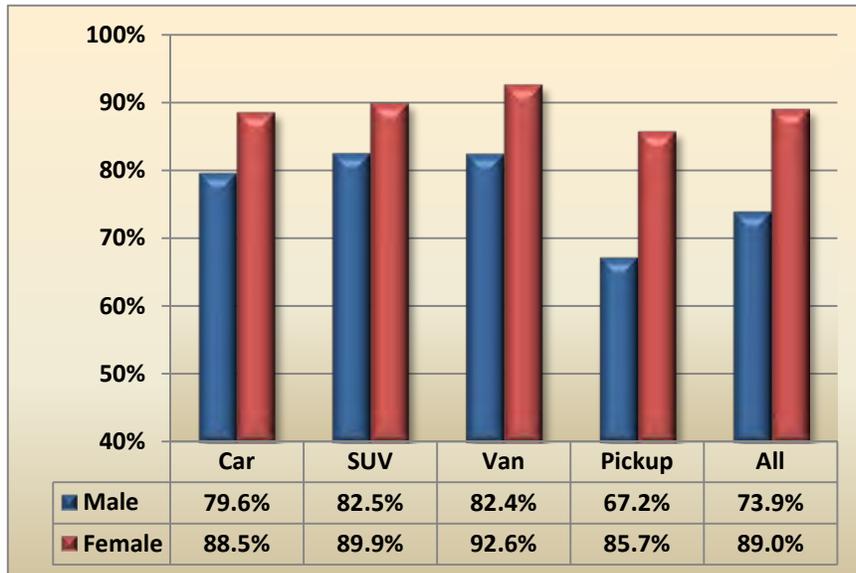


Figure 21: Percent of Sample by Vehicle Type and Gender, 2014

Gender of seat belt users by vehicle type in 2014 reflected findings similar to prior years. In general, female seat belt use rates were consistently high across all types of vehicles, at least 85.7%, although the size of the gender difference varied (Figure 22). Males demonstrated ranges of use between 67.2% (pickup) to a high of 82.5% (SUV). Although both male and female observed use is lowest in pickups, the

male rate dropped off precipitously to 67.2% versus 85.7% for females. Apart from male pickup occupants, seat belt use for both genders across the vehicle types was higher than the unweighted state rate.



	3 Yr Average	
	Male	Female
Car	78.3%	87.2%
SUV	80.4%	89.0%
Van	82.1%	92.1%
Pickup	66.3%	83.9%

**Figure 22: Percent Belted by Gender & Vehicle Type, 2014**

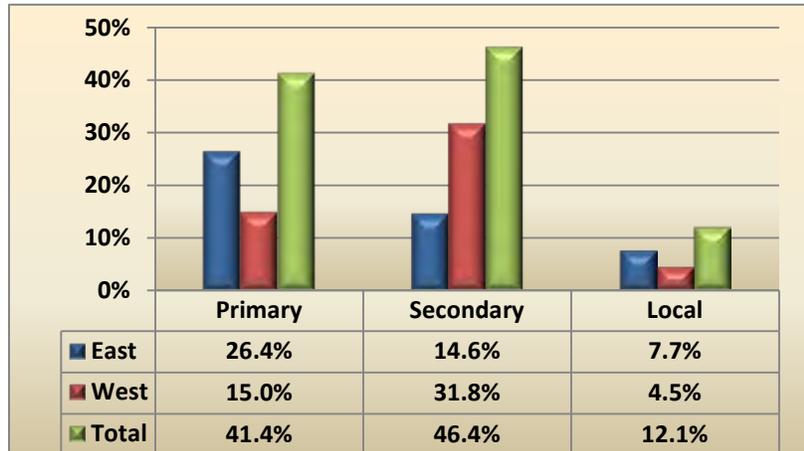
## Results by Roadway Type

Roadways are classified into three road types and broadly described as follows:

- Primary road – divided, limited-access, i.e. interstates
- Secondary road – main arteries usually in U.S./state/county highway system
- Local neighborhood road/rural road/city street – paved, non-arterial streets

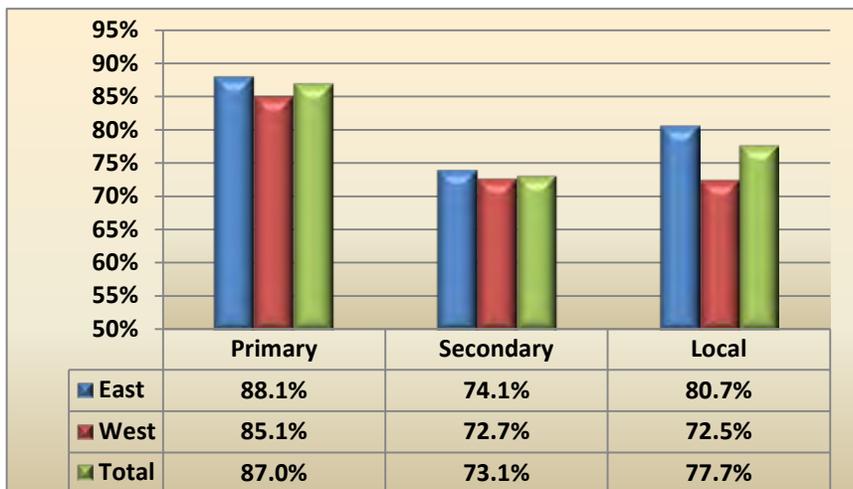
A more comprehensive definition of road type is provided in Appendix F. In the 2014 survey, primary, secondary and local roadways accounted for 41.4%, 46.4%, and 12.1% of the vehicle occupants respectively (Figure 23).

Differences in seat belt use rates are found across the road types. It is typical in North Dakota to find that vehicle occupants on interstate roadways have the highest rates of seat belt use, and this was again evident in 2014. Overall, vehicle occupants on primary roads were belted at a rate considerably higher than the rates for secondary and local



**Figure 23: Percent of Sample by Roadway Type, 2014**

roads (Figure 24). Seat belt use stratified by region and roadway type reveals that east/west use was relatively consistent on primary and secondary road types. However, a clearer disparity was seen on local roads.



**Figure 24: Seat Belt Use by Roadway Type, 2014**

## SUMMARY

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Observers collected data on seat belt use for 22,203 drivers and 5,515 right front-seat passengers, for a total of 27,718 vehicle occupants. The observations were collected at 320 sites across 16 counties. Based on the sampling methodology weighting procedures, the final estimate for the statewide seat belt use was 81.0%. Experiences from other states indicate that improvement in seat belt use will likely only occur through some type of significant change such as implementation of a primary seat belt law, increased funding for additional enforcement, or possibly higher fines (NHTSA).

A summary of major findings regarding seat belt use in North Dakota for 2014 are:

- **Region.** In 2014, rates of seat belt use were higher in the east region overall, 82.7%, versus 76.3% in the west. The driver population from the east recorded a rate of 81.4% compared to 75.6% in the west. There was a larger disparity between the east/west regions in the passenger population where use rates were 86.9% and 79.6% respectively.
- **County.** Stutsman was the singular county with seat belt use above the national average with the highest use rate of 87.8%. Six additional counties demonstrated seat belt use above 80%: Billings, Cass, Grand Forks, McLean, Pembina, and Richland. Of the 16 counties observed, McKenzie, Morton, and Pierce were observed to have seat belt use rates less than 70%.
- **Vehicle Type.** The results of the 2014 statewide survey indicated that rates of seat belt use were above the unweighted statewide average in every vehicle type except pickups. Seat belt use among pickup occupants continued to depress the overall rate in North Dakota because these occupants made up 38.3% of the sample and the use was low – 69.9% overall, with male occupants at 67.2%.
- **Gender.** Female occupants had much higher rates of seat belt use than male occupants (89.0% and 73.9% overall). The lowest county rate for female occupants was 74.4% whereas the lowest rate for male occupants was 60.6%, both in Pierce County. Higher rates hold for females whether they are drivers or passengers. Females consistently have higher rates when compared to males not only in North Dakota, but across the nation.
- **Gender and Vehicle Type.** Females had higher rates of seat belt use than males for every vehicle type. Female rates were relatively high even in pickup trucks. The highest rate for males was

found in SUVs, 82.5%, and the lowest in pickups, 67.2%. By comparison, female rates were more consistent across vehicle types, ranging from 92.6% in vans to 85.7% in pickups.

