2008

[SEAT BELT USE IN NORTH DAKOTA, JUNE 2008]

This report documents the results of the annual observational survey of vehicle seat belt use in North Dakota, conducted for the thirteenth time since the seat belt law went into effect on July 14, 1994. The field data collection occurred during the first week of June 2008.

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The opinions, findings, and conclusions expressed in this report are those of the authors and not necessarily those of the North Dakota Department of Transportation, Office of Traffic Safety or the United States Department of Transportation, National Highway Traffic Safety Administration.

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EXECUTIVE SUMMARY

The purpose of North Dakota's studies of seat belt use is to provide statistically reliable data from which generalizations, comparative analyses, and recommendations can be developed. The survey provides the North Dakota Department of Transportation (NDDOT) with a system that monitors the usage rate and permits the determination of seat belt usage rates within the state. The National Highway Traffic Safety Administration (NHTSA) funded the study through the NDDOT's Office of Traffic Safety (OTS).

The sampling methodology for this study was originally developed in 2001. The 2001 data was collected in July of that year, after which data was collected during late June in 2002, mid-June in 2003, and the first week in June for the subsequent surveys in 2004, 2005, 2006, 2007, and 2008. The analysis of the data for each report since 2001 incorporates the current method of weighting the data, with the weights based on sampling probabilities and vehicle miles traveled for counties and sites within counties. The sampling probabilities and estimates of vehicle miles traveled have been held constant since 2004, which makes the 2004-2008 studies the most directly comparable. However, whenever some components of individual surveys have changed, such as the data collection period or the analysis procedures, a new baseline has been created. This was the case in 2001 when the sampling methodology changed significantly. In 2002 and 2003, the data collection timeframes changed, and, in 2004, the timeframes changed again and a revised weighting system was implemented. These changes have limited the comparability of the surveys prior to 2004. However, since 2004,

there have been no changes in the methodology or the details of the analysis procedures.

The 2008 survey was based on a random probability sample of North Dakota counties and observation sites developed for and approved by NHTSA in 2001. Observations were made at the 319 sites originally pre-selected in 2001. All sites were surveyed over the same days of the week as in previous studies. Front seat drivers and outboard passengers in automobiles, vans, sport utility vehicles (SUVs), and pickup trucks were observed for seat belt use by the vehicle occupants.

In general, the findings in the 2008 North Dakota statewide survey are consistent with the findings of the previous surveys. For example, the great majority of the vehicle occupants have been drivers. In previous studies, and in 2008, there were about six drivers for every passenger. As in previous surveys, the southeast quadrant of the state was observed to have the highest rate of seat belt use, with much lower rates of seat belt use in the northeast and northwest. However, in 2008, the rate for the southwest quadrant was only slightly less than the rate in the southeast. As in previous studies, rural vehicle occupants had a higher rate of seat belt use than vehicle occupants observed in urban areas and the highest rates of seat belt use were on interstate roadways. Vans and SUV occupants continue to have the highest rates of seat belt use, with occupants of automobiles at about the statewide average, while pickup trucks occupants lag far behind in seat belt use. For 2008, as in previous studies, female vehicle occupants have higher rates of seat belt use than do male occupants in all types of vehicles. The one area where changes are most common from

one study to the next occurs when the data is broken down to the county level. Some counties increase and some decrease from year to year, and those changes will be detailed later in this report.

For the 2008 survey, observers tracked 22,722 vehicles and drivers in the 16 counties and 319 intersections included in the sample. There were 3,758 outboard passengers in those vehicles. The estimates derived from the data analysis indicated that 80.9 percent of the drivers and 85.6 percent of the passengers were observed wearing seat belts. When drivers and passengers are combined, the total amounts to 26,480 observations. The overall estimate of seat belt use for all vehicle occupants in 2008 is 81.6 percent belted. This figure represents a decrease from the 2007 estimate of 82.2 percent; however, that difference is less than one percentage point (0.6).[1] The 2008 rate of 81.6 percent belted is the second highest rate recorded for North Dakota since 1999.

[1] A chi-square test was computed to determine whether the difference between the 2007 and 2008 surveys is statistically significant in terms of seat belt use for all vehicle occupants. The test produced a chi-square value of 3.25, while a value of 3.84 was needed to rise to the level of significance at the .05 level, or a value of 6.63 at the .01 level of significance. Chi-Square is a commonly used statistic for testing significance levels on nominal scale data. Therefore, it is reasonable to conclude that the difference is statistically insignificant.

INTRODUCTION

DLN Consulting, Inc., located in Dickinson, ND, was contracted by the North Dakota Department of Transportation (NDDOT) to conduct a field survey of seat belt use. The study required use of a sampling methodology approved by the National Highway Transportation Safety Administration (NHTSA) and NDDOT. National requirements for conducting statewide seat belt surveys are located in *The Federal Register, 23 CFR Part 1340*, published on September 1, 1998. The methodology was designed to yield a statistically valid estimate of the current Seat Belt Use (SBU) rate in the State of North Dakota.

DLN consulting, Inc. is incorporated in the State of North Dakota. The corporation has a solid and reputable background and understanding of traffic safety issues and evaluation techniques. Deb Nelson, owner and president of DLN consulting, Inc., served as the project administrator, with project coordination conducted by DLN staff member, Tonya Kottre. Keith Fernsler, Ph.D., Professor Emeritus at Dickinson State University provided the calculations and analysis for the 2008 study. The spreadsheets, tables, and charts for this report were developed by DLN staff under the direction of Dr. Fernsler. Observers were hired from a trained and experienced pool. They participated in extensive training and accuracy testing prior to conducting the field observations.

Data entry was conducted in the *Microsoft Excel Professional 2000* program, and then imported into the *Statistical Program for the Social sciences (SPSS) 14.0* for the data analysis. Tables and charts were created with *Microsoft Excel Professional 2007* for this report.

OBJECTIVE

The objective of this study, like all those conducted in the state since 2000, was:

- To determine the Seat Belt Use (SBU) rate of drivers and front seat outboard passengers in the State of North Dakota.

Further broken down, the data was also used to determine the SBU rate for the following:

- Occupant (driver, passenger)
- Gender (males, females)
- Population (rural, urban)
- Roadway (interstate, federal highway, state highway)
- Type of Vehicle (automobile, van, sport utility vehicle, pickup)
- County (16 observed counties)
- Region of State (northwest, northeast, southwest, southeast)

The technical section of this report presents the description of the various tasks involved in conducting the SBU survey. General information about the methods and protocols used to conduct the SBU survey is found beginning on the next page.

The table below summarizes the survey:

Figure 1: Summary of the Seat Belt Use Survey

Methodology	Probability Based Sampling (stratified intersections within selected counties)
Source of Samples	2001 Methodology, approved by NDDOT and NHTSA.
Identified Regions	Four Quadrants of the State Northwest Northeast Southwest Southeast
Selected Counties	**Counties by Region:** *Northwest:* Bottineau, Mountrail, Ward, Williams *Northeast:* Grand Forks, Pembina, Ramsey, Wells *Southwest:* Burleigh, Mercer, Morton, Stark *Southeast:* Barnes, Cass, Nelson, Stutsman
Survey Period	June 2-6, 2008
Sample Size	22,722 vehicles
Observation Duration Per Site	Thirty (30) minutes
Number of Sites	319
Geographic Coverage	State of North Dakota

METHODOLOGY

From 1998 to 2000, the methodology for the observational seat belt survey in North Dakota was based on simple random sampling of twelve counties and intersections within those selected counties. The result of this sampling meant the demographic character of the observations was predominantly rural, reflecting the rural character of North Dakota.

By the end of the 2000 survey, the staff of DLN Consulting, Inc. had concluded that these simple random sampling methods produced observations that were demographically representative of rural North Dakota, but not representative of traffic patterns and the distribution of drivers and passengers in North Dakota. After receiving approval from NDDOT, a new methodology eventually emerged. Every step in the process was reviewed, approved, and guided by Dennis Utter and Donna Glassbrenner of NHTSA.

The methodology followed since 2001 includes sixteen counties, representing the quadrants of the state, and 319 intersections, about half of which are above and half below the mean of vehicle miles traveled within each county. In other words, the current methodology can be described as stratified random sampling modified by the inclusion of what are referred to in federal guidelines as "certainty" counties. The four "certainty" counties represent about three-fourths of North Dakota's population and about two-thirds of the vehicle miles traveled in North Dakota. The new methodology was approved prior to the 2001 survey and has been in use since that time.

The repeated use of the sample provides considerable comparability in the analysis of trends in the rate of seat belt compliance in North Dakota over the years in which this methodology has been in effect.

Calculating the Weighted Estimates of Seat Belt Use

The typical analysis of North Dakota seat belt usage data has taken the form of aggregate calculations of overall county and state-weighted estimates using a spreadsheet design that incorporates the mathematical formulas. These formulas produced estimates of seat belt use based on the formulas for estimating seat belt use in the different strata, where one stratum represents sites where the daily vehicle miles traveled are above the mean for the county and a second stratum represents sites where the daily vehicle miles traveled is below the mean for the county.

The formula for estimating belt use for the sample sites is a follows:

$\frac{1}{\sum W_{ijk} VMT_{ijk}} \sum W_{ijk} VMT_{ijk} \left(B_{ijk} / O_{ijk} \right)$ = Belt Use in Stratum, adapted to each stratum.

Where the variables are:

i = county

j = stratum

k = designated sample site

W_{ijk} = the weight for the sample site in the stratum

(Weight = Total sample sites in the stratum / number of sites sampled in the stratum)

VMT_{ijk} = Daily vehicle miles traveled for the individual sample site in the stratum

B_{ijk} = Total number of belted drivers and passengers for the sample site in the stratum

O_{ijk} = Total number of observed drivers and passengers for the sample site in the stratum

These estimates are then used to create the county estimates using the following formula for the counties as follows:

$$\frac{VMT_{cs1}}{VMT_c} BeltUseStratum_1 + \frac{VMT_{cs2}}{VMT_c} BeltUseStratum_2$$

Where:

VMT_{cs1} = Total daily vehicle miles traveled for the upper stratum in the county

VMT_{cs2} = Total daily vehicle miles traveled for the lower stratum in the county

VMT_c = Total daily vehicle miles traveled for the county

The county estimates are then used to calculate the overall estimate for the state as follows:

$$\text{State Seat Belt Use} = \frac{\sum W_i V_i}{\sum W_i V_i P_i}$$

Where:

i = county

Wi= county weight (number of available counties in the quadrant / number of counties sampled in the quadrant)

Vi = total daily vehicle miles traveled for the county

Pi = seat belt use in the county

These formulas were incorporated into a spreadsheet to generate estimates for each county and for the state as a whole. Any additional analysis depended on unweighted data. For example, only unweighted estimates could be used in discussions of the variation of seat belt usage rates for the different regions, roadway types, vehicle types, gender of drivers and passengers, and so forth. This imposed a significant limitation on inferences from the data analysis since the unweighted data did not take into consideration adjustments for vehicle miles traveled or the probabilities of sample selection for counties and sites in the study.

During 2004, the staff of DLN Consulting, Inc. worked with the Traffic Records Research Manager at the Drivers License and Traffic Safety Division (now Office of Traffic Safety), NDDOT, to devise a method of weighting all of the data for analysis. The method involved the creation of a single weighting frequency for each observation. The steps involved in that process are as follows:

- To produce an estimate for each county, the county's daily vehicle miles traveled was multiplied by the probability of each county's selection in the sample, or $W_c * VMT_c$. This produced an average, W_cVMT_c for each county.

- To produce an estimate for each site in the sample, the site's daily vehicle miles traveled was multiplied by the probability of the selection of each site for the sample (out of all the sites within a county), or $VMT_{ik} * W_{ik}$ for each site, where *i* is the county and *k* is the sample site within the county.

These two estimates were added together to create an average of the two estimates. In order to reduce the size of the average, each result for each county and site was divided by a constant, the mean of the average of the two estimates.

The frequency that resulted from these calculations is unique to the cases in each site. It was used in SPSS's data weighting procedure as the multiplier for each observation in the data set. The results approximate the results for the aggregate formulas and should be reliable for the kinds of analysis typically done with the unweighted data.

As a final test, the percentages for a selected county were computed using both the traditional spreadsheet method of computation and the SPSS-based weighting procedure for the 2004 study. The results were virtually identical.

The unweighted overall frequencies and the weighted percentages were used to generate the tables and graphs for this report. Specific frequencies in the tables were then calculated based on the weighted percentages.

Overall, this process generated weighted data throughout the analysis that approximates the same results that would have been found if it had been possible to extend the spreadsheet approach to additional variables. The significant advantage is that all of the data reflect adjustments for sample probability and vehicle miles traveled in calculating seat belt usage rates based on the mathematical formulas.

Throughout this report, the percentage estimates of seat belt use reflect the weighted data. Where it is sometimes appropriate, unweighted counts, or frequencies, are provided. However, because the weighted frequencies are substantially inflated by the weighting process, those weighted frequencies are not reported. Readers are cautioned to note that weighted percentage estimates do not usually match unweighted frequencies and may be more confusing than enlightening. For that reason, weighted frequencies, or counts, are usually omitted in the tables and charts presented in the report.

CONFIDENCE INTERVALS[2]

To determine the validity of the sample of observations in the June 2008 seat belt survey, ninety-five percent confidence intervals were calculated for drivers, outboard passengers, and the combination of drivers and passengers. The results are presented in the following table.