- **Road Type.** Secondary roads held the largest share of occupants in the sample (46.4%), followed by primary roads (41.4%). Local roads had the smallest share (12.1%). Frequency of seat belt use was highest on primary roads (87.0%) followed by local roads (77.7%) and secondary roads (73.1%).

## **APPENDICES**

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## **Appendix A: Site Locations**

## BARNES COUNTY

Site	Location	Longitude	Latitude	Direction	Segment Length
1	I- 94	-98.356489	46.892286	W	1.715394
2	I- 94	-98.399349	46.892254	W	1.326712
3	I- 94	-98.068763	46.913694	W	0.768731
4	I- 94	-97.77342	46.920078	E	0.634726
5	I- 94	-98.15072	46.906721	W	0.427605
6	I- 94	-97.953242	46.917391	E	0.231374
7	I- 94	-98.03492	46.911904	E	0.121896
8	113th Ave SE	-98.080741	46.899112	S	1.007284
9	126th Ave SE	-97.807913	46.738823	N	1.000069
10	22nd St SE	-98.203587	47.095837	W	0.902989
11	128th Ave SE	-97.790496	47.085716	S	0.761741
12	128th Ave SE	-97.790621	47.046995	N	0.600938
13	109th Ave SE	-98.19331	47.092175	S	0.505008
14	22nd St SE	-98.250805	47.095789	E	0.482591
15	54th St SE	-97.918264	46.630397	W	0.455818
16	113th Ave SE	-98.081555	46.684496	N	0.385575
17	113th Ave SE	-98.081542	46.691172	N	0.306283
18	128th Ave SE	-97.790538	47.092963	N	0.239568
19	128th Ave SE	-97.790675	47.136932	S	0.168073
20	14th St SE	-97.962182	47.213802	E	0.070416

**BILLINGS COUNTY**

Site	Location	Longitude	Latitude	Direction	Segment Length
1	I- 94	-103.339119	46.890433	E	2.203156
2	I- 94	-103.401664	46.891393	W	1.751695
3	I- 94	-103.465739	46.909844	W	1.608209
4	I- 94	-103.428328	46.902069	E	1.152164
5	I- 94	-103.408512	46.896609	E	0.885979
6	I- 94	-103.539319	46.931131	E	0.787375
7	I- 94	-103.50023	46.918098	W	0.686475
8	I- 94	-103.368135	46.888	E	0.486447
9	I- 94	-103.556186	46.929887	E	0.319323
10	I- 94	-103.569938	46.928496	E	0.26144
11	I- 94	-103.528546	46.929551	W	0.201336
12	US Hwy 85	-103.22289	47.256306	S	1.504804
13	US Hwy 85	-103.201966	47.0463	S	0.89789
14	US Hwy 85	-103.223134	47.178168	N	0.63997
15	US Hwy 85	-103.201922	47.056423	N	0.500756
16	US Hwy 85	-103.201844	47.07769	S	0.453455
17	US Hwy 85	-103.202052	47.003091	S	0.374689
18	US Hwy 85	-103.223153	47.194564	S	0.279845
19	US Hwy 85	-103.201732	47.119233	S	0.188942
20	US Hwy 85	-103.201893	47.06683	N	0.046836

**BURLEIGH COUNTY**

Site	Location	Longitude	Latitude	Direction	Segment Length
1	I- 94	-100.255593	46.839108	W	1.199425
2	314th St SE	-100.292454	46.68804	W	0.54819
3	12th Ave SW	-100.749104	47.209317	S	0.159232
4	Moffit Rd	-100.499892	46.692409	E	1.020085
5	158th St NE	-100.541435	46.817962	N	0.032535
6	Co Hwy 10	-100.572912	46.823395	E	0.927562
7	Tacoma Ave	-100.774543	46.782808	E	0.035558
8	Stevens St	-100.800146	46.833643	N	0.052641
9	S 2nd St	-100.790218	46.797887	N	0.054243
10	Rutland Dr	-100.79646	46.768173	E	0.055059
11	Greenfield Ln	-100.798488	46.869143	E	0.455918
12	N 26th St	-100.751893	46.825133	N	0.058028
13	Domino Dr	-100.822744	46.837655	S	0.065415
14	E Brandon Dr	-100.791	46.842207	E	0.074963
15	12th St SE	-100.773571	46.782262	S	0.075224
16	43rd Ave NE	-100.736936	46.85247	W	0.101315
17	Edwards Ave	-100.814246	46.820529	E	0.103021
18	W Century Ave	-100.816547	46.832609	E	0.119855
19	N Hannifin St	-100.797322	46.810264	S	0.071567
20	2nd Ave W	-100.285151	47.141443	W	0.050986

## CASS COUNTY

Site	Location	Longitude	Latitude	Direction	Segment Length
1	I- 94	-97.260985	46.876015	E	0.227566
2	25th Ave S	-96.809757	46.84331	W	0.014799
3	35th St SE	-97.104062	46.905686	W	0.034689
4	2nd St N	-96.781974	46.878686	N	0.049207
5	40th Ave S	-96.904108	46.818987	E	0.052263
6	54th St SE	-97.678289	46.629915	W	0.064256
7	Old County Road 10	-97.0529	46.8105	E	0.881437
8	158th Ave SE	-97.158671	46.855985	N	0.778157
9	149th Ave SE	-97.345482	46.856466	S	0.667422
10	34th St SE	-97.528176	46.919193	W	0.55633
11	8th St W	-96.913549	46.866034	S	0.065305
12	146th Ave	-97.408929	47.213283	N	0.471077
13	25 St SE	-97.23532	47.05001	E	0.424967
14	22nd St S	-96.81624	46.825006	S	0.350048
15	Taylor St S	-96.854933	46.823194	S	0.263011
16	28th Ave S	-96.812746	46.837497	E	0.194207
17	Co Rd 38	-97.555592	46.750697	N	0.133057
18	32nd Ave NE	-96.771811	46.919372	E	0.087458
19	139th Ave SE	-97.55604	46.686601	N	0.057884
20	33rd St S	-96.832981	46.832842	N	0.02473

**GRAND FORKS COUNTY**

Site	Location	Longitude	Latitude	Direction	Segment Length
1	Hwy 2	-97.636052	47.946939	E	0.805038
2	30th St NE (Co Rd 2)	-97.472525	47.93285	W	0.023697
3	20th Ave S	-97.067653	47.900366	E	0.033125
4	N 2nd St	-97.043038	47.93637	S	0.033992
5	11th Ave S	-97.080639	47.911249	E	0.048911
6	3rd Ave	-97.565892	47.733178	E	0.056917
7	17th St NE	-97.196377	47.974682	N	0.07124
8	S 38th St	-97.082468	47.897316	S	0.087548
9	14th Ave S	-97.065133	47.907194	W	0.117309
10	Washington Ave	-97.561258	47.734126	E	0.138829
11	31st St (Co Rd 2)	-97.4952	47.765731	N	0.167606
12	17th St NE	-97.19612	47.958675	S	0.487439
13	Co Rd 4	-97.526249	47.916711	E	0.44923
14	16th St NE	-97.174808	47.906995	N	0.395984
15	N 69th St	-97.131078	47.945269	S	0.332116
16	47th Ave S	-97.060654	47.874918	E	0.259329
17	S 17th St	-97.051102	47.894478	S	0.18233
18	Mulberry Dr	-97.061065	47.883079	S	0.126782
19	24th Ave S	-97.042784	47.896736	W	0.071389
20	W 3rd St	-97.631805	47.90672	W	0.032996