Figure 2: Confidence Intervals for Drivers, Passengers, and All Occupants, 2008 (Unweighted Data

95% Confidence Interval					Standard Error of Mean
Occupants	**Frequency**	**Mean**	**Lower Boundary**	**Upper Boundary**	
Drivers	22,722	1.29	1.28	1.30	0.003
Passengers	3,758	1.24	1.23	1.25	0.007
All	26,480	1.28	1.27	1.29	0.004

The means reported in the table reflect a range of variation from a value of one (belted) and two (not belted). The "95 percent Confidence Intervals" mean that, statistically, it can be assumed that there is a ninety-five percent probability that the reported mean for the sample of vehicle occupants (1.28) falls within the lower boundary of 1.27 and the upper boundary of 1.28 in the real world. The standard error of the mean, which is .004 for all vehicle occupants, can be interpreted to mean that there are fewer than four chances out of one thousand that the sample mean is invalid.

[2] The measures of sample validity, the confidence intervals, and the standard error of the means, are calculated from the *unweighted*, raw data. Because the weighting process inflates the raw numbers, calculations based on weighted data would produce very small measures, thereby exaggerating the sample validity. The use of the unweighted data is the statistically more conservative approach to the calculations.

Sample validity, as measured by the calculation of confidence intervals and the standard error of the mean, is dependent on sample size, with validity increasing as sample size increases. This is the reason why the table shows narrower confidence intervals and a lower standard error of the mean for drivers than for passengers. Whenever data are broken down by various combinations of variables, sample validity tends to decline and statistical significance drops. In other words, this study is valid, but some generalizations may not be if they are drawn from highly selected sub-samples. This is generally not the case when individual counties are examined and generalizations have to be based on a relatively small part of the larger set of observations.

Overall, most of the generalizations offered in this report are valid and statistically significant. When this is not the case, the reader will be cautioned about the limitations of the data.

PROTOCOLS

OBSERVERS

Sixteen observers and one alternate were hired to conduct the seat belt survey. Fourteen of the 17 people had observed in previous years and three were new observers. All observers were required to have a good driving record and provide proof of adequate insurance for the vehicle they were driving for the surveys. All observers were required to sign DLN Consulting, Inc.'s seat belt policy for consultants requiring them to wear seat belts for the duration of the project.

OBSERVATIONAL PROTOCOLS

The observational protocols were those employed every year since the 2001 survey, and were developed by DLN Consulting, Inc. What follows is a discussion of the methodological protocols for the observations.

THE ORDER OF OBSERVATION

Within clusters, the order of observation was assigned with the use of a random numbering procedure. For sites outside the clusters, the order was determined by proximity to clustered sites.

TRAFFIC DIRECTION

In those cases where the roadway moved in only one direction, no real choice was involved. When a site was on a county line, the traffic direction was toward the county associated with the survey. In all other instances involving decisions, a randomization process was employed. Usually, this involved a random choice of one of two directions, north or south, or east or west.

Day of the Week

Observations were conducted Monday through Friday. Since most of the counties involve a significant number of square miles with considerable distance between sites, observers proceeded from one site to the next in the order already determined and listed in their directions.

Time of Day

A twelve-hour block of daylight, from 7:00 A.M. to 7:00 P.M., was identified for the parameters of the observational period. Each site observation occurred in pre-determined time slots, requiring a 30-minute observation period beginning at the first five-minute interval after arrival at the site, and ending exactly thirty minutes later.

Traffic Conditions and Data Collection Problems

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

- When traffic was heavy and there were too many vehicles to count visually, counting was done as long as possible and then stopped until the observer's count could catch up with observations. Some vehicles were, of necessity, skipped under these circumstances. 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 had to be entered 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.

- Vehicles with darkened windows were ignored because visibility problems were likely to reduce accuracy.

- Field observers could terminate a pre-selected observation if any of the following circumstances arose: (1) Weather conditions that would hinder the accuracy of the observations; (2) Traffic flow that was so heavy that it might have endangered the safety of the observer; (3) Road conditions that rendered observations unfeasible, such as road construction, detoured traffic, or a crash site. If a pre-selected site was to be terminated, the observer was to note the reason and mark the time of termination on the form. The observer was instructed to notify the supervisor as soon as possible if any of these situations were to occur.

Site Accessibility Problems

If a pre-selected site was not available on the survey date and time, the observer made the following modifications:

- On mile-posted roads, observations were to be made at a location with a mile point that was one mile higher on the same roadway in the same direction as the assigned traffic flow. If this point was not accessible, one more mile could be added. Increments up to three miles could be added with such changes noted on the observation forms.

- On non-mile point streets and local roadways, the observer was to proceed in the same direction as the assigned traffic flow in one-quarter mile increments, not to exceed three-quarters of a

mile, until an appropriate observation site was found and so noted on the observation form.

- In cases of road construction where traffic was detoured, the observer was required to select a site on the detour as close to the original site as possible, no more than two miles away on mile-posted roadways and no more than one-half mile on non-mile point streets and local roadways. The change in site location and the reason for the change was noted on the observation form.

OBSERVED VEHICLES

All passenger vehicles were observed and classified on the observation form as automobiles, vans, pickup trucks, and sport utility vehicles.

OBSERVATIONS

Seat belt usage and gender characteristics were recorded for both drivers and passengers. The observations occurred from the observer's vehicle whenever possible, so the observer was parked as close as possible for accurate observation without compromising the observer's safety. If an observer could not observe from a vehicle, the observer was allowed to stand off the roadway at an intersection and required to wear a ANSI-approved Type-2 safety vest to enhance the visibility of the observer.

PROBLEMS ENCOUNTERED BY OBSERVERS

Several observers encountered light rain during the course of the 2008 survey, but none so heavy that the site had to be postponed or terminated. Road construction created some site accessibility issues, but no sites were terminated because of inaccessibility.

QUALITY ASSURANCE

OBSERVERS

The observer training session was held on May 30, 2008. Each observer was required to participate in the classroom instruction and in training observations. Each observer was tested through participation in a minimum of four observation test sites to acquire an inter-accuracy ratio. 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 was used as a test site. Observers worked in teams of two, observing the same vehicles, but recording data independently on separate observation forms. Teams were rotated throughout the training to ensure that each observer was paired at least four times with different partners. Each observer recorded type of vehicle, seat belt use, and gender during the tests. The average inter-accuracy ratio for all observers after testing was 96.4%.

DATA ENTRY

Quality control standards were developed for the data entry. The following steps were taken by the data entry supervisor to ensure quality control:

- Each site packet was double-checked to determine the actual number of sheets was the same as that noted by the observers.
- Each observation sheet was double-checked to ensure the number of observations entered by the data entry operators equaled the number of observations.

- Any problems detected in the coding by the data entry operators were noted and brought to the attention of the project coordinator prior to the data cleaning. The coordinator made a determination as to the correct code.

- Each observation sheet was compared with the actual data entry for that sheet.

- Data entry accuracy was recorded at 99.86%. All errors discovered during quality assurance checks were corrected to achieve 100% accuracy.

RESULTS

The results of the June 2008 survey of seat belt use in North Dakota indicate that 80.9 percent of the drivers, 85.6 percent of the passengers, and a combined 81.6 percent of all vehicle occupants were observed to be wearing seat belts.[3]

The estimated seat belt usage rate for all vehicle occupants in 2008 is 0.6 percentage points lower than the June 2007 estimate of seat belt use. However, the rate is the second highest rate recorded in North Dakota for all statewide surveys.

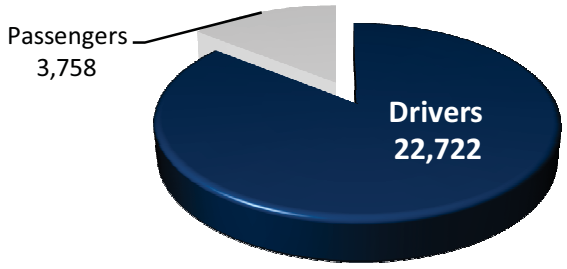
CHARACTERISTICS OF THE SAMPLE

The characteristics of the sample, on which the estimates are based, provide helpful background information.

THE RATIO OF DRIVERS TO PASSENGERS

In June of 2008, sixteen observers were dispatched to 319 intersections in the sixteen counties. There, they recorded data on 22,722 drivers and 3,758 outboard passengers. For this sample, drivers represented 85.8 percent of all vehicle occupants, producing a ratio of more than six drivers (6.1 drivers to passengers) for every passenger. The

Figure 3: Ratio of Drivers to Passengers

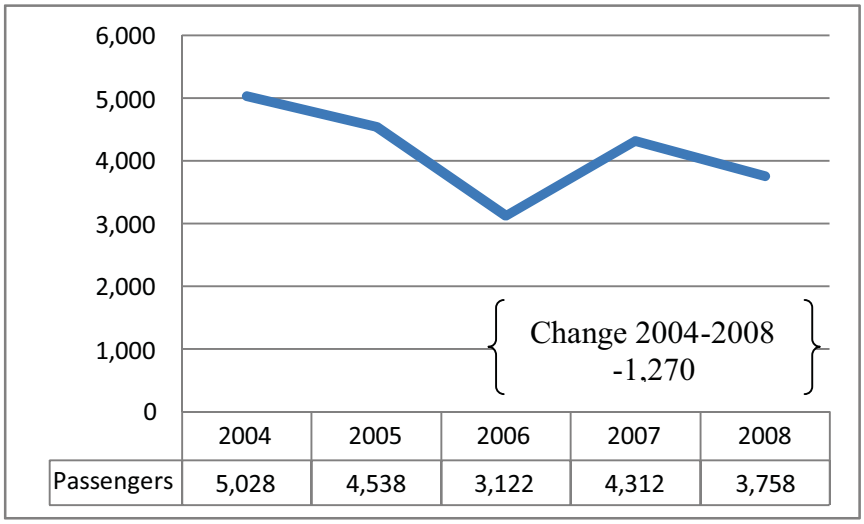


[3] These results are *estimates* calculated from the weighted data.

distribution of drivers and passengers in the 2008 sample is illustrated in Figure 3.

The ratio of drivers to passengers increased over the 2007 ratio of 5.2 drivers for every passenger, when drivers were 84.0 percent of the vehicle occupants instead of the 85.8 percent of vehicle occupants found in 2008. This is relevant in that passengers have a higher rate of seat belt use, which was true in 2007 and is true in 2008, as will be seen later in the report. In other words, a higher percent of passengers in the sample, and a lower ratio of drivers to passengers, tend to raise the overall estimate of seat belt use. One reason why the rate is lower in 2008 relative to 2007 is the relative decline in the proportion of passengers in the 2008 sample. While the relative number of passengers has varied from survey to survey, the general trend has been toward a decline in the proportion of passengers, which can be seen in Figure 4.

Figure 4: Passengers, 2004-2008



	2004	2005	2006	2007	2008
Passengers	5,028	4,538	3,122	4,312	3,758

Between 2007 and 2008, the proportion of drivers relative to passengers increased. In addition, the seat belt usage rate for drivers declined by 1.0 percentage points. While the seat belt usage rate for passengers increased by nearly two percent, this was not enough to offset the effects from lower driver seat belt use and the increased ratio of drivers to passengers. A comparison of the 2007 and 2008 results appears in Figure 5.

Figure 5: Comparison of 2008 Results with 2007 Results

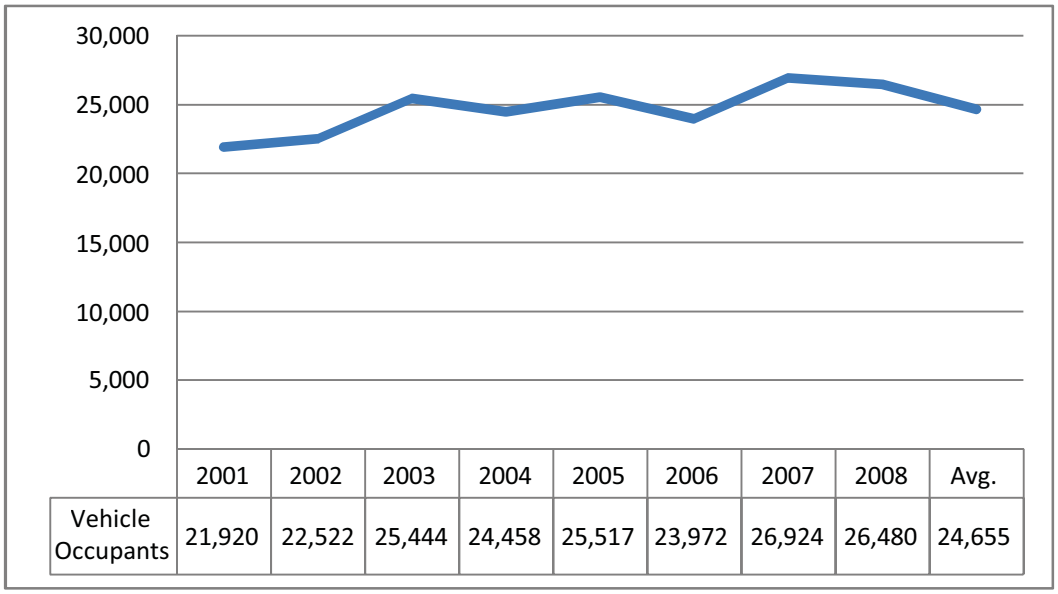
		2008	2007	Difference
Occupant	Status	Estimate	Estimate	
Drivers	Belted	80.9%	81.9%	-1.0%
	Not Belted	19.1%	18.1%	1.0%
	Total	100.0%	100.0%	
	Frequency	22,722	22,612	110
Passengers	Belted	85.6%	83.7%	1.9%
	Not Belted	14.4%	16.3%	-1.9%
	Total	100.0%	100.0%	
	Frequency	3,758	4,312	-554
All Occupants	Belted	81.6%	82.2%	-0.6%
	Not Belted	18.4%	17.8%	0.6%
	Total	100.0%	100.0%	
	Frequency	26,480	26,924	-444

		2008	2007	Difference
	Ratio			
	Drivers : Passengers	6.05	5.24	0.81
	Drivers as Percent of Sample	85.8%	84.0%	1.8%

Sample Size by Year

Since the new sampling methodology was introduced in 2001, the average number of observations has been 24,655 vehicle occupants, with a low of 21,920 in 2001 to a high of 26,924 in 2007. In 2008, the sample size declined by 444 vehicle occupants, a decrease of about 1.6 percentage points. However, the long-term trend has been for the sample size to increase. Between 2001 and 2008, observers have tracked the seat belt use of 197,237 drivers and passengers in North Dakota. The history of those observations by year is illustrated in Figure 6.

Figure 6: Observations, 2001 - 2008



	2001	2002	2003	2004	2005	2006	2007	2008	Avg.
Vehicle Occupants	21,920	22,522	25,444	24,458	25,517	23,972	26,924	26,480	24,655

Frequencies by County

For 2008, observations were completed for the same sixteen counties as in each of the survey years since 2001 when the sampling methodology changed. The frequencies of drivers, passengers, and all occupants are presented in Figure 7.

Figure 7: Frequencies for Drivers, Passengers, and All Vehicle Occupants by County

County	Drivers	Passengers	All Occupants	Percent of Sample
Barnes	1,224	151	1,375	5.2%
Bottineau	365	89	454	1.7%
Burleigh	2,305	115	2,420	9.1%
Cass	4,032	815	4,847	18.3%
Grand Forks	2,181	318	2,499	9.4%
Mercer	481	146	627	2.4%
Morton	1,644	93	1,737	6.6%
Mountrail	897	195	1,092	4.1%
Nelson	406	107	513	1.9%
Pembina	698	162	860	3.2%
Ramsey	1,357	360	1,717	6.5%
Stark	1,758	342	2,100	7.9%
Stutsman	2,128	285	2,413	9.1%
Ward	1,959	342	2,301	8.7%
Wells	362	117	479	1.8%
Williams	925	121	1,046	4.0%
Total	22,722	3,758	26,480	100.0%

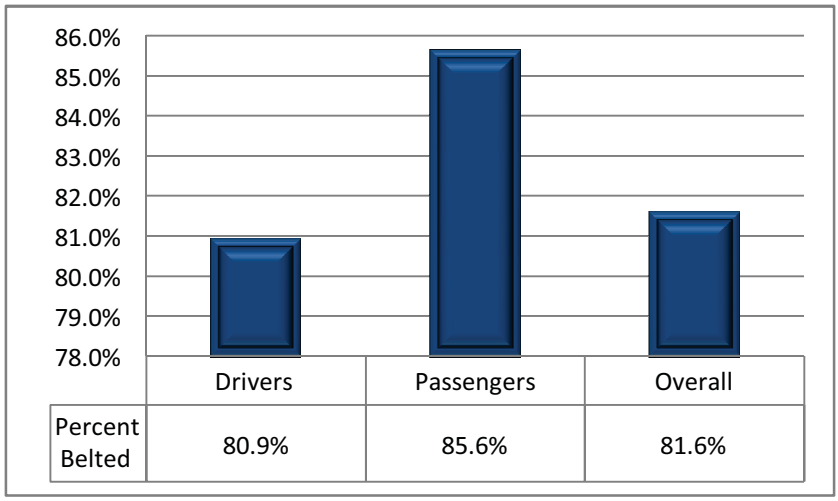
Cass County, a major population center for the state, produced 18.3 percent of the total observations in the 2008 sample. Together, five of the sixteen counties -- Cass, Burleigh, Grand Forks, Stutsman, and Ward – total 62.6 percent of the total observations in the 2008 survey.

Results for Vehicle Occupants

There were 22,722 drivers and 3,758 passengers observed during the 2008 statewide seat belt usage survey in North Dakota. To produce the estimates of seat belt use, these observations were weighted to reflect sampling probabilities and estimates of vehicle miles traveled for counties and sites within counties. All of the estimates of seat belt use reported in this study are based on these weighted calculations.

For the 2008 survey, 80.9 percent of the drivers and 85.6 percent of the passengers were observed wearing seat belts. For the drivers and passengers combined, 81.6 percent were observed as belted, and this figure of 81.6 percent represents the 2008 estimate of seat belt use

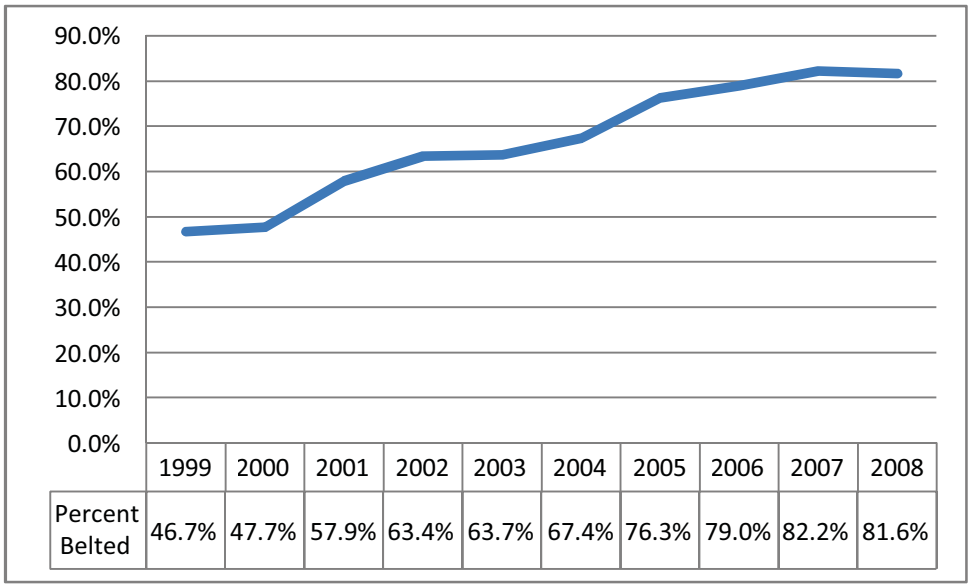
Figure 8: Belted by Vehicle Occupant



for vehicle occupants in North Dakota. The results are illustrated by Figure 8.

The total seat belt utilization rate of 81.6 percent represents a decrease of 0.6 percentage points from the 2007 rate of 82.2 percent.[4] However, the rate of 81.6 percent represents an increase of 3.2 percentage points over the rate of 78.4 for the 2006 survey. In general, seat belt usage rates for vehicle occupants have risen considerably between 1999 and 2008. Figure 9 illustrates the estimated rates between 1999 and 2008.

Figure 9: Belted by Year, 1999-2008



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Percent Belted	46.7%	47.7%	57.9%	63.4%	63.7%	67.4%	76.3%	79.0%	82.2%	81.6%

There have been years when the rate of increase in seat belt use was relatively dramatic: a 10.2 percentage points increase between 2000 and 2001, a 5.5 percentage point increase between 2001 and 2002, and an 8.9

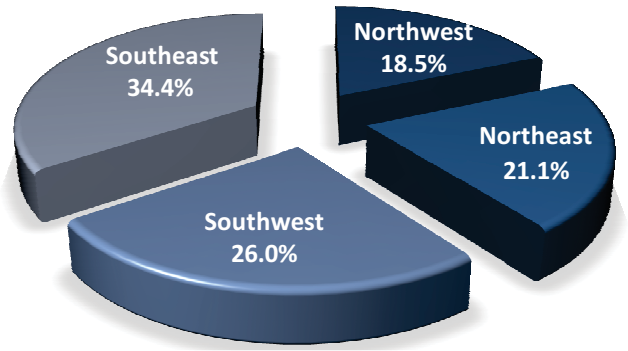
[4] Based on the chi-square test of significance, the difference is not statistically significant. See footnote # 1 for details.

percentage point increase between 2004 and 2005. Since then, the rate of increase has leveled off and has varied between the high seventies and low eighties over the past three years. The average change in seat belt use for vehicle occupants in North Dakota has been 1.8 percentage points between 2006 and 2008.

Results by Region of North Dakota

The sampling methodology divides the state into quadrants, Northwest, Northeast, Southwest, and Southeast. Each region contains a "certainty" county and three additional randomly selected counties from all of the counties in each quadrant.[5] For 2008, about a third (34.4%) of the observations of vehicle occupants came from the southeast quadrant, which contains the state's most populous county, Cass County, and the state's largest city, Fargo. A little more than a fourth of the observations (26.0%) were from the southwest quadrant; the rest of the observations came from the northeast quadrant (21.1%) and the

Figure 10: Sample by Region

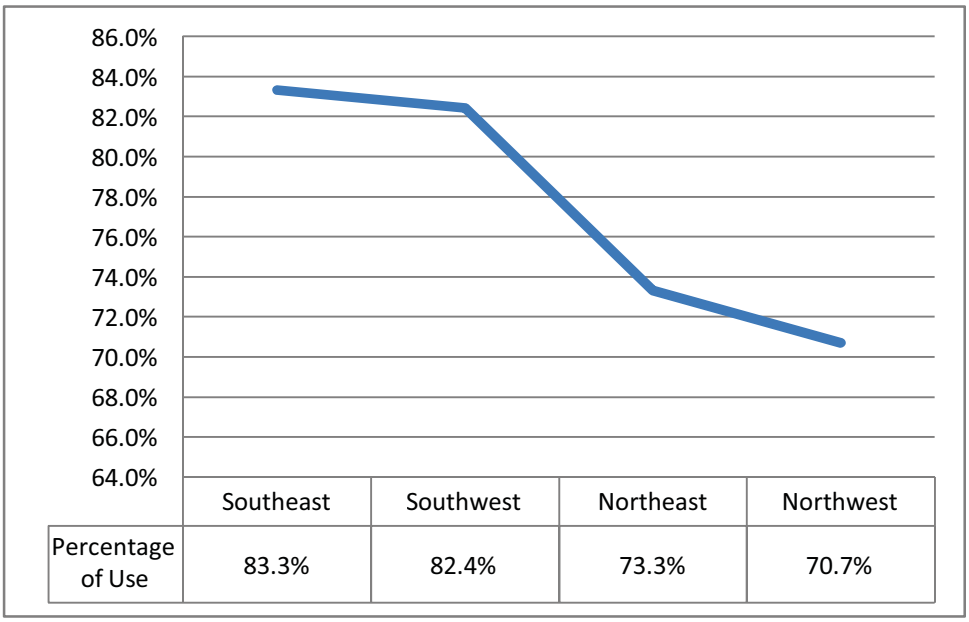


[5] See the discussion of the sampling methodology for details on "certainty" counties and the selection process.

northwest quadrant (18.5%). The distribution of observations by region is illustrated in Figure 10.

Seat belt use was highest among vehicle occupants in the southeast region (83.3%) and the southwest region (82.4%). Seat belt usage rates were considerably lower, and below the statewide average of 81.6 percent, in the northeast (73.3%) and the northwest (70.7%). These results are illustrated in Figure 11.

Figure 11: Belted by Region

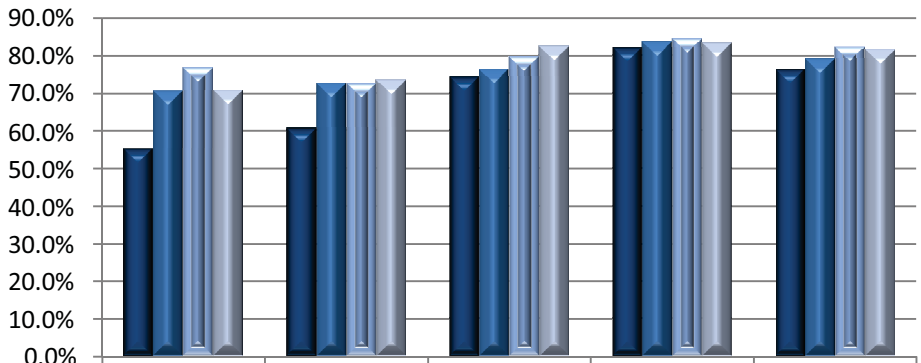


The southeast region had a significant impact on the overall seat belt usage rate in North Dakota, partly because of the large number of observations that came from this region, and partly because of the large number of vehicle miles traveled in the region. Both of these are elements of the weighting process in determining estimates of seat belt usage. In the past, the southeast region has been the one region

above the state average, while the others lag behind. For 2008, the rate of seat belt use in the southwest was 82.4 percent, which was higher that the state average (81.6%) and higher than the southwest rate in the 2007 survey (79.6%). On the other hand, the rate for the northwest region dropped significantly from 76.8 percent in 2007 to 70.7 percent in 2008, a decrease of 6.1 percentage points. There was little change in the rate for the northeast, which was 72.6 percent in 2007 and 73.3 percent in 2008.

In general, since 2005, rates of seat belt use have been stable in the southeast, and have increased steadily in the southwest. The rates for the northeast have stabilized in the low seventies. The rate for the northwest was at a very low point in 2005, but this varied between the low and mid-seventies over the past three years. These trends are illustrated in Figure 12.