**MCKENZIE COUNTY**

Site	Location	Longitude	Latitude	Direction	Segment Length
1	US Hwy 85	-103.648066	47.913493	S	1.000484
2	Hwy 1806 N	-103.142765	48.081859	W	0.855577
3	US Hwy 85	-103.659113	48.002153	S	0.749703
4	Hwy 85 N	-103.248252	47.482383	S	0.695263
5	State Hwy 16	-103.887417	47.503706	S	0.643902
6	State Hwy 1806	-103.206788	47.845831	S	0.577763
7	State Hwy 23	-102.94322	47.930526	N	0.522664
8	US Hwy 85	-103.427955	47.804826	W	0.475846
9	State Hwy 22	-102.719324	47.785506	S	0.431245
10	State Hwy 200	-103.662685	47.877321	E	0.392436
11	US Hwy 85	-103.659067	47.982218	N	0.353215
12	State Hwy 1806	-102.87151	48.064412	S	0.311063
13	State Hwy 22	-102.729145	47.965303	N	0.275317
14	State Hwy 16	-103.852474	47.561108	S	0.247473
15	State Hwy 23	-102.941866	47.973753	N	0.223058
16	State Hwy 23	-102.944743	47.842261	N	0.178915
17	State Hwy 68	-103.646637	47.805721	S	0.143125
18	State Hwy 1806	-103.103284	48.101533	S	0.107005
19	Elk St	-103.642377	47.842548	N	0.071714
20	State Hwy 16	-103.856911	47.574797	N	0.022243

**MCLEAN COUNTY**

Site	Location	Longitude	Latitude	Direction	Segment Length
1	US Hwy 83	-101.25996	47.566862	S	1.02849
2	72nd Ave NW	-102.128965	47.796979	S	0.999081
3	23rd St NW	-101.925583	47.74628	E	0.944954
4	51st Ave NW	-101.684232	47.796271	S	0.875916
5	53rd Ave NW	-101.675385	47.669144	S	0.751633
6	51st Ave NW	-101.679183	47.736895	N	0.688095
7	US Hwy 83	-101.188744	47.520481	S	0.592456
8	29th St NW	-100.805545	47.832212	W	0.533715
9	15th Ave NW	-100.907321	47.688771	S	0.497303
10	23rd St NW	-102.00592	47.746324	W	0.473312
11	State Hwy 41	-100.909788	47.795726	S	0.451177
12	15th Ave NW	-100.907321	47.722055	N	0.405334
13	US Hwy 83	-100.899715	47.198283	N	0.375835
14	3rd St NW	-101.051305	47.458445	E	0.341759
15	US Hwy 83	-101.200232	47.529447	S	0.293257
16	16th St NW	-101.390986	47.646457	W	0.254891
17	US Hwy 83	-101.165343	47.491582	S	0.21479
18	State Hwy 1804	-100.945489	47.198597	N	0.177076
19	State Hwy 1804	-100.942824	47.199822	N	0.126567
20	28th St NW	-101.249585	47.819291	W	0.05826

## MORTON COUNTY

Site	Location	Longitude	Latitude	Direction	Segment Length
1	I- 94	-101.352826	46.86099	E	0.826994
2	State Hwy 49	-101.865255	46.771153	S	0.617583
3	State Hwy 1806	-100.89318	46.843661	N	0.084771
4	Co Rd 84	-101.281173	46.837947	N	1.248136
5	Co Rd 86	-101.509324	46.752741	N	0.961365
6	Co Rd 139	-101.871646	46.819119	E	0.820882
7	Fort Lincoln Rd	-100.844814	46.76672	N	0.709442
8	E South Ave	-101.826579	46.816494	W	0.064803
9	Co Rd 139	-101.124431	46.848176	W	0.067562
10	Co Rd 139	-102.079334	46.897863	E	0.29452
11	Old Red Trl	-100.886129	46.843144	E	0.469698
12	50th Ave	-101.512691	46.929099	N	0.772588
13	S 2nd St	-101.831365	46.81303	S	0.088366
14	State Hwy 1806	-100.916318	46.89698	S	0.10914
15	Co Rd 139	-101.757216	46.82346	E	0.275641
16	45th Ave	-101.406761	46.835906	S	0.228949
17	Shoal Loop	-100.835591	46.802646	W	0.271284
18	40th Ave NW	-100.944399	46.866416	S	0.123371
19	Co Rd 84	-101.28148	46.880661	S	0.075273
20	Main Ave	-102.037677	46.901449	W	0.275954

**PEMBINA COUNTY**

Site	Location	Longitude	Latitude	Direction	Segment Length
1	I- 29	-97.228595	48.828214	S	2.669153
2	I- 29	-97.181829	48.644135	N	1.450785
3	I- 29	-97.223865	48.782189	N	1.093183
4	I- 29	-97.233352	48.88594	S	0.750821
5	I- 29	-97.190054	48.683785	S	0.492769
6	I- 29	-97.190507	48.696819	S	0.272041
7	93rd St NE	-97.763054	48.761487	W	1.015029
8	148th Ave NE	-97.447777	48.59371	S	1.000812
9	148th Ave NE	-97.447917	48.564519	N	0.973169
10	80th St NE	-97.33237	48.571784	E	0.947573
11	82nd St NE	-97.851654	48.601039	E	0.914581
12	80th St NE	-97.268361	48.571616	W	0.791082
13	84th St NE	-97.913308	48.629994	W	0.645179
14	State Hwy 32	-97.916372	48.909635	S	0.563087
15	144th Ave NE	-97.556462	48.829916	S	0.497186
16	State Hwy 18	-97.622668	48.73532	N	0.439074
17	80th St NE	-97.295546	48.571696	W	0.364881
18	130th Ave NE	-97.862085	48.730017	N	0.276674
19	Hwy 18 S	-97.622375	48.785382	S	0.18823
20	127th Ave NE	-97.92736	48.84825	N	0.083335

**PIERCE COUNTY**

Site	Location	Longitude	Latitude	Direction	Segment Length
1	State Hwy 17	-99.51422	48.490224	W	1.047534
2	48th Ave NE	-99.623671	48.537724	S	0.999694
3	75th St NE	-100.026396	48.50167	E	0.951739
4	65th St NE	-99.923238	48.354639	E	0.948532
5	75th St NE	-100.069885	48.501634	W	0.944567
6	29th Ave NE	-99.998505	48.203363	S	0.902785
7	30th Ave NE	-99.940729	47.928347	S	0.859889
8	65th St NE	-99.856366	48.354495	E	0.79866
9	42nd St NE	-100.088653	48.021765	W	0.732319
10	29th Ave NE	-99.999047	48.215957	S	0.687133
11	75th St NE	-99.783246	48.501374	E	0.609467
12	30th Ave NE	-99.977519	48.090301	S	0.505752
13	29th Ave NE	-100.037214	48.411208	N	0.478417
14	US Hwy 52	-100.170079	47.849777	S	0.462616
15	30th Ave NE	-99.977534	48.10207	S	0.429059
16	65th St NE	-99.875688	48.354545	W	0.351578
17	75th St NE	-99.844849	48.500329	E	0.287829
18	65th St NE	-100.217885	48.355287	E	0.238915
19	65th St NE	-100.014248	48.354867	E	0.188595
20	42nd St NE	-100.006768	48.021606	E	0.101227