Figure 12: Belted by Region & Year

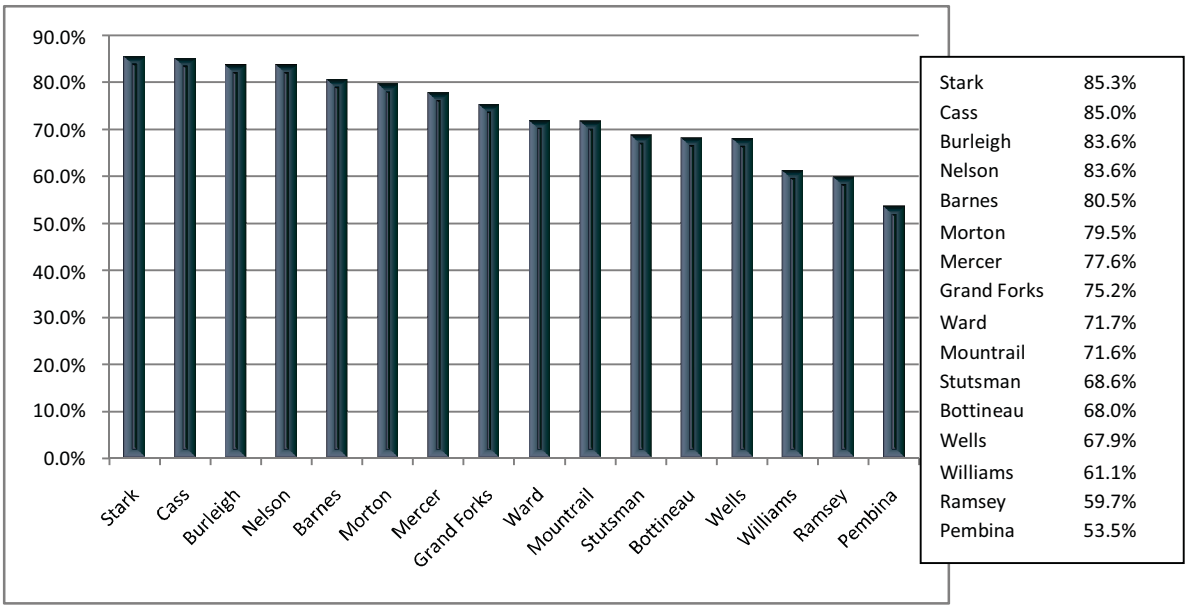


	Northwest	Northeast	Southwest	Southeast	Total
2005	55.2%	60.6%	74.3%	82.0%	76.3%
2006	70.5%	72.5%	76.2%	83.5%	79.0%
2007	76.8%	72.6%	79.6%	84.4%	82.2%
2008	70.7%	73.3%	82.4%	83.3%	81.6%

RESULTS BY COUNTY

The 2008 seat belt usage rates for all vehicle occupants in the sixteen counties included in the sample are illustrated in Figure 13, with the counties listed in descending order from the county with the highest rate to the county with the lowest rate.

Figure 13: Belted by County



The 2008 data indicate that four counties – Stark, Cass, Burleigh, and Nelson – are above the statewide average for seat belt use. Cass, Burleigh, and Nelson have usually been found near the top in seat belt use, but in 2008, they were joined by Stark County. Stark County increased from a rate of 63.7 percent in 2007 to a rate of 85.3 percent in 2008, a dramatic change of 21.6 percentage points. The other counties where double-digit increases in usage rates occurred were Mercer and Mountrail. Barnes County was the only one with a double-digit decrease, but the rate for Barnes was exceptionally high and,

perhaps, an anomaly in 2007. The rates by county for 2007 and 2008 are illustrated in Figure 14.

Figure 14: COUNTIES, 2007-2008

Percent Belted by County, 2008			
	2008	2007	Percent Change
Stark	85.3%	63.7%	21.6%
Cass	85.0%	84.9%	0.1%
Burleigh	83.6%	81.5%	2.1%
Nelson	83.6%	91.2%	-7.6%
All	81.6%	82.2%	-0.6%
Barnes	80.5%	91.6%	-11.1%
Morton	79.5%	81.4%	-1.9%
Mercer	77.6%	67.1%	10.5%
Grand Forks	75.2%	73.8%	1.4%
Ward	71.7%	78.6%	-6.9%
Mountrail	71.6%	57.7%	13.9%
Stutsman	68.6%	75.3%	-6.7%
Bottineau	68.0%	68.0%	0.0%
Wells	67.9%	68.3%	-0.4%
Williams	61.1%	65.6%	-4.5%
Ramsey	59.7%	61.2%	-1.5%
Pembina	53.5%	56.2%	-2.7%

It should be noted here that it is best to be cautious in interpreting usage rates from year to year at the county level. In particular,

those rate changes are unlikely to be statistically significant, especially for those counties where the total observations amount to fewer than one thousand vehicle occupants, which includes the counties of Bottineau, Mercer, Nelson, Pembina, and Wells. Even for the larger counties, the rates are likely to be volatile over time. Having said that, it is clear from the above table that the rates for most of the counties change by only a few percent from year to year, as can be seen by the above table.[6]

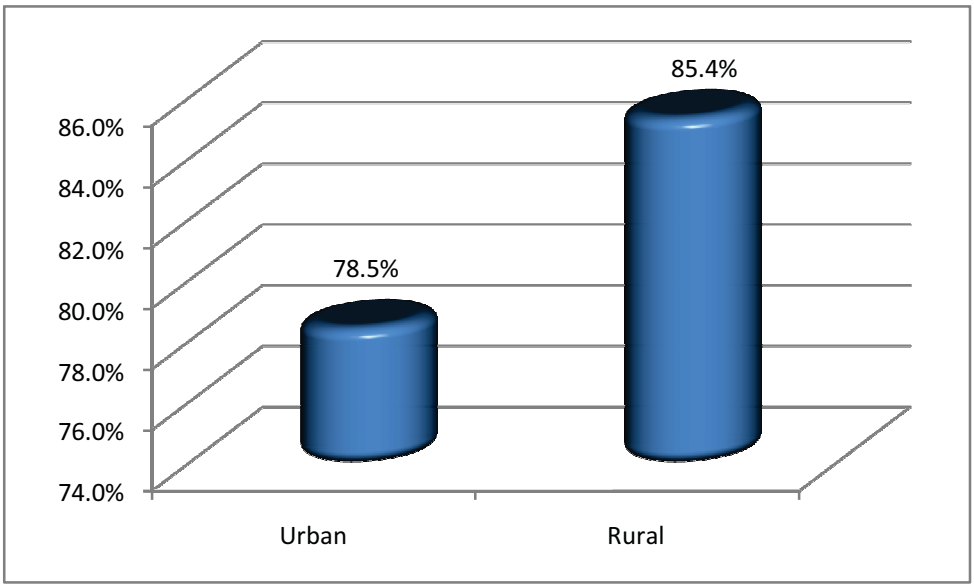
RESULTS BY POPULATION DENSITY

In North Dakota, urban areas are defined as areas with a population of 2,500 or more residents, while rural areas are defined as having fewer than 2,500 residents. As a result, many of the "urban" areas of North Dakota actually have a very small town or rural character. In addition, many of the sites that are "rural" may be part of the interstate or federal roadway system, where rates tend to be higher. While most of the observations tend to come from urban areas (58% for the 2008 survey), which include some of the larger North Dakota cities in the survey, those larger cities do not completely offset the small town nature of many of the "urban" sites. This may help explain the general findings on the relationship between seat belt use and population density. The definition that creates the dichotomy of urban and rural produces a categorization where many of the "urban" sites are actually rural in character, and some of the "rural" sites are urban in terms of seat belt use because of their roadway location.

[6] Additional details on the counties can be found in the appendix to this report.

In the North Dakota 2008 survey of seat belt use, 78.5 percent of urban vehicle occupants were observed as belted, compared to 85.4 percent of vehicle occupants observed in rural sites. These findings are consistent with prior surveys and are almost identical with the findings for 2007, where seat belt use was 78.7 percent in urban areas and 85.8 percent in rural areas. The 2008 rates of seat belt use by urban and rural population density are illustrated in Figure 15.

Figure 15: Belted by Population



Results by Roadway Type

Observations of seat belt use in North Dakota are classified based on the type of roadway, which includes state-designated, federally-designated, and interstate roadways. In 2008, 71.8 percent of the observations were collected from federal (37.1%) or interstate (33.2%) roadways, while the remainders (29.6%) were collected from state

roadways. The details of the frequency and percent of the sample by roadway for the vehicle occupants are illustrated by Figure 16.

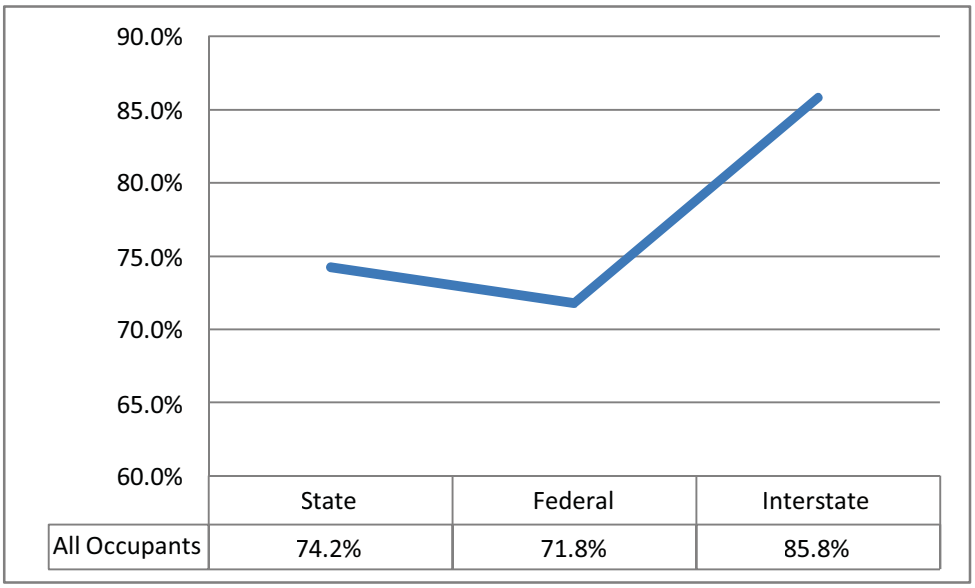
Figure 16: Frequency and Percent of Sample by Vehicle Occupant

Occupant		State	Federal	Interstate	Total
Drivers	Belted	74.9%	71.0%	85.2%	80.9%
	Not Belted	25.1%	29.0%	14.8%	19.1%
	Total	100.0%	100.0%	100.0%	100.0%
	Count	6,588	8,474	7,660	22,722
Passengers	Belted	70.7%	76.5%	89.8%	85.6%
	Not Belted	29.3%	23.5%	10.2%	14.4%
	Total	100.0%	100.0%	100.0%	100.0%
	Count	1,261	1,359	1,138	3,758
All	Belted	74.2%	71.8%	85.8%	81.6%
Occupants	Not Belted	25.8%	28.2%	14.2%	18.4%
	Total	100.0%	100.0%	100.0%	100.0%
	Count	7,849	9,833	8,798	26,480
Percent of Sample		29.6%	37.1%	33.2%	100.0%

A typical result for North Dakota seat belt surveys is to find the highest rates of seat belt use on interstate roadways, followed by federal roadways, with the lowest rates on state-designated roadways. The results for the 2008 statewide survey are similar to past trends in that vehicle occupants on interstate roadways had the highest rate of seat belt use at 85.8 percent. While vehicle occupants on state and

federal highways have lower rates of seat belt use, as in the past, the state roadway rate, at 74.2 percent, was actually higher than the rate for vehicle occupants on federal roadways, which was 71.8 percent for 2008. The results on seat belt use by roadway type are illustrated in Figure 17.

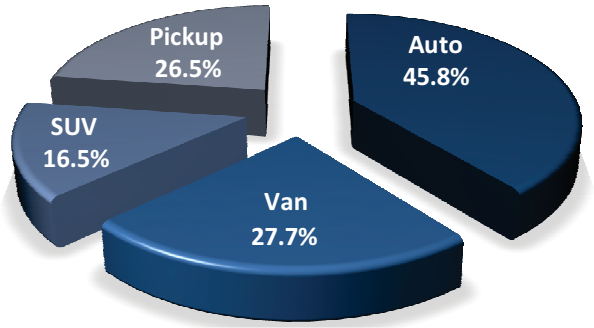
Figure 17: Belted by Roadway, All Vehicle Occupants



Results by Vehicle Type

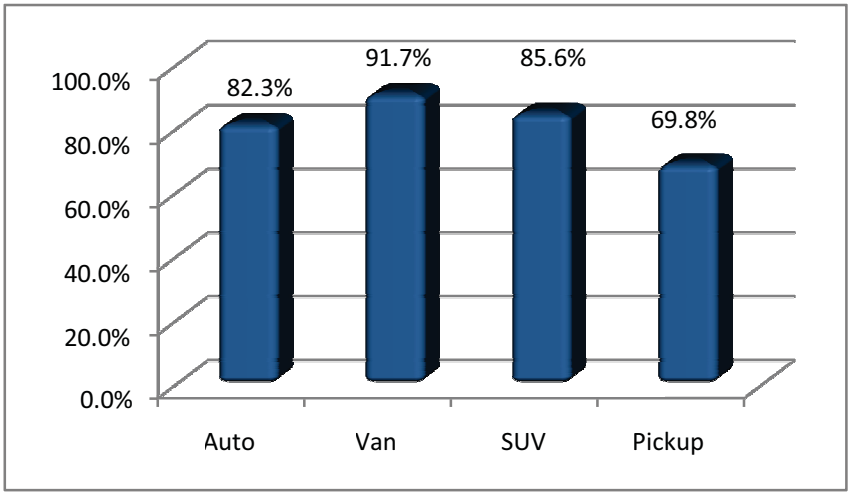
For the 2008 North Dakota survey, 45.8 percent of the vehicle occupants were observed in automobiles. About one in four vehicle occupants (26.5%), were observed in pickup trucks. The remaining observations, 27.7 percent of the sample, were either in vans (11.2%) or in Sport Utility Vehicles (SUVs) (16.5%). The distribution of the sample by vehicle type is illustrated in Figure 18.