**RAMSEY COUNTY**

Site	Location	Longitude	Latitude	Direction	Segment Length
1	81st Ave NE	-98.876144	48.294306	N	1.429573
2	State Hwy 1	-98.356438	48.245736	S	0.999989
3	104th Ave NE	-98.379076	48.332092	N	0.945505
4	US Hwy 2 W	-99.126887	48.235445	W	0.887893
5	69th St NE	-98.397288	48.413293	E	0.702945
6	78th St NE	-98.854897	48.543895	W	0.610705
7	69th St	-98.477178	48.413416	W	0.517309
8	State Hwy 20	-98.865472	48.154804	S	0.482338
9	State Hwy 1	-98.356458	48.264002	S	0.466453
10	US Hwy 2 W	-98.966288	48.160828	W	0.420574
11	US Hwy 2	-98.786583	48.066301	S	0.38001
12	US Hwy 2 W	-98.97337	48.163985	E	0.331203
13	US Hwy 2	-99.144458	48.243949	S	0.292631
14	Hwy 19	-98.937704	48.107836	E	0.26458
15	US Hwy 2 W	-99.116021	48.230556	S	0.24527
16	82nd Ave NE	-98.883947	48.455545	N	0.226635
17	US Hwy 2 W	-98.998128	48.17251	W	0.195316
18	US Hwy 2 W	-98.988945	48.167996	E	0.168498
19	US Hwy 2	-98.892115	48.126423	W	0.118358
20	US Hwy 2 W	-98.891785	48.125918	W	0.055098

**RICHLAND COUNTY**

Site	Location	Longitude	Latitude	Direction	Segment Length
1	I- 29	-96.836329	45.950112	N	1.359951
2	I- 29	-96.835584	46.087736	N	1.005018
3	I- 29	-96.830271	46.362143	S	0.991233
4	I- 29	-96.835737	45.987624	N	0.871156
5	I- 29	-96.831012	46.303086	S	0.662594
6	I- 29	-96.835391	46.06193	N	0.427745
7	I- 29	-96.831406	46.309682	N	0.250397
8	Hwy 127 (11th St S)	-96.6162	46.159619	S	1.006046
9	Hwy 18 (157th Ave SE)	-97.134785	46.507293	S	0.944671
10	Hwy 46 (54th St SE)	-97.167008	46.629559	W	0.90175
11	Hwy 18 (157th Ave SE)	-97.134535	46.465036	S	0.776723
12	State Hwy 11	-96.859407	46.051599	W	0.672046
13	State Hwy 11	-96.797428	46.051454	E	0.556777
14	Hwy 18 (157th Ave SE)	-97.134188	46.34502	N	0.481229
15	State Hwy 13	-96.880792	46.261476	W	0.428462
16	State Hwy 11	-96.829118	46.051575	E	0.364157
17	State Hwy 11	-96.614055	46.050911	W	0.292571
18	State Hwy 13	-96.722722	46.261258	W	0.227072
19	Hwy 18 (7th St)	-97.134983	46.274365	N	0.130541
20	State Hwy 13	-96.998992	46.261636	W	0.057889

**STARK COUNTY**

Site	Location	Longitude	Latitude	Direction	Segment Length
1	I- 94	-102.637798	46.881231	E	1.512552
2	I- 94	-102.46441	46.876866	E	0.96493
3	I- 94	-102.591049	46.881903	W	0.918117
4	I- 94	-102.906237	46.890699	E	0.83166
5	I- 94	-102.294515	46.869338	E	0.755253
6	I- 94	-102.376434	46.877101	E	0.633728
7	I- 94	-102.281031	46.866794	E	0.505937
8	I- 94	-102.111179	46.863189	W	0.465072
9	I- 94	-102.681552	46.883957	W	0.358611
10	I- 94	-102.542746	46.872137	W	0.265398
11	I- 94	-102.547671	46.873429	W	0.196159
12	111th Ave SW	-102.789792	46.796393	S	1.002572
13	130th Ave SW	-103.195785	46.635069	N	0.716407
14	111th Ave SW	-102.78977	46.783093	N	0.516479
15	130th Ave SW	-103.189554	46.956131	S	0.435818
16	I- 94 Bus	-102.827683	46.887597	E	0.340075
17	I- 94 Bus	-102.821926	46.880355	E	0.255456
18	89th Ave SW	-102.328894	46.955982	S	0.194181
19	Donald St	-103.189682	46.882978	S	0.101479
20	Hwy 22	-102.789715	46.952641	S	0.052921

**STUTSMAN COUNTY**

Site	Location	Longitude	Latitude	Direction	Segment Length
1	I- 94	-98.595628	46.892432	E	2.626063
2	I- 94	-98.964636	46.891004	E	1.724538
3	I- 94	-98.833075	46.892329	W	1.223388
4	I- 94	-99.205013	46.885531	W	0.949006
5	I- 94	-99.08709	46.890337	E	0.604692
6	I- 94	-99.124201	46.886185	W	0.204712
7	US Hwy 52	-98.805694	47.039007	S	1.48201
8	19th St SE	-99.407636	47.139348	E	0.944597
9	State Hwy 36	-99.118835	47.164723	N	0.852425
10	6th St SE	-98.981854	47.326812	E	0.669885
11	US Hwy 52	-98.78135	47.012071	S	0.591682
12	State Hwy 36	-99.309984	47.15254	N	0.534474
13	86th Ave SE	-98.679256	47.149591	S	0.484735
14	17th St SE	-99.10605	47.167891	W	0.454427
15	53rd Ave SE	-99.341956	46.851932	N	0.412876
16	92nd Ave SE	-98.552404	47.31534	N	0.356878
17	17th St SE	-98.950769	47.167873	W	0.288895
18	83rd Ave SE	-98.712839	46.844765	S	0.22733
19	53rd Ave SE	-99.344121	46.657108	N	0.150449
20	17th St SE	-98.469618	47.168007	E	0.07891

## TRAILL COUNTY

Site	Location	Longitude	Latitude	Direction	Segment Length
1	I- 29	-97.069661	47.434862	S	2.742714
2	I- 29	-97.091349	47.529055	S	2.227357
3	I- 29	-97.077941	47.483519	N	1.74391
4	I- 29	-97.080562	47.57781	N	1.021246
5	I- 29	-97.017784	47.275123	S	0.996408
6	I- 29	-97.081686	47.548936	N	0.870444
7	I- 29	-97.079974	47.619816	S	0.795696
8	I- 29	-97.072773	47.412867	S	0.279053
9	State Hwy 200	-97.052759	47.374633	S	1.034586
10	156th Ave SE	-97.217676	47.245977	N	0.99733
11	State Hwy 200	-96.931563	47.352935	W	0.941677
12	State Hwy 200 Alt	-97.188328	47.353	W	0.825497
13	State Hwy 200	-96.993103	47.352864	E	0.720477
14	State Hwy 18	-97.453176	47.566634	S	0.583405
15	State Hwy 18	-97.453304	47.662398	N	0.490108
16	State Hwy 200 Alt	-97.065314	47.352954	E	0.438128
17	State Hwy 18	-97.32563	47.478773	S	0.337779
18	State Hwy 18	-97.217579	47.345644	N	0.203867
19	State Hwy 18	-97.217602	47.34199	N	0.088438
20	3rd St SE	-97.322307	47.498023	E	0.025359

**WARD COUNTY**

Site	Location	Longitude	Latitude	Direction	Segment Length
1	254th St SW	-101.679085	47.855177	S	0.978156
2	247th Ave SW	-101.690223	47.978137	E	0.913969
3	247th Ave SW	-101.585118	47.97826	W	0.778966
4	US Hwy 2	-101.427272	48.269504	N	0.6564
5	State Hwy 28	-101.715018	48.455295	S/E	0.599361
6	US Hwy 52	-101.679456	48.428342	N	0.516449
7	US Hwy 83	-101.298972	48.397099	S	0.500459
8	247th Ave SW	-101.663018	47.978197	W	0.476961
9	247th Ave SW	-101.439163	47.978593	E	0.421909
10	2nd St SW	-101.292373	47.925282	S	0.384765
11	US Hwy 2	-101.483333	48.289842	E	0.338084
12	2nd St SW	-101.293305	47.96648	S	0.292193
13	US Hwy 83	-101.298973	48.420558	N	0.258904
14	72nd Ave NW	-101.719036	48.313194	W	0.23781
15	US Hwy 52	-101.213049	48.185374	N	0.209211
16	2nd St SW	-101.295295	48.158791	N	0.178205
17	4th Ave	-101.093423	48.239844	E	0.144766
18	US Hwy 2	-101.264972	48.211809	E	0.111586
19	2nd St SW	-101.295678	48.118384	S	0.070957
20	State Hwy 28	-101.679084	47.84795	N	0.020381

## **Appendix B: Code Book**

### Variable Information

Variable	Type	Label
CASENO	Number	Overall Case Number
CTYIDNBR	Number	County ID Number
CTYNAME	Text	County Name
CTY_SEL_PROB	Number	County Probability of Selection
DESCRIP	Text	Description
DIR	Text	Direction of Traffic
DIR_SEL_PROB	Number	Direction Probability of Selection
DIV_ROAD	Text	Number of Lanes
DRGENDER	Text	Driver Gender
DRPROT	Text	Driver Protection
ENDTIME	Date/Time	End of Observations at this Site
FIRSTNAME	Text	Observer First Name
HWYNBR	Text	Highway Number
ID	Number	Overall Site ID
LANE_SEL_PROB	Number	Lane Probability of Selection
LASTNAME	Text	Observer Last Name
LATITUDE	Number	Latitude
LONGITUDE	Number	Longitude
MAPID	Text	MAP ID
NOPUS_Year	Number	Year of NOPUS Data
OBSDATE	Date/Time	Date of Observations at this Site
OBSID	Number	Observer ID
OBSNBR	Number	Site Observation Number
PASSGENDER	Text	Passenger Gender
PASSPROT	Text	Passenger Protection
RDTYPE	Text	Road Type
REGION	Text	Region of the State
SEGLEN_MI	Number	Segment Length in Miles
SITEDESCNBR	Number	County Site Description Number
SITE_SEL_PROB	Number	Site Probability of Selection
STRATUM	Text	East or West
STTIME	Date/Time	Start of Observations at this Site
TOTLEN	Number	Total County Segment Length
Variable	Data Type	Description
VEHTYPE	Text	Vehicle Type

## Variable Values

County		
Value	Label	Region
1	Barnes	1
17	Billings	2
3	Burleigh	2
4	Cass	1
5	Grand Forks	1
18	McKenzie	2
19	McLean	2
7	Morton	2
10	Pembina	1
20	Pierce	2
11	Ramsey	1
21	Richland	1
12	Stark	2
13	Stutsman	1
22	Traill	1
14	Ward	2

	Value	Label
<b>Region</b>	1	East
	2	West
<b>Roadway</b>	1	Primary
	2	Secondary
	3	Local
<b>Weekday</b>	1	Sunday
	2	Monday
	3	Tuesday
	4	Wednesday
	5	Thursday
	6	Friday
	7	Saturday

## **Appendix C: Frequencies**

**North Dakota Statewide Survey, June 2014**

Estimated Seat Belt Use (Percent) and Unweighted Frequencies for Vehicle Occupants

<b>Occupant</b>	<b>Status</b>	<b>Estimate Percent</b>	<b>Unweighted Frequency</b>		
<i><b>Driver</b></i>	Belted	78.3%			
	Not Belted	21.7%			
	Total	100.0%	22,203		
				<b>Ratio</b>	4.0
<i><b>Passenger</b></i>	Belted	83.8%			
	Not Belted	16.2%			
	Total	100.0%	5,515		
<i><b>All Occupants</b></i>	Belted	79.4%			
	Not Belted	20.6%			
	Total	100.0%	27,718		

**North Dakota Statewide Survey, June 2014**

Seat Belt Use by Region

<b>Region of State</b>				
<b>Occupant</b>	<b>Status</b>	<b>East</b>	<b>West</b>	<b>Total</b>
<i><b>Drivers</b></i>	Belted	81.4%	75.6%	78.3%
	Not Belted	18.6%	24.4%	21.7%
	Total	100.0%	100.0%	100.0%
	Count	10,281	11,922	22,203
<i><b>Passengers</b></i>	Belted	86.9%	79.6%	83.8%
	Not Belted	13.1%	20.4%	16.2%
	Total	100.0%	100.0%	100.0%
	Count	3,215	2,300	5,515
<i><b>All Occupants</b></i>	Belted	82.7%	76.3%	79.4%
	Not Belted	17.3%	23.7%	20.6%
	Total	100.0%	100.0%	100.0%
	Count	13,496	14,222	27,718

## North Dakota Statewide Survey, June 2014

### Seat Belt Use by County

Note: Based on unweighted percentages		County																	
Occupants	Status	Barnes	Billings	Burleigh	Cass	Grand Forks	McKenzie	McLean	Morton	Pembina	Pierce	Ramsey	Richland	Stark	Stutsman	Traill	Ward	Total	
<b>Drivers</b>	Belted	81.1%	83.6%	76.8%	85.1%	77.8%	65.6%	78.2%	72.8%	81.0%	65.4%	70.6%	81.4%	80.3%	87.9%	83.6%	71.9%	78.3%	
	Not Belted	18.9%	16.4%	23.2%	14.9%	22.2%	34.4%	21.8%	27.2%	19.0%	34.6%	29.4%	18.6%	19.7%	12.1%	16.4%	28.1%	21.7%	
	Count	1752	1456	906	1257	934	1465	1063	746	838	589	1133	1473	3454	1310	1584	2243	22203	
	% of Sample	6.3%	5.3%	3.3%	4.5%	3.4%	5.3%	3.8%	2.7%	3.0%	2.1%	4.1%	5.3%	12.5%	4.7%	5.7%	8.1%	80.1%	
<b>Passengers</b>	Belted	87.8%	95.1%	80.0%	87.4%	81.6%	64.7%	94.3%	82.4%	84.1%	68.6%	80.3%	95.5%	84.4%	91.3%	85.9%	75.3%	83.8%	
	Not Belted	12.2%	4.9%	20.0%	12.6%	18.4%	35.3%	5.7%	17.6%	15.9%	31.4%	19.7%	4.5%	15.6%	8.7%	14.1%	24.7%	16.2%	
	Count	539	203	125	199	256	368	353	74	498	204	432	421	366	403	467	607	5515	
	% of Sample	1.9%	0.7%	0.5%	0.7%	0.9%	1.3%	1.3%	0.3%	1.8%	0.7%	1.6%	1.5%	1.3%	1.5%	1.7%	2.2%	19.9%	
<b>All Occupants</b>	Belted	82.7%	85.0%	77.2%	85.4%	78.7%	65.4%	82.2%	73.7%	82.2%	66.2%	73.3%	84.5%	80.7%	88.7%	84.1%	72.6%	79.4%	
	Not Belted	17.3%	15.0%	22.8%	14.6%	21.3%	34.6%	17.8%	26.3%	17.8%	33.8%	26.7%	15.5%	19.3%	11.3%	15.9%	27.4%	20.6%	
	Count	2291	1659	1031	1456	1190	1833	1416	820	1336	793	1565	1894	3820	1713	2051	2850	27718	
	% of Sample	8.3%	6.0%	3.7%	5.3%	4.3%	6.6%	5.1%	3.0%	4.8%	2.9%	5.6%	6.8%	13.8%	6.2%	7.4%	10.3%	100.0%	