Figure 18: Percentage of Observations by Vehicle Type



For the 2008 North Dakota Statewide Survey, seat belt use for all vehicle types was above the statewide estimate of 81.6 percent: automobiles (82.3%), vans (91.7%), and SUVs (85.6%). However, the seat belt usage rate for drivers and passengers in pickup trucks was 69.8 percent. This rate is down slightly from the 2007 rate of 70.8 percent, but it is higher than the 2006 rate of 67.4 percent. Seat belt use for the different vehicle types is illustrated in Figure 19.

Figure 19: Belted by Vehicle Type, All Occupants

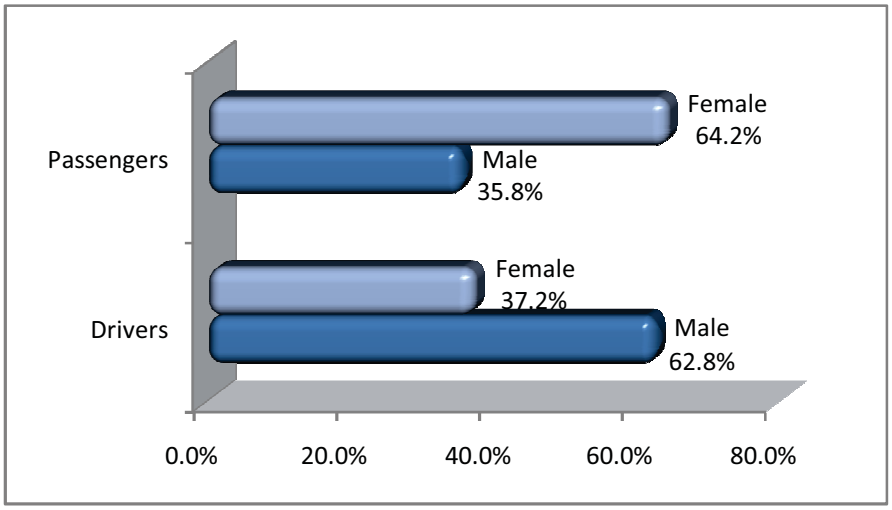


The 2008 results for North Dakota by vehicle type are consistent with long-term trends for North Dakota and other states that have high frequencies of pickup trucks and a sizeable rural population.

Gender and Seat Belt Use

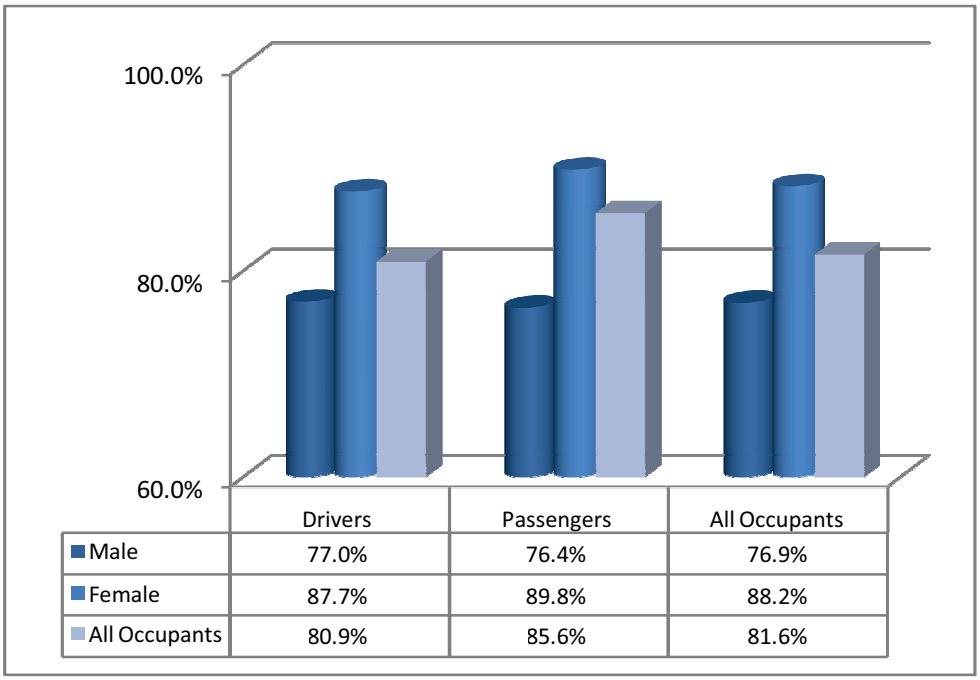
As in prior surveys of seat belt use in North Dakota, the majority of drivers were males (62.8%) and the majority of passengers were females (64.2%). Because drivers outnumber passengers by a large margin, most of the vehicle occupants (59.0%) were male. The percent of vehicle occupants by gender is illustrated in Figure 20.

Figure 20: Percentage of Sample by Gender & Occupant



A consistent finding in North Dakota surveys is a higher rate of seat belt use by females. This is also true for the 2008 survey. For all vehicle occupants, females were belted at a rate of 88.2 percent compared to a rate of 76.9 percent for males, a difference of 11.3 percentage points. This result is virtually identical to the result for 2007, where the difference was 11.2 percentage points. This pattern by gender applies to both drivers and passengers, and the pattern is illustrated in Figure 21.

Figure 21: Percentage of Sample by Gender & Occupant

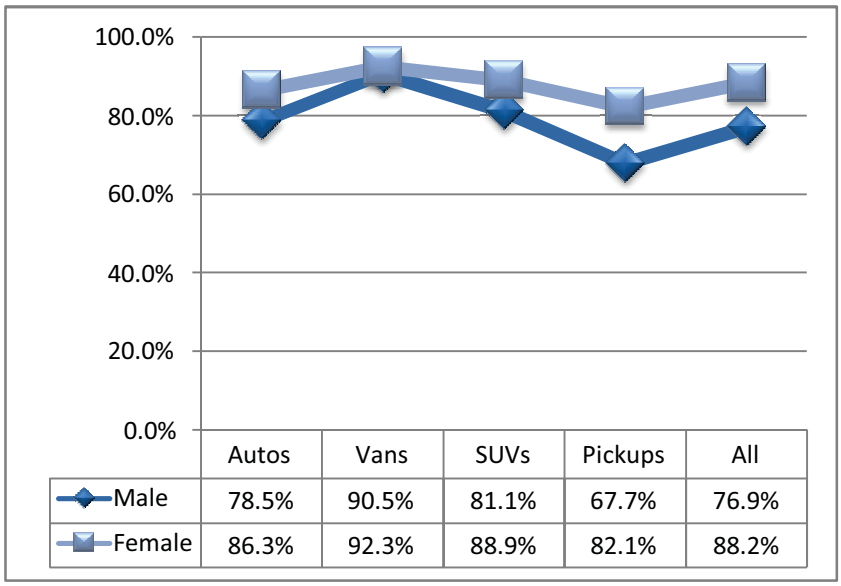


	Drivers	Passengers	All Occupants
Male	77.0%	76.4%	76.9%
Female	87.7%	89.8%	88.2%
All Occupants	80.9%	85.6%	81.6%

Gender and Vehicle Type

Surveys in North Dakota have found that females are more likely to be observed wearing seat belts in every type of vehicle. The following chart shows that this is also true for the 2008 survey.

Figure 22: Belted by Gender & Vehicle Type



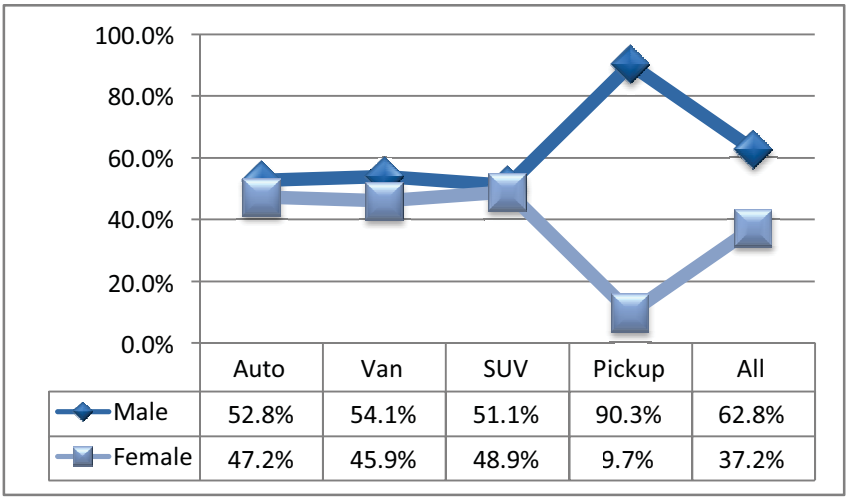
	Autos	Vans	SUVs	Pickups	All
Male	78.5%	90.5%	81.1%	67.7%	76.9%
Female	86.3%	92.3%	88.9%	82.1%	88.2%

Males were most likely to have a seat belt usage pattern similar to females in vans, where the rate of seat belt use was only 1.8 percentage points higher for females. Females were 7.8 percentage points more likely than males to be belted in automobiles and SUVs. The largest effect of the gender effect on seat belt use can be seen for pickup trucks: 82.1 percent of females and 67.7 percent of males were observed as belted in pickup trucks, a difference of 14.4 percentage points.

The context for the rates of seat belt use for the combination of gender and vehicle type is found in the representation of men and women

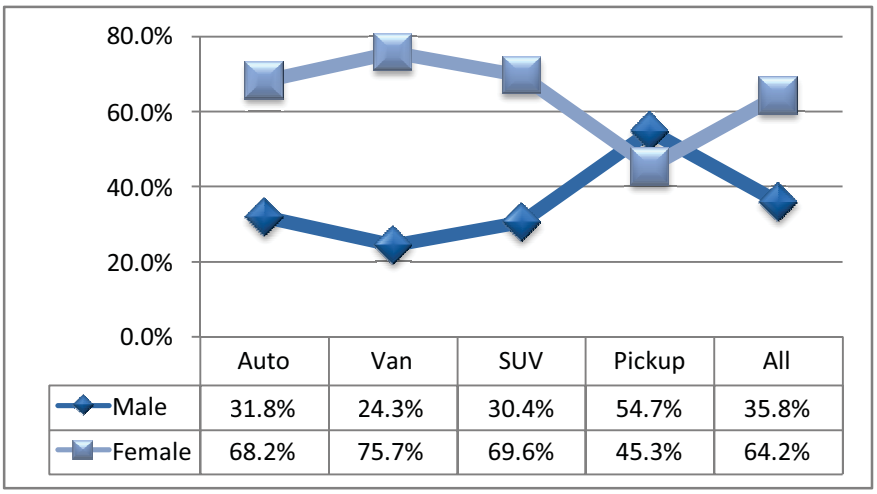
among the various vehicle types. For 2008, the data indicate that males were likely to be the greater percentage of drivers in all vehicles, while females represented a larger percentage of passengers in all vehicles with the exception of pickup trucks. The sample percent by gender, vehicle type, and vehicle occupants is illustrated in Figure 23.

Figure 23: Percentage of Sample by Vehicle Type, Drivers



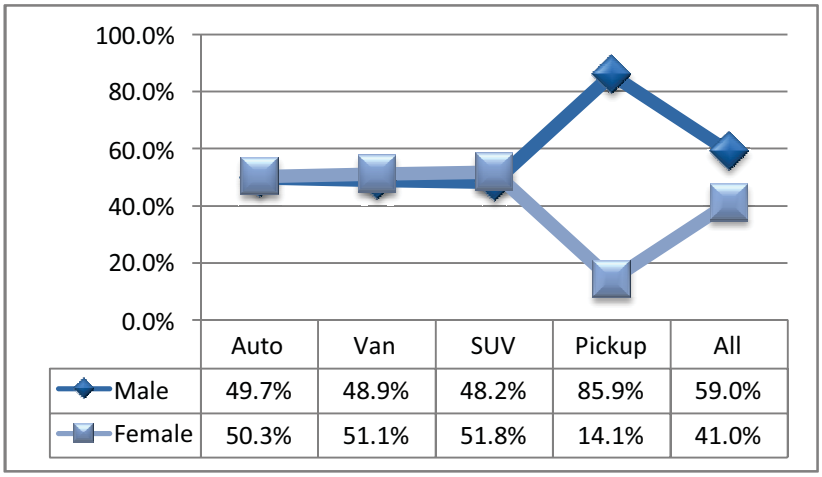
	Auto	Van	SUV	Pickup	All
Male	52.8%	54.1%	51.1%	90.3%	62.8%
Female	47.2%	45.9%	48.9%	9.7%	37.2%

Figure 24: Percentage of Sample by Vehicle Type, Passengers



	Auto	Van	SUV	Pickup	All
Male	31.8%	24.3%	30.4%	54.7%	35.8%
Female	68.2%	75.7%	69.6%	45.3%	64.2%

Figure 25: Percentage of Sample by Vehicle Type, All Occupants



	Auto	Van	SUV	Pickup	All
Male	49.7%	48.9%	48.2%	85.9%	59.0%
Female	50.3%	51.1%	51.8%	14.1%	41.0%

In general, male and female vehicle occupants were evenly distributed among the different types of vehicles. However, pickup trucks tend to be the province of males: 90.3 percent of the drivers and 54.7 percent of the passengers in pickup trucks were males in the 2008 survey. Overall, males represented 85.9 percent of the pickup truck occupants. Because of this significant disparity, males ended up as the majority of vehicle occupants (59.0%) in spite of the finding that women are a slightly greater percentage of vehicle occupants for every other type of vehicle.

SUMMARY

In general, the 2008 statewide survey of seat belt use in North Dakota did not produce any major surprises in comparison to recent prior surveys. In comparison to the 2007 survey, the number of total observations was down slightly because of a decline in the number of passengers, which also produced an increase in the driver to passenger ratio. Statistical analysis found that the survey sample is within normal confidence intervals. What follows in the remainder of this report are where appropriate, a summary and a discussion of the findings.

- The 2008 overall rate of 81.6 percent belted was 0.6 percentage points lower than the rate for 2007, but this difference is not statistically significant. While the rate did not increase over the prior year, it did not decrease in any significant way. The decrease may be attributed to the decline in the number of passengers relative to drivers because passengers have a higher rate of seat belt use. The overall rate is the second highest of the annual rates since the sampling methodology changed in 2001.
- Another consideration why the rate may be slightly lower than in 2007 is the number of enforcement and media blitzes held during the year. Between June 2006 and June 2007, there were three full campaign blitzes. Between June 2007 and June 2008, there was only one full enforcement and media blitz. When the issue is not kept in front of the public, seat belt use may not rise.
- The results for the different regions of the state indicate that the highest rates were in the southern quadrants, the southeast

and the southwest, with lower rates in the northeast and northwest. The most significant increase in seat belt use occurred in the southwest region of the state. Except for that change, the relative rates of seat belt use appear to be stable over the past few years.

- The results by county are similar to the results in prior surveys in that only three or four of the sixteen counties were above the state average for seat belt use. In 2008, those counties were Stark, Cass, Burleigh, and Nelson. The major surprise of the 2008 survey was the significant rise in seat belt use in Stark County. Barnes County had the most significant decline in seat belt use. However, it bears repeating here that the level of sampling errors increases significantly when data is broken down by county, especially for those counties with a smaller number of observations. Therefore, readers should be cautious in generalizing from the data on the counties.
- The results by population density indicate, once again, that seat belt use was greater for those sites designated as "rural" and seat belt use was lower in sites designated as urban. This unusual result is not likely to be found in many seat belt surveys. The reason for this difference has to do with the definition of urban and rural and the possibility that many urban sites have a very small town character, while rural sites may be on interstates or other major highways where seat belt use is more common.
- The results by type of roadway were consistent with previous surveys in that seat belt use was most common on interstate

roadways and less common on state and federal roadways. Seat belt use was higher on state roadways than on federal roadways, an exception to the usual pattern, but the most important and consistent result, higher use on interstate roadways, was the norm in 2008.

- The results for seat belt use by vehicle type were consistent with prior surveys. The highest rates were for the occupants of vans and SUVs, followed by the drivers and passengers in automobiles. Pickup trucks occupants had the lowest seat belt usage rate in 2008, just as in prior studies.
- The results by gender again confirm the importance of the gender effect, the finding that females have higher rates of seat belt use. Females were 11.3 percentage points more likely to be belted than males, a finding that is almost identical to the one for the 2007 survey.
- The results of the 2008 survey indicated that the gender effect applies across all types of vehicles. However, males and females had the most similar seat belt usage rates in vans, perhaps because vans are considered a family type of vehicle. For pickup trucks, distinctively male vehicles in the 2008 surveys, the difference by gender was greatest, just as it has been in prior surveys.

The remainder of this report contains many of the tables that were prepared as part of the data analysis but were not necessarily included in the body of the narrative. These tables provide a more complete picture of the results and reveal the origins of the charts and graphs that appear in the narrative.

Site Locations

BARNES COUNTY

Site #	Hwy	Description	Direction	Map
1	I-94	Urbana Exit 272	E	2-2
2	I-94	4 mi. East of Site 1 at Eckelson Exit 276	W	2-2
3	94 Bus Lp	Westbound ramp to I-94	W	Valley City 2-2
4	I-94	South Hwy 1 Exit 288, 2 miles west of Valley City	E	2-2
5	1	Southeast limits of Dazey, Hwy 1 & 26	N&S	2-2
6	1	Southeast limits of Rogers	N&S	Rogers 2-2
7	I-94	6 miles east of Site 2, Exit 283	W	2-2
8	I-94	West Exit of Valley City. Exit 290 Park on eastbound on ramp	E	Valley City 2-2
9	94 Bus Lp	Main St. & 12th Ave. E	E&W	Valley City 2-2
10	I-94	4 ½ mi. east of Valley City. Exit 298	W	2-2
11	I-94	County Line exit 307 at Tower City	W	2-2
12	32	Camp Arnold Historic Site 3 ½ mi. North of Oriska (Watch Mileage).	N&S	2-2
13	32	Southeast limits of Oriska	N&S	Oriska 2-2
14	I-94	Oriska Exit 302	W	2-2
15	32	Northeast limits of Nome	N&S	Nome 2-1
16	46	Intersection with Hwy 1	E&W	2-1
17	1	2 mi. north of Hwy 46. County Road 38 and Hwy 1	N&S	2-1
18	94 Bus Lp	Service road to I-94 east edge of Valley City. Exit 294	E	2-2
19	I-94	2 mi. east of Valley City. Exit 296	E	2-2
20	I-94	East exit to Valley City. Exit 294	W	Valley City 2-2

BOTTINEAU COUNTY

Site #	Hwy	Description	Direction	Map
1	5	Intersection with Main street	W	Bottineau 5-1
2	5	Intersection with Co.Rd. 57	E&W	5-1
3	60	Southeast limits of Willow City	N	Willow City 5-1
4	60	Northwest limits of Willow City	S	Willow City 5-1
5	60	Intersection with Co.Rd. 22	N&S	5-1
6	60	"Y" Intersection (see map)	S	5-1
7	5	Intersection with 13th ave NE, east of Bottineau	W	5-1
8	5	Intersection with Co.Rd ; One mile West of Site # 1	E	5-1
9	14	I mile south of Hwy 5 intersection	N&S	5-1
10	14	Intersection with 2nd Ave. at Kramer	N	Kramer 5-1
11	14	3 mi. south of Kramer	N	5-1
12	5	Intersection with Hwy 83	W	5-2
13	83	At Westhope (see map)	N	Westhope 5-2
14	83	½ mi. north of Westhope	N&S	5-2
15	83	Intersection with Hwy 5	N	5-2
16	5	3 mi. north of Maxbass	N	5-2
17	5	Intersection with Co.Rd. 3	E&W	5-2
18	83	Intersection with Hwy 5	S	5-2
19	256	Intersection with Co.Rd. 6, 4 mi. south of Antler	S	5-2
20	256	At Antler	S	5-2

BURLEIGH COUNTY

Site #	Hwy	Description	Direction	Map
1	83N	Intersection with Co.Rd. 16, 4 mi. south of Wilton	S	8-1
2	83N	9 mi. north of Bismarck	N	8-2
3	83N	At Northwood Estates, 6 ½ mi. north of I-94 exit	N	8-2
4	I-94	At Divide Ave. Exit	E	Bismarck 8-2
5	1804	Junction River Road and 1804 (At Eagles Park)	S	8-2
6	94 Bus Lp	Intersection with Memorial Highway and Fraine Barracks Road; east entrance memorial bridge	W	Bismarck 8-2
7	94 Bus Lp	Intersection with Divide, near Oasis Truck Stop	N	Bismarck 8-2
8	I-94	East Exit at Bismarck	W	Bismarck 8-2
9	I-94	2 mi. east of East Bismarck exit	E	8-2
10	I-94	7 mi. east of Sterling exit (at the Driscole exit)	W	8-2
11	83S	2 mi. south of I-94 @ Sterling	N&S	8-2
12	36	East limits of Wing	W	Wing 8-1
13	14	West limits of Wing	S	Wing 8-1
14	94 Bus Lp	Bismarck Expressway & 26th St.	W	Bismarck 8-2
15	83 Bus Lp	7th St. S. & Bismarck Expressway	S	Bismarck 8-2
16	94 Bus Lp	Broadway & Washington	E	Bismarck 8-2
17	83 Bus Lp	9th St. S & Bismarck Expressway	N	Bismarck 8-2
18	83 Bus Lp	7th St. N & Broadway	S	Bismarck 8-2
19	83 Bus Lp	7th St. N & Main	S	Bismarck 8-2
20	I-94	Intersection with Hwy 83 @ Bismarck. Went 1 block East so could count traffic coming on to I-94 from Bismarck going East.	E	Bismarck 8-2

CASS COUNTY

Site #	Hwy	Description	Direction	Map
1	I-29	6 mi. north of Gardner exit 92 @ County Line	S	9-1
2	I-29	1 mi. south of Argusville exit, mile marker 78	N	9-1
3	I-29	Gardner exit 86	S	9-1
4	I-29	Argusville exit 79	S	9-1
5	I-29	1 mi. north of Argusville exit, mile marker 80	N	9-1
6	I-29	19th Ave N (exit 67), Fargo	S	Fargo 9-1
7	I-29	Rest area north of Harwood	N	9-1
8	I-29	Harwood exit	S	9-1
9	81 Bus Lp	19th Ave N and University, Fargo	S	Fargo 9-1
10	81 Bus Lp	University and Dakota Dr. (8th Ave N), Fargo	S	Fargo 9-1
11	I-29	Main Street Exit, Fargo	S	Fargo 9-1
12	294	12th Ave N and Dakota Drive, Fargo	E	Fargo 9-1
13	I-29	Hickson exit 50	N	9-2
14	46	South of Leonard, Intersection of Hwy 18	E	9-2
15	I-94	Leonard and Hwy 18, Exit 331 at Casselton	E	9-2
16	10 Bus Lp	University and Main Avenue, Fargo	W	Fargo 9-1
17	I-94	Intersection with Hwy 81 (University) exit 351, Fargo	W	Fargo 9-1
18	I-29	Horace/WildRice exit 56	N	9-2
19	10 Bus Lp	Main Avenue and 45th St, Fargo	W	Fargo 9-2
20	10 Bus Lp	MainAvenue and 42nd St., Fargo	E	Fargo 9-2

GRAND FORKS COUNTY

Site #	Hwy	Description	Direction	Map
1	15	North limits of Northwood	E	Northwood 18-2
2	18	Intersection with Hwy 15, 5 mi. east of Northwood	S	18-2
3	15	7 mi. east of Site #2 at curve	E	18-2
4	15	Intersection with Legion Baseball Field Road @ Thompson	E&W	Thompson 18-2
5	15	Intersection with I-29	W	18-2
6	I-29	5.3 mi. north of Hwy 15	N	18-2
7	81 bus lp	Columbia Rd. and 32nd Ave, Grand Forks	N	Gr. Forks 18-2
8	297	DeMers and 12th St. at Hardees	E	Gr. Forks 18-2
9	81 bus lp	Washington St. and 8th Ave.S., Grand Forks	S	Gr. Forks 18-2
10	I-29	Intersection with DeMers and Hwy 297	S	Gr. Forks 18-2
11	2	Gateway Drive and 42nd St .N., Grand Forks	W	Gr. Forks 18-2
12	2	Gateway Drive and 20th St. N., Grand Forks	E	Gr. Forks 18-2
13	81 bus lp	81 (Wash) and 10th Ave. N, Grand Forks	N	Gr. Forks 18-2
14	2	Gateway and 3rd St. N. (from SE), Grand Forks Pay attention to the map	W	Gr. Forks 18-2
15	2	Gateway and Columbia Rd., Grand Forks	E	Gr. Forks 18-2
16	2	4 mi. west of Emerado	E	18-2
17	2	Northwest limits of Emerado East of AFB exit. (Use Median Crossing east of Exit)	E&W	Emerado 18-2
18	I-29	Manvel Exit (exiting Manvel by I-29 south)	S	18-1
19	I-29	4 mi. north of Manvel Exit 157	N	18-1
20	81	Intersection with Co.Rd. 8 @ Manvel	E&W	Manvel 18-1

MERCER COUNTY

Site #	Hwy	Description	Direction	Map
1	49	Intersection with Co.Rd. 34, 9 mi. south of Beulah (Hannover Exit)	N	29-2
2	200	@ Golden Valley	E	29-2
3	49	Intersection with Hwy 200	S	29-2
4	1806	@ curve near Hille Wildlife Management Area (see map)	E	29-1
5	200	Main St. and 2nd Ave. E. Pick City	W	Pick City 29-1
6	200	I mi. west of Pick City	E	29-1
7	200	Intersection with 200A	W	29-2
8	200A	3 mi. east of Intersection with Hwy 200 and Hwy 31 intersection	E	29-2
9	200A	Intersection with Hwy 31 to Stanton. About 2 miles East of Site 8.	W	29-2
10	200A	4 mi. east of Stanton Rd.	W	29-2
11	31	Intersection with South Ave, Stanton	S	Stanton 29-2
12	200	Intersection with 6th Ave. NE, Hazen	E	Hazen 29-2
13	200	Intersection with 9th Ave. NW, Hazen	W	Hazen 29-2
14	200	Intersection with 3rd Ave NW, Hazen, Jct. Mercer Co. Rd. 27	E	Hazen 29-2
15	200	2 mi. west of Hazen	E	29-2
16	49	Intersection with Main St., Beulah	N	Beulah 29-2
17	49	Intersection with 7th St. NW, Beulah	S	Beulah 29-2
18	200	2 mi. east of intersection with Hwy 49	W	29-2
19	49	Intersection with Co.Rd. 20, North of river on the south side of Beulah	N	Beulah 29-2
20	49	Intersection with subdivision road south of Beulah (see map)	S	Beulah 29-2