**North Dakota Statewide Survey, June 2014**

Seat Belt Use by Gender

Occupant	Status	Gender			Total
		Male	Female	Unknown	
<i>Drivers</i>	Belted	74.4%	87.4%	80.0%	78.3%
	Not Belted	25.6%	12.6%	20.0%	21.7%
	Count	15,478	6,710	15	22,203
<i>Passengers</i>	Belted	70.6%	92.1%	61.5%	83.8%
	Not Belted	29.4%	7.9%	38.5%	16.2%
	Count	2,103	3,399	13	5,515
<i>All Occupants</i>	Belted	73.9%	89.0%	71.4%	79.4%
	Not Belted	26.1%	11.0%	28.6%	20.6%
	Count	17,581	10,109	28	27,718

**North Dakota Statewide Survey, June 2014**

Male Seat Belt Use

Vehicle Type						
Occupant	Status	Car	SUV	Van	Pickup	Total
<i>Male Drivers</i>	Belted	79.4%	82.6%	83.0%	68.0%	74.4%
	Not Belted	20.6%	17.4%	17.0%	32.0%	25.6%
	Count	3,717	2,804	1,003	7,954	15,478
<i>Male Passengers</i>	Belted	80.9%	81.8%	79.1%	61.1%	70.6%
	Not Belted	19.1%	18.2%	20.9%	38.9%	29.4%
	Count	414	407	182	1,100	2,103
<i>All Male Occupants</i>	Belted	79.6%	82.5%	82.4%	67.2%	73.9%
	Not Belted	20.4%	17.5%	17.6%	32.8%	26.1%
	Count	4,131	3,211	1,185	9,054	17,581

**North Dakota Statewide Survey, June 2014**

Female Seat Belt Use Rate

<b>Vehicle Type</b>						
<b>Occupant</b>	<b>Status</b>	<b>Car</b>	<b>SUV</b>	<b>Van</b>	<b>Pickup</b>	<b>Total</b>
<i><b>Female Drivers</b></i>	Belted	87.4%	88.4%	91.3%	81.2%	87.4%
	Not Belted	12.6%	11.6%	8.7%	18.8%	12.6%
	Count	2,742	2,522	663	783	6,710
<i><b>Female Passengers</b></i>	Belted	91.3%	93.3%	94.8%	90.3%	92.1%
	Not Belted	8.7%	6.7%	5.2%	9.7%	7.9%
	Count	1,114	1,121	400	764	3,399
<i><b>All Female Occupants</b></i>	Belted	88.5%	89.9%	92.6%	85.7%	89.0%
	Not Belted	11.5%	10.1%	7.4%	14.3%	11.0%
	Count	3,856	3,643	1,063	1,547	10,109

**Appendix D: Survey Instrument**

**Seat Belt Survey Form**

Page # \_\_\_\_\_ of \_\_\_\_\_

Date \_\_\_\_\_

Start Time: \_\_\_\_\_ AM/PM

End Time \_\_\_\_\_ AM/PM

County \_\_\_\_\_

Observer Name: \_\_\_\_\_

Site Location Description (including city/town where applicable): \_\_\_\_\_

Site ID Number: \_\_\_\_\_ (if applicable)

Traffic Type Being Observed:  Town/City  Highway/County Road (outside of town/city)  Interstate

Obs	Vehicle Type					Driver					Passenger				
						Gender		Protection			Gender		Protection		
1	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
2	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
3	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
4	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
5	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
6	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
7	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
8	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
9	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
10	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
11	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
12	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
13	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
14	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
15	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
16	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
17	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
18	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
19	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
20	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
21	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
22	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
23	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
24	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
25	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
26	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
27	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
28	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
29	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
30	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK

M=Male; F=Female; DK = Do Not Know

**Appendix E: Seat Belt Use Rates with Site  
and County Weights**

**Barnes County**

**June, 2014**

Site Rates with Weights					
Site	Site Weight	County Weight	Total Belted	Total Occupants	Seat Belt Rate
1	0.17128	0.82025	232	265	87.5%
2	0.13247	0.82025	257	309	83.2%
3	0.07676	0.82025	311	374	83.2%
4	0.06338	0.82025	290	330	87.9%
5	0.04270	0.82025	215	250	86.0%
6	0.02310	0.82025	183	216	84.7%
7	0.01217	0.82025	197	272	72.4%
8	0.10058	0.82025	26	39	66.7%
9	0.09985	0.82025	11	11	100.0%
10	0.09016	0.82025	9	9	100.0%
11	0.07606	0.82025	9	15	60.0%
12	0.06000	0.82025	5	13	38.5%
13	0.05042	0.82025	41	53	77.4%
14	0.04819	0.82025	8	11	72.7%
15	0.04551	0.82025	14	17	82.4%
16	0.03850	0.82025	18	23	78.3%
17	0.03058	0.82025	29	30	96.7%
18	0.02392	0.82025	12	15	80.0%
19	0.01678	0.82025	18	24	75.0%
20	0.00703	0.82025	9	15	60.0%

**Billings County**

**June, 2014**

Site Rates with Weights					
Site	Site Weight	County Weight	Total Belted	Total Occupants	Seat Belt Rate
1	0.71783	0.1931	79	88	89.8%
2	0.57074	0.1931	76	83	91.6%
3	0.52399	0.1931	130	143	90.9%
4	0.37540	0.1931	109	124	87.9%
5	0.28867	0.1931	61	70	87.1%
6	0.25654	0.1931	62	73	84.9%
7	0.22367	0.1931	122	137	89.1%
8	0.15849	0.1931	125	133	94.0%
9	0.10404	0.1931	50	72	69.4%
10	0.08518	0.1931	61	71	85.9%
11	0.06560	0.1931	75	86	87.2%
12	0.49030	0.1931	45	55	81.8%
13	0.29255	0.1931	84	102	82.4%
14	0.20852	0.1931	40	54	74.1%
15	0.16316	0.1931	48	66	72.7%
16	0.14774	0.1931	50	60	83.3%
17	0.12208	0.1931	68	92	73.9%
18	0.09118	0.1931	35	43	81.4%
19	0.06156	0.1931	49	59	83.1%
20	0.01526	0.1931	41	48	85.4%

**Burleigh County**

**June, 2014**

Site Rates with Weights					
Site	Site Weight	County Weight	Total Belted	Total Occupants	Seat Belt Rate
1	0.01123	1.00000	119	134	88.8%
2	0.00513	1.00000	20	23	87.0%
3	0.00149	1.00000	26	29	89.7%
4	0.00955	1.00000	8	9	88.9%
5	0.00030	1.00000	20	36	55.6%
6	0.00868	1.00000	28	40	70.0%
7	0.00033	1.00000	43	64	67.2%
8	0.00049	1.00000	5	8	62.5%
9	0.00051	1.00000	85	110	77.3%
10	0.00052	1.00000	7	14	50.0%
11	0.00427	1.00000	0	3	0.0%
12	0.00054	1.00000	16	18	88.9%
13	0.00061	1.00000	5	7	71.4%
14	0.00070	1.00000	13	14	92.9%
15	0.00070	1.00000	55	70	78.6%
16	0.00095	1.00000	60	84	71.4%
17	0.00096	1.00000	59	73	80.8%
18	0.00112	1.00000	205	263	77.9%
19	0.00067	1.00000	7	8	87.5%
20	0.00048	1.00000		0	