MORTON COUNTY

Site #	Hwy	Description	Direction	Map
1	6	Intersection with 19th St. SW, Mandan	N	Mandan 30-1
2	94 bus lp	Memorial Hwy and 3rd St. SE, Mandan	W	Mandan 30-1
3	1806	Intersection with 19th St. SE, Mandan (HWY1806 is labeled 6th Ave SE at this point)	N	Mandan 30-1
4	1806	At Fort Rice	N	30-2
5	94 bus lp	Memorial Hwy @ exit from I-94, Mandan	W	Mandan 30-1
6	94 bus lp	Memorial Hwy @ Redwing Dr., Mandan (park @ Auto dealership & Jakes Glass)	E	Mandan 30-1
7	6	Intersection with 3rd St. SW, Mandan	S	Mandan 30-1
8	94 bus lp	Intersection of Hwy 1806 and Old Red Trail, Mandan	E	Mandan 30-1
9	I-94	Mandan Ave., Exit 153, Mandan	E	Mandan 30-1
10	94 bus lp	Old Red Trail and 8th Ave. NE, Mandan	W	Mandan 30-1
11	I-94	Intersection with Hwy 25 @ Truck Stop west of Mandan, Exit 147	W	30-1
12	I-94	Sweet Briar Lake/Judson Exit 134	E	30-1
13	6	Intersection with Co.Rd. 136	N&S	30-2
14	6	@ Bridge to Selfridge at county line	N&S	30-2
15	6	Intersection with Hwy 21	E (N)	30-2
16	21	Main and Hwy 21, Flasher	E&W	Flasher 30-2
17	I-94	Rest area east of Glen Ullin, mile 120	W	30-3
18	49	Intersection with I-94, north of Glen Ullin (North of interstate)	S	30-3
19	49	Intersection with Co.Rd. 6 at the west edge of Glen Ullin (Corner where 49 turns South)	N (E)	30-3
20	I-94	Hebron exit 97	E	30-3

MOUNTRAIL COUNTY

Site #	Hwy	Description	Direction	Map
1	8	5 mi. north of Stanley	S	31-1
2	2	Intersection of Hwy 8 & 6th Ave. SE, Stanley	N	Stanley 31-1
3	2	Intersection with Hwy 8, Stanley	E&W	Stanley 31-1
4	2	1 mi. east of Stanley	E	31-1
5	2	Southwest limits of Palermo	W	31-1
6	2	Intersection with Co.Rd. 37 to Blaisdell	E	31-1
7	2	Intersection with Co.Rd. 5 to White Earth	E	31-1
8	2	½ mi. east of Ross	W	31-1
9	8	Corner of 6th Ave. SW. and Main St., Stanley	N&E	Stanley 31-1
10	8	Intersection with 1st Ave. N., Stanley	N&S	Stanley 31-1
11	8	2 ½ mi. south of Stanley	S	31-1
12	8	5 ½ mi. south of Stanley at curve	N	31-1
13	8	4 mi. north of Intersection with Hwy 23	S	31-2
14	23	Intersection with Hwy 8	E&W	31-2
15	23	Intersection with Hwy 37	E&W	31-2
16	37	Intersection of 3rd St. East and 3rd Ave. South, Parshall	N	Parshall 31-2
17	37	Intersection of 3rd St. E and Railroad Ave., Parshall	N&S	Parshall 31-2
18	23	Intersection with Hwy 1804, New Town	E&W	N.Town 31-2
19	1804	4 mi. northwest of New Town	E	31-2
20	1804	10 mi. northwest of New Town	N&S	31-2

NELSON COUNTY

Site #	Hwy	Description	Direction	Map
1	15	Intersection with Co.Rd. 5, 1 mi. south of Tolna	E	32-1
2	15	Intersection of Railroad Ave and First St., Pekin	E&W	Pekin 32-1
3	1	Intersection with Hwy 15, ½ mi. east of Pekin	N	32-1
4	15	Intersection with Hwy 1, ½ mi. east of Pekin	E&W	32-1
5	1	6 mi. north of intersection with Hwy 15 @ Old Settlers Park	N&S	32-1
6	1	Intersection with Hwy 2 @ Lakota	N	Lakota 32-1
7	1	Northeast limits of Lakota	S	Lakota 32-1
8	1	Intersection with Co.Rd. 4, 7 mi. north of Lakota (Site 7)	S	32-1
9	35	Intersection at South 3rd St. and Jeanette Ave, Michigan	N	Michigan 32-1
10	2	Intersection with Hwy 35, Michigan	E&W	Michigan 32-1
11	35	Intersection with Hwy 2, Michigan (Hwy 2 is split by a median)	N&S	Michigan 32-1
12	2	1 mi. west of Petersburg	E&W	32-1
13	2	Intersection with 5th St., Petersburg	W	Petersburg 32-1
14	2	Intersection with Hwy 32 Petersburg	E	Petersburg 32-1
15	32	Intersection with Co.Rd. 20, 7 mi. south of Petersburg	N&S	32-1
16	32	Intersection with Hwy 15	N&S	32-1
17	15	Intersection with Co.Rd. 21, 4 mi. west of Hwy 32	E&W	32-1
18	15	Intersection with Co.Rd. 15 at southeast limits of McVille	W	McVille 32-1
19	15	Southwest limits of McVille	E	McVille 32-1
20	1	Intersection with Co.Rd. 36, 7 mi. south of Pekin	N	32-1

PEMBINA COUNTY

Site #	Hwy	Description	Direction	Map
1	32	Intersection with Co.Rd. 10 , Walhalla	N&S	Wallhalla 34-1
2	18	Northwest limits of Neche	S	Neche 34-1
3	18	Intersection with Co.Rd. 10, 4 mi. west of Bathgate	N&S	34-1
4	5	3 mi. west of intersection with Hwy 18 (Co. Rd. 15)	E&W	34-1
5	32	I mi. north of intersection with Hwy 5, near Oak Lawn Cemetery Historical Site	N&S	34-2
6	32	Intersection with Co.Rd. 24, Mountain	N&S	Mountain 34-2
7	5	Intersection with Hwy 32, 5 mi. north of Mountain	E	34-2
8	5	Intersection with Co.Rd. 11, near Icelandic State Park	E&W	34-2
9	5	Intersection with Bedrock Lake Rd, west limits of Cavalier	E&W	Cavalier 34-2
10	18	Southern limits of Cavalier	N&S	Cavalier 34-2
11	18	Intersection with Hwy 66, 2 mi. east of Crystal	N&S	34-2
12	91	Intersection with Hwy 81, St. Thomas	N	St.Thomas 34-2
13	81	1 ½ mi. north of St. Thomas	N&S	34-2
14	I-29	Intersection with Co.Rd. 28 @ Pittsburg exit	S	34-2
15	66	At I-29 exit, Drayton	E	Drayton 34-2
16	66	Intersection with Main St. (Hwy 44), Drayton	W	Drayton 34-2
17	44	Main St. and Divide St., Drayton	N&S	Drayton 34-2
18	44	Main St. and Scribner St., Drayton	N&S	Drayton 34-2
19	66	Intersection with Co.Rd. 29, 5 mi. west of Drayton	E&W	34-2
20	66	Intersection with Hwy 81, 3 mi. south of St. Thomas	E&W	34-2

RAMSEY COUNTY

Site #	Hwy	Description	Direction	Map
1	2	Intersection with Co.Rd. 20 @ Penn	E	36-2
2	2	At Grand Harbor & Darby No Marker	W	36-2
3	2	Highway 2 intersecting with Frontage Road @ Davis Hotel.	E	D. Lake 36-2
4	19	Intersection with Hwy 2, Devils Lake. Park North of stoplights. Park at the entrance of Roosevelt Park. Observe southbound traffic. Road is designated West.	W	D. Lake 36-2
5	19	Corner of Devils Lake city limits	E	D. Lake 36-2
6	20	Intersection with 22nd St.	N	D. Lake 36-2
7	20	At Webster	N&S	36-1
8	17	Intersection with Co.Rd. 27 (Ram Co. sign #3)	E&W	36-1
9	17	At eastern limits, Edmore	E&W	Edmore 36-1
10	2	Intersection with Co.Rd. 27, Crary exit	W	36-2
11	2	Intersection with Co.Rd. 27 at Crary Wildlife Management Area (this is a rest stop)	E	36-2
12	2	Intersection With southeast city limits, Devils Lake –US #2 and Elks Drive	W	D. Lake 36-2
13	20	Directly across from Lake Region State College highway sign facing East. Devils Lake	S	D. Lake 36-2
14	20	Intersection with Hwy 19, Devils Lake	N	D. Lake 36-2
15	20	Intersection with southern limits, Devils Lake	N	D. Lake 36-2
16	19	@ southeast boundary of Airport, Devils Lake	E	D. Lake 36-2
17	2	Intersection with Hwy 20, Devils Lake	E	D. Lake 36-2
18	2	Intersection with 14th Ave., Devils Lake	W	D. Lake 36-2
19	20	Intersection with Shamrock Lane, Devils Lake	S	D. Lake 36-2
20	20	Intersection with Hwy 57 By Casino	N	36-2

STARK COUNTY

Site #	Hwy	Description	Direction	Map
1	22	2 mi. north of Dickinson (32 St. SW by Jay R's Auto Body)	S	45-2
2	I-94	Intersection with Hwy 22 exit, Dickinson	W	Dix 45-2
3	22	3rd Ave. W & 12th ST. W, or Museum Drive, Dickinson	S	Dix 45-2
4	I-94	Exit 59, west of Dickinson	E	Dix 45-2
5	85	Intersection with Co.Rd. 22, 13 mi. south of Belfield, 13 mi So. of old Hwy 10; 25 mi off eastside of school	N&S	45-2
6	85	Intersection with I-94, south side of interstate, Belfield	N&S	Belfield 45-2
7	I-94	Intersection with 85 at Belfield	E	Belfield 45-2
8	I-94	Exit at South Heart	W	45-2
9	22	3rd Ave. W and 8th St. S, (Loaf N Jug) Dickinson	N	Dix 45-2
10	94 bus lp	State Ave & 2nd St. W., Dickinson	N	Dix 45-2
11	22	Prairie Hills Mall entrance, Dickinson	S	Dix 45-2
12	22	3rd Ave. W and 21st St. W., Dickinson	N	Dix 45-2
13	I-94	@ old Green River Rest Area	E	45-2
14	I-94	@ Taylor Exit 78	W	45-1
15	8	Intersection with Co.Rd. 24, 13 mi. south of Richardton	N&S	45-1
16	8	Intersection with Hwy 10 west of Richardton	S&E	45-1
17	94 bus lp	Villard & 10th Ave. E (Kum & Go), Dickinson	W	Dix 45-2
18	I-94	Exit 64 east of Dickinson	E	Dix 45-2
19	94 bus lp	States Ave and Villard, Dickinson	E	Dix 45-2
20	22	3rd Ave. W and 4th St. W, Dickinson	S	Dix 45-2

STUTSMAN COUNTY

Site #	Hwy	Description	Direction	Map
1	I-94	Intersection with Hwy 30, 1 mi. west of Medina, Exit 228	E	47-2
2	I-94	Medina Exit	E	47-2
3	I-94	Windsor Exit 242	E	47-2
4	94 bus lp	Bus. Loop and 14th Ave. SW, Jamestown	W	J.town 47-2
5	281	Intersection of 94 Bus. Loop and 281, Jamestown	N	J.town 47-2
6	52	2 mi. north of Jamestown at Pipestem Lake	S	47-2
7	36	West of Woodworth at curve	E	47-1
8	36	Intersection with Hwy 52 at Pingree	W	Pingree 47-1
9	46	Intersection with Hwy 281	N	47-2
10	281	Intersection with Co.Rd. to Sydney, 10 mi. south of Jamestown	N&S	47-2
11	281	3 mi. south of Jamestown	N&S	47-2
12	281	Last intersection in south Jamestown	N	J.town 47-2
13	52	12th Ave. SE and the road intersecting between 12th and 13th street, Jamestown	E	J.town 47-2
14	281	Intersection with 4th Ave. SW, Jamestown	N	J.town 47-2
15	9	Intersection with Hwy 20, Courtenay	W	Courtenay 47-2
16	9	@Kensal city limits	S	47-1
17	281	@ Buffalo Mall entrance (25th St. SW), Jamestown	N&S	J.town 47-2
18	I-94	5 mi. east of Jamestown, Bloom exit 262	W	47-2
19	I-94	East Jamestown exit	W	J.town 47-2
20	281	Intersection immediately south of Buffalo Mall, Jamestown	N	J.town 47-2

WARD COUNTY

Site #	Hwy	Description	Direction	Map
1	52	Intersection with Hwy 50	N&S	51-1
2	50	Intersection with Hwy 52	W	51-1
3	52	Northwest limits of Donnybrook	N&S	D.Brook 51-1
4	28	Northern limits of Carpio	N&S	Carpio 51-2
5	52	Intersection Co.Rd. 11 and Co. Rd. 8 at Foxholm, 128 ave. NW	N&S	51-2
6	2	1 mi. east of Berthold	E&W	51-2
7	52	Intersection with Hwy 2	N&S	51-2
8	2	At Burlington exit	E&W	51-2
9	2	Intersection with Hwy 83 Bypass at Minot	E	Minot 51-2
10	52 bus loop	Intersection with Hwy 2, Minot	N&E	Minot 51-2
11	83	4 mi. north of Ruthville	S	51-2
12	83	Intersection with Co.Rd. 8 at Ruthville	N	51-2
13	83	Intersection with 20th Ave. SE, Minot	N	Minot 51-2
14	83	Intersection with Hwy 2	S	Minot 51-2
15	83	Intersection with Hwy 23	N	51-3
16	83	Intersection with Co.Rd. 24 to Douglas, 345th Ave. SW	S	51-3
17	23	Intersection with Hwy 28 to Ryder	W	51-3
18	52 Bus loop	Intersection with 8th Ave. SE, Minot	E	Minot 51-2
19	52 Bus loop	Intersection with Hiawatha, Minot	W	Minot 51-2
20	2	Intersection with 6th St. SE, Minot	W	Miniot 51-2