**Cass County**

**June, 2014**

Site Rates with Weights					
Site	Site Weight	County Weight	Total Belted	Total Occupants	Seat Belt Rate
1	0.00123	1.00000	254	272	93.4%
2	0.00008	1.00000	160	195	82.1%
3	0.00019	1.00000	15	17	88.2%
4	0.00026	1.00000	233	276	84.4%
5	0.00028	1.00000	290	325	89.2%
6	0.00035	1.00000	39	43	90.7%
7	0.00475	1.00000	20	21	95.2%
8	0.00419	1.00000	6	6	100.0%
9	0.00359	1.00000	8	10	80.0%
10	0.00300	1.00000	1	1	100.0%
11	0.00035	1.00000	80	117	68.4%
12	0.00254	1.00000	0	1	0.0%
13	0.00229	1.00000	6	10	60.0%
14	0.00188	1.00000	10	13	76.9%
15	0.00142	1.00000	4	5	80.0%
16	0.00105	1.00000	4	8	50.0%
17	0.00072	1.00000	3	3	100.0%
18	0.00047	1.00000	30	38	78.9%
19	0.00031	1.00000	9	10	90.0%
20	0.00013	1.00000	72	85	84.7%

## Grand Forks County

June, 2014

Site Rates with Weights					
Site	Site Weight	County Weight	Total Belted	Total Occupants	Seat Belt Rate
1	0.00565	1.00000	170	204	83.3%
2	0.00017	1.00000	222	252	88.1%
3	0.00023	1.00000	18	25	72.0%
4	0.00024	1.00000	1	4	25.0%
5	0.00034	1.00000	60	80	75.0%
6	0.00040	1.00000	11	28	39.3%
7	0.00050	1.00000	12	16	75.0%
8	0.00061	1.00000	15	18	83.3%
9	0.00082	1.00000	34	41	82.9%
10	0.00098	1.00000	1	2	50.0%
11	0.00118	1.00000	7	9	77.8%
12	0.00342	1.00000	20	25	80.0%
13	0.00316	1.00000	24	29	82.8%
14	0.00278	1.00000	81	91	89.0%
15	0.002333	1.00000	6	7	85.7%
16	0.00182	1.00000	56	81	69.1%
17	0.00128	1.00000	145	207	70.0%
18	0.00089	1.00000	9	11	81.8%
19	0.00050	1.00000	39	50	78.0%
20	0.00023	1.00000	5	10	50.0%

**McKenzie County**

**June, 2014**

Site Rates with Weights					
Site	Site Weight	County Weight	Total Belted	Total Occupants	Seat Belt Rate
1	0.07387	0.63922	126	208	60.6%
2	0.06317	0.63922	4	6	66.7%
3	0.05535	0.63922	135	204	66.2%
4	0.05133	0.63922	63	86	73.3%
5	0.04754	0.63922	13	13	100.0%
6	0.04266	0.63922	65	83	78.3%
7	0.03859	0.63922	55	87	63.2%
8	0.03513	0.63922	77	137	56.2%
9	0.03184	0.63922	43	75	57.3%
10	0.02897	0.63922	34	41	82.9%
11	0.02608	0.63922	123	175	70.3%
12	0.02297	0.63922	5	10	50.0%
13	0.02033	0.63922	70	121	57.9%
14	0.01827	0.63922	20	56	35.7%
15	0.01647	0.63922	81	112	72.3%
16	0.01321	0.63922	64	87	73.6%
17	0.01057	0.63922	46	63	73.0%
18	0.00790	0.63922	5	10	50.0%
19	0.00529	0.63922	160	248	64.5%
20	0.00164	0.63922	10	11	90.9%

**McLean County**

**June, 2014**

Site Rates with Weights					
Site	Site Weight	County Weight	Total Belted	Total Occupants	Seat Belt Rate
1	0.06187	0.66257	171	204	83.8%
2	0.06010	0.66257	13	19	68.4%
3	0.05684	0.66257	13	19	68.4%
4	0.05269	0.66257	3	3	100.0%
5	0.04521	0.66257	11	21	52.4%
6	0.04139	0.66257	8	12	66.7%
7	0.03564	0.66257	193	231	83.5%
8	0.03211	0.66257	3	4	75.0%
9	0.02992	0.66257	7	13	53.8%
10	0.02847	0.66257	21	26	80.8%
11	0.02714	0.66257	12	14	85.7%
12	0.02438	0.66257	17	21	81.0%
13	0.02261	0.66257	147	174	84.5%
14	0.02056	0.66257	16	21	76.2%
15	0.01764	0.66257	156	188	83.0%
16	0.01533	0.66257	117	162	72.2%
17	0.01292	0.66257	232	254	91.3%
18	0.01065	0.66257	2	5	40.0%
19	0.00761	0.66257	14	17	82.4%
20	0.00350	0.66257	8	8	100.0%

**Morton County**

**June, 2014**

Site Rates with Weights					
Site	Site Weight	County Weight	Total Belted	Total Occupants	Seat Belt Rate
1	0.00848	1.00000	204	229	89.1%
2	0.00633	1.00000	7	15	46.7%
3	0.00087	1.00000	69	96	71.9%
4	0.01279	1.00000	6	8	75.0%
5	0.00986	1.00000	7	11	63.6%
6	0.00841	1.00000	14	22	63.6%
7	0.00727	1.00000	6	9	66.7%
8	0.00066	1.00000	14	44	31.8%
9	0.00069	1.00000	23	28	82.1%
10	0.00302	1.00000	5	11	45.5%
11	0.00481	1.00000	146	199	73.4%
12	0.00792	1.00000	2	4	50.0%
13	0.00091	1.00000	2	3	66.7%
14	0.00112	1.00000	59	71	83.1%
15	0.00283	1.00000	5	9	55.6%
16	0.00235	1.00000	3	6	50.0%
17	0.00278	1.00000	8	15	53.3%
18	0.00126	1.00000	2	4	50.0%
19	0.00077	1.00000	1	2	50.0%
20	0.00283	1.00000	21	34	61.8%

**Pembina County**

**June, 2014**

Site Rates with Weights					
Site	Site Weight	County Weight	Total Belted	Total Occupants	Seat Belt Rate
1	0.24339	0.43142	172	178	96.6%
2	0.13229	0.43142	138	146	94.5%
3	0.09968	0.43142	54	78	69.2%
4	0.06846	0.43142	171	179	95.5%
5	0.04493	0.43142	157	175	89.7%
6	0.02481	0.43142	163	190	85.8%
7	0.09256	0.43142	25	32	78.1%
8	0.09126	0.43142	34	49	69.4%
9	0.08874	0.43142	13	30	43.3%
10	0.08641	0.43142	7	15	46.7%
11	0.08340	0.43142	9	13	69.2%
12	0.07214	0.43142	14	24	58.3%
13	0.05883	0.43142	8	11	72.7%
14	0.05135	0.43142	25	48	52.1%
15	0.04534	0.43142	23	25	92.0%
16	0.04004	0.43142	21	35	60.0%
17	0.03327	0.43142	7	14	50.0%
18	0.02523	0.43142	11	16	68.8%
19	0.01716	0.43142	33	59	55.9%
20	0.00760	0.43142	13	19	68.4%

Pierce County

June, 2014

Site Rates with Weights					
Site	Site Weight	County Weight	Total Belted	Total Occupants	Seat Belt Rate
1	0.14260	0.16585	4	10	40.0%
2	0.13609	0.16585	5	8	62.5%
3	0.12956	0.16585	10	13	76.9%
4	0.12912	0.16585	66	108	61.1%
5	0.12858	0.16585	4	8	50.0%
6	0.12289	0.16585	17	24	70.8%
7	0.11705	0.16585	10	15	66.7%
8	0.10872	0.16585	86	112	76.8%
9	0.09969	0.16585	2	5	40.0%
10	0.09354	0.16585	14	22	63.6%
11	0.08297	0.16585	7	9	77.8%
12	0.06885	0.16585	9	14	64.3%
13	0.06513	0.16585	31	45	68.9%
14	0.06297	0.16585	34	63	54.0%
15	0.05841	0.16585	11	18	61.1%
16	0.04786	0.16585	37	59	62.7%
17	0.03918	0.16585	9	14	64.3%
18	0.03252	0.16585	89	112	79.5%
19	0.02567	0.16585	67	115	58.3%
20	0.01378	0.16585	13	19	68.4%

**Ramsey County**

**June, 2014**

Site Rates with Weights					
Site	Site Weight	County Weight	Total Belted	Total Occupants	Seat Belt Rate
1	0.15423	0.49038	19	26	73.1%
2	0.10788	0.49038	20	30	66.7%
3	0.10201	0.49038	10	12	83.3%
4	0.09579	0.49038	26	31	83.9%
5	0.07584	0.49038	13	19	68.4%
6	0.06589	0.49038	8	11	72.7%
7	0.05581	0.49038	10	20	50.0%
8	0.05204	0.49038	45	78	57.7%
9	0.05032	0.49038	9	11	81.8%
10	0.04537	0.49038	92	127	72.4%
11	0.04100	0.49038	137	175	78.3%
12	0.03573	0.49038	115	149	77.2%
13	0.03157	0.49038	65	97	67.0%
14	0.02854	0.49038	114	169	67.5%
15	0.02646	0.49038	66	86	76.7%
16	0.02445	0.49038	19	31	61.3%
17	0.02107	0.49038	57	71	80.3%
18	0.01818	0.49038	109	131	83.2%
19	0.01277	0.49038	121	160	75.6%
20	0.00594	0.49038	92	131	70.2%

**Richland County**

**June, 2014**

Site Rates with Weights					
Site	Site Weight	County Weight	Total Belted	Total Occupants	Seat Belt Rate
1	0.10138	0.90254	132	151	87.4%
2	0.07492	0.90254	113	124	91.1%
3	0.07389	0.90254	240	268	89.6%
4	0.06494	0.90254	138	164	84.1%
5	0.04939	0.90254	139	155	89.7%
6	0.03189	0.90254	94	109	86.2%
7	0.01867	0.90254	224	243	92.2%
8	0.07500	0.90254	19	25	76.0%
9	0.07042	0.90254	23	29	79.3%
10	0.06722	0.90254	19	27	70.4%
11	0.05790	0.90254	18	21	85.7%
12	0.05010	0.90254	22	33	66.7%
13	0.04150	0.90254	14	17	82.4%
14	0.03587	0.90254	19	26	73.1%
15	0.03194	0.90254	76	96	79.2%
16	0.02715	0.90254	26	46	56.5%
17	0.02181	0.90254	27	38	71.1%
18	0.01693	0.90254	191	227	84.1%
19	0.00973	0.90254	13	24	54.2%
20	0.00432	0.90254	54	71	76.1%

**Stark County**

**June, 2014**

Site Rates with Weights					
Site	Site Weight	County Weight	Total Belted	Total Occupants	Seat Belt Rate
1	0.16400	0.94191	253	317	79.8%
2	0.10462	0.94191	220	256	85.9%
3	0.09955	0.94191	231	267	86.5%
4	0.09017	0.94191	205	259	79.2%
5	0.08189	0.94191	228	278	82.0%
6	0.06871	0.94191	212	245	86.5%
7	0.05486	0.94191	137	156	87.8%
8	0.05042	0.94191	173	214	80.8%
9	0.03888	0.94191	190	235	80.9%
10	0.02878	0.94191	163	193	84.5%
11	0.02127	0.94191	256	293	87.4%
12	0.10870	0.94191	100	126	79.4%
13	0.07768	0.94191	28	36	77.8%
14	0.05600	0.94191	67	85	78.8%
15	0.04725	0.94191	71	99	71.7%
16	0.03687	0.94191	127	184	69.0%
17	0.02770	0.94191	173	240	72.1%
18	0.02105	0.94191	16	18	88.9%
19	0.01100	0.94191	59	80	73.8%
20	0.00574	0.94191	172	239	72.0%

**Stutsman County**

**June, 2014**

Site Rates with Weights					
Site	Site Weight	County Weight	Total Belted	Total Occupants	Seat Belt Rate
1	0.17185	1.00000	232	252	92.1%
2	0.11286	1.00000	198	221	89.6%
3	0.08006	1.00000	155	170	91.2%
4	0.06210	1.00000	180	194	92.8%
5	0.03957	1.00000	184	203	90.6%
6	0.01340	1.00000	217	233	93.1%
7	0.09698	1.00000	80	89	89.9%
8	0.06182	1.00000	5	8	62.5%
9	0.05578	1.00000	9	9	100.0%
10	0.04384	1.00000	1	2	50.0%
11	0.03872	1.00000	72	82	87.8%
12	0.03498	1.00000	13	15	86.7%
13	0.03172	1.00000	16	23	69.6%
14	0.02974	1.00000	3	4	75.0%
15	0.02702	1.00000	14	19	73.7%
16	0.02335	1.00000	13	19	68.4%
17	0.01891	1.00000	6	13	46.2%
18	0.01488	1.00000	71	87	81.6%
19	0.00985	1.00000	20	26	76.9%
20	0.00516	1.00000	31	44	70.5%

## Trail County

June, 2014

Site Rates with Weights					
Site	Site Weight	County Weight	Total Belted	Total Occupants	Seat Belt Rate
1	0.39262	0.69378	207	230	90.0%
2	0.31884	0.69378	170	188	90.4%
3	0.24964	0.69378	125	151	82.8%
4	0.14619	0.69378	172	191	90.1%
5	0.14263	0.69378	190	216	88.0%
6	0.12460	0.69378	172	198	86.9%
7	0.11390	0.69378	143	171	83.6%
8	0.03995	0.69378	230	258	89.1%
9	0.14810	0.69378	28	42	66.7%
10	0.14277	0.69378	15	22	68.2%
11	0.13480	0.69378	22	27	81.5%
12	0.11817	0.69378	18	23	78.3%
13	0.10314	0.69378	22	32	68.8%
14	0.08351	0.69378	23	26	88.5%
15	0.07016	0.69378	27	32	84.4%
16	0.06272	0.69378	10	14	71.4%
17	0.04835	0.69378	22	32	68.8%
18	0.02918	0.69378	15	19	78.9%
19	0.01266	0.69378	17	20	85.0%
20	0.00363	0.69378	97	159	61.0%

**Ward County**

**June, 2014**

Site Rates with Weights					
Site	Site Weight	County Weight	Total Belted	Total Occupants	Seat Belt Rate
1	0.06197	1.00000	4	13	30.8%
2	0.05791	1.00000	48	72	66.7%
3	0.04935	1.00000	63	83	75.9%
4	0.04159	1.00000	207	246	84.1%
5	0.03797	1.00000	9	17	52.9%
6	0.03272	1.00000	39	54	72.2%
7	0.03171	1.00000	179	231	77.5%
8	0.03022	1.00000	40	71	56.3%
9	0.02673	1.00000	84	133	63.2%
10	0.02438	1.00000	196	235	83.4%
11	0.02142	1.00000	112	176	63.6%
12	0.01851	1.00000	205	270	75.9%
13	0.01640	1.00000	47	76	61.8%
14	0.01507	1.00000	95	145	65.5%
15	0.01326	1.00000	113	153	73.9%
16	0.01129	1.00000	155	238	65.1%
17	0.00917	1.00000	105	138	76.1%
18	0.00707	1.00000	155	244	63.5%
19	0.00450	1.00000	210	247	85.0%
20	0.00129	1.00000	3	8	37.5%

## **Appendix F: Roadway Classifications**

## Roadway Type Classifications

Code	Name	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	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.