WELLS COUNTY

Site #	Hwy	Description	Direction	Map
1	3	1 mi. north of North St. in Harvey	S	Harvey 52-1
2	3	Intersection with Hwy 91 at Harvey	S	Harvey 52-1
3	52 Bus Loop	Intersection with Hwy 3 at Harvey	E&W	Harvey 52-1
4	52	Intersection with Hwy 52 Bus Loop south of Harvey	E&W	52-1
5	30	3 mi. north of Hamburg	N&S	52-1
6	30	Intersection with Railroad Ave., Hamburg	N&S	Hamburg 52-1
7	52	@ Manfred	E&W	52-1
8	15	Intersection with Hwy 30, 5 mi. east of Fessenden	W	52-1
9	15	½ mi. east of Fessenden	E	52-1
10	15	Intersection with Vine Ave., Fessenden	E	Fessenden 52-1
11	15	Intersection with Hwy 52 at Fessenden	W	Fessenden 52-1
12	52	1 mi. south of Fessenden	N	52-1
13	52	3 mi. south of Fessenden	S	52-1
14	200	Intersection with Hwy 3, 1 ½ mi. west of Hurdsfield	E	52-2
15	3	½ mi. north of Hurdsfield	N&S	52-2
16	3	Northern city limits of Hurdsfield	N&S	Hurdsfield 52-2
17	200	Intersection with Bowdon exit	E&W	52-2
18	52	Intersection with Hwy 200	S/E	52-2
19	52	Intersection at Sykeston exit	E&W	52-2

WILLIAMS COUNTY

Site #	Hwy	Description	Direction	Map
1	50	Intersection with Main St., Grenora	E&W	Grenora 53-2
2	50	1 mi. west of Zahl, at junction with Co.Rd. 3A	E&W	53-2
3	50	Intersection with Hwy 42, 6 ½ mi. east of Alamo	W	53-2
4	50	3 ½ mi. south of Wildrose	E	53-2
5	40	Intersection with Hwy 2, 10 mi. east of Ray	N&S	53-1
6	2	6 mi. east of Ray, OR 4 mi. west of Site 5	E&W	53-1
7	2	Intersection with Co.Rd. 41 at Ray	W	Ray 53-1
8	2	Intersection with Co.Rd. 33, 4 mi. north of Epping	E&W	53-1
9	2	Intersection with Hwy 85, north of Williston	S	53-3
10	2/85	At Hi-Land Heights, north of Williston	S	53-3
11	2 Bus Loop	Intersection with 22nd St. W, Williston	N	Williston 53-3
12	1804	Intersection with Main St., Williston	W	Williston 53-3
13	1804	Intersection with 9th Ave. E, Williston	E	Williston 53-3
14	1804	Intersection with East Dakota Parkway, Williston	W	Williston 53-3
15	1804	Intersection with 20th Ave. E, Williston	E	Williston 53-3
16	1804	Intersection with 27th Ave. E, Williston	W	Williston 53-3
17	1804	Intersection with Co.Rd. 33 to Lewis & Clark State Park, east of Williston	E&W	53-1
18	1804	Intersection with Co.Rd. 51, 16 mi. east of Lewis & Clark State Park	E&W	53-1
19	2	Intersection with Hwy 85 South, west of Williston	W	53-3
20	2	Intersection with Hwy 1804, west of Williston	E	53-3

QUALITY ASSURANCE REPORT

Statewide Survey: June 2nd-6th		
# of errors	# of fields	field Acc %
0	4278	100.00%
13	1533	99.15%
14	7405	99.81%
42	13989	99.70%
2	7440	99.97%
1	1995	99.95%
0	5471	100.00%
5	3341	99.85%
0	1698	100.00%
4	2678	99.85%
6	5053	99.88%
4	6218	99.94%
13	7212	99.82%
3	6824	99.96%
2	1567	99.87%
5	3262	99.85%
114	**79964**	**99.86%**

CODE BOOK

Variable Information								
Variable	**Position**	**Label**	**Measurement Level**	**Column Width**	**Alignment**	**Print Format**	**Write Format**	**Missing Values**
YEAR	1	Year of Study	Nominal	8	Right	F11	F11	9999
COUNTY	2	County	Nominal	8	Right	F11	F11	99
INTSECTN	3	Intersection	Nominal	8	Right	F11	F11	999
POP	4	Population Density	Nominal	8	Right	F11	F11	9
ROAD	5	Roadway Type	Nominal	8	Right	F11	F11	9
DAY	6	Weekday Status	Nominal	8	Right	F11	F11	9
OBS	7	Observer	Nominal	8	Right	F11	F11	99
REGION	8	Region of State	Nominal	8	Right	F11	F11	9
SiteVMT	9	Site VMTs	Scale	8	Right	F11.1	F11.1	
CoVMT	10	County VMTs	Nominal	8	Right	F11.8	F11.8	
WC	11	County Weight	Nominal	8	Right	F11.2	F11.2	
WS	12	Site Weight	Scale	8	Right	F11.1	F11.1	
CASENO	13	Case Number	Nominal	22	Right	F11	F11	
VEHICLE	14	Vehicle Type	Nominal	8	Right	F11	F11	9
DRIVER	15	Driver Status	Nominal	8	Right	F11	F11	9
DRSEX	16	Driver Gender	Nominal	8	Right	F11	F11	9
PASSNGR	17	Passenger Status	Nominal	8	Right	F11	F11	9
PASSEX	18	Passenger Gender	Nominal	8	Right	F11	F11	9
filter_$	19	OBS = 2 (FILTER)	Scale	10	Right	F1	F1	
wcvmtc	20	COMPUTE wcvmtc = WC * CoVMT	Scale	10	Right	F8.2	F8.2	
swsvmts	21	COMPUTE swsvmts = WS * SiteVMT	Scale	10	Right	F8.2	F8.2	
cscomb	22	COMPUTE cscomb = TotWcVc * TotWsVs	Scale	10	Right	F8.2	F8.2	
finwt	23	COMPUTE finwt = cscomb	Scale	10	Right	F8.2	F8.2	
TotWcVc	24	COMPUTE TotWcVc = wcvmtc/359271152.996	Scale	10	Right	F8.2	F8.2	
TotWsVs	25	COMPUTE TotWsVs = swsvmts/45317.50	Scale	10	Right	F8.2	F8.2	
Variables in the working file								

Variable Values		
Value		**Label**
COUNTY	**1**	Barnes
	2	Bottineau
	3	Burleigh
	4	Cass
	5	Grand Forks
	6	Mercer
	7	Morton
	8	Mountrail
	9	Nelson
	10	Pembina
	11	Ramsey
	12	Stark
	13	Stutsman
	14	Ward
	15	Wells
	16	Williams
POP	**1**	Urban
	2	Rural
ROAD	**1**	State
	2	Federal
	3	Interstate
DAY	**1**	Thursday
	2	Friday
	3	Saturday
	4	Wednesday
	5	Monday
	6	Tuesday
	7	Sunday

OBS	**6**	Ida Harmon
	7	Susie Kapelovitz
	13	Ken Nelson
	16	Naomi Thorson
	19	Richard Benz
	22	Pat Zastoupil
	23	Tyler Frank
	26	Leon Rustand
	27	Dawn Gutierrez
	31	Don Kostelecky
	32	Lucy Kostelecky
	33	Luella Nantt
	35	Joan Johnson
	37	Larry Rustand
	39	Bonnie Evenson
	40	Brian Nelson

REGION	**1**	Northwest
	2	Northeast
	3	Southwest
	4	Southeast
VEHICLE	**1**	Auto
	2	Van
	3	SUV
	4	Pickup
DRIVER	**1**	Belted
	2	Not Belted
DRSEX	**1**	Male
	2	Female
PASSNGR	**1**	Belted
	2	Not Belted
PASSEX	**1**	Male
	2	Female
filter_$	**0**	Not Selected
	1	Selected

FREQUENCIES

North Dakota Statewide Survey, June 2008

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

Occupant	Status	Estimate Percent	Unweighted Count	Percent of Sample	
Occupant	Status				
Drivers	Belted	80.9%	16,129		Ratio
	Not Belted	19.1%	6,593		6.04630122
	Total	100.0%	22,722	85.8%	
Passengers	Belted	85.6%	2,860		
	Not Belted	14.4%	898		
	Total	100.0%	3,758	14.2%	
Both	Belted	81.6%	18,989		71.0%
	Not Belted	18.4%	7,491		28.3%
	Total	100.0%	26,480	100.0%	99.3%

North Dakota Statewide Survey, June 2008
Estimated Seat Belt Use (% Belted) for Drivers, Passengers, and All Vehicle Occupants

Occupant	Status	Estimate
Drivers	Belted	80.9%
	Not Belted	19.1%
	Total	100.0%
	Frequency	22,722
Passengers	Belted	85.6%
	Not Belted	14.4%
	Total	100.0%
	Frequency	3,758
All Occupants	Belted	81.6%
	Not Belted	18.4%
	Total	100.0%
	Frequency	26,480
Ratio		
Drivers : Passengers	6.05	

North Dakota Statewide Survey, June 2008
Comparison of Pre-Survey with Statewide Survey

		Pre-Survey	Statewide Survey
Occupant	Status	2008	2008
Drivers	Belted	83.9%	80.9%
	Not Belted	16.1%	19.1%
	Total	100.0%	100.0%
	Count	4,461	22,722
	% of Sample	83.4%	84.4%
Passengers	Belted	82.0%	85.6%
	Not Belted	18.0%	14.4%
	Total	100.0%	100.0%
	Count	888	3,758
	% of Sample	16.6%	14.0%
All Occupants	Belted	83.6%	81.6%
	Not Belted	16.4%	18.4%
	Total	100.0%	100.0%
	Count	5,349	26,924

North Dakota Statewide Survey, June 2008
Seat Belt Use by Region

		Region of State				
Occupant	Status	Northwest	Northeast	Southwest	Southeast	Total
Drivers	Belted	68.6%	73.0%	81.1%	82.8%	80.9%
	Not Belted	31.4%	27.0%	18.9%	17.2%	19.1%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%
	Count	4,146	4,642	6,188	7,746	22,722
Passengers	Belted	82.5%	74.8%	94.0%	86.0%	85.6%
	Not Belted	17.5%	25.2%	6.0%	14.0%	14.4%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%
	Count	747	947	696	1368	3758
All Occupants	Belted	70.7%	73.3%	82.4%	83.3%	81.6%
	Not Belted	29.3%	26.7%	17.6%	16.7%	18.4%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%
	Count	4,893	5,589	6,884	9,114	26,480

North Dakota Statewide Survey, June 2008
Seat Belt Use by County

		County																
Occupants	Status	Barnes	Bottineau	Burleigh	Cass	Grand Forks	Mercer	Morton	Mountrail	Nelson	Pembina	Ramsey	Stark	Stutsman	Ward	Wells	Williams	Total
Drivers	Belted	80.2%	65.5%	82.9%	84.6%	74.9%	75.8%	78.6%	70.5%	81.1%	51.2%	58.8%	84.3%	68.1%	69.5%	64.9%	59.8%	80.9%
	Not Belted	19.8%	34.5%	17.1%	15.4%	25.1%	24.2%	21.4%	29.5%	18.9%	48.8%	41.2%	15.7%	31.9%	30.5%	35.1%	40.2%	19.1%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Count	1,224	365	2,305	4,032	2,181	481	1,644	897	406	698	1,357	1,758	2,128	1,959	362	925	22,722
	Percent of Sample	27.4%	8.2%	51.7%	90.4%	48.9%	10.8%	36.9%	20.1%	9.1%	15.7%	30.4%	39.4%	47.7%	43.9%	8.1%	20.7%	509.5%
Passengers	Belted	83.1%	78.1%	97.7%	86.8%	77.6%	83.7%	94.6%	76.5%	92.9%	63.6%	63.2%	90.4%	72.2%	84.1%	77.3%	71.0%	85.6%
	Not Belted	16.9%	21.9%	2.3%	13.2%	22.4%	16.3%	5.4%	23.5%	7.1%	36.4%	36.8%	9.6%	27.8%	15.9%	22.7%	29.0%	14.4%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Count	151	89	115	815	318	146	93	195	107	162	360	342	285	342	117	121	3,758
	Percent of Sample	17.0%	10.0%	13.0%	91.8%	35.8%	16.4%	10.5%	22.0%	12.0%	18.2%	40.5%	38.5%	32.1%	38.5%	13.2%	13.6%	423.2%
All Occupants	Belted	80.5%	68.0%	83.6%	85.0%	75.2%	77.6%	79.5%	71.6%	83.6%	53.5%	59.7%	85.3%	68.6%	71.7%	67.9%	61.1%	81.6%
	Not Belted	19.5%	32.0%	16.4%	15.0%	24.8%	22.4%	20.5%	28.4%	16.4%	46.5%	40.3%	14.7%	31.4%	28.3%	32.1%	38.9%	18.4%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Count	1,375	454	2,420	4,847	2,499	627	1,737	1,092	513	860	1,717	2,100	2,413	2,301	479	1,046	26,480
	Percent of Sample	28.0%	9.2%	49.2%	98.5%	50.8%	12.7%	35.3%	22.2%	10.4%	17.5%	34.9%	42.7%	49.1%	46.8%	9.7%	21.3%	538.3%

North Dakota Statewide Survey, June 2008
Frequencies for Drivers, Passengers, and All Vehicle Occupants by County

County	Drivers	Passengers	All Occupants	% of Sample
Barnes	1,224	151	1,375	5.2%
Bottineau	365	89	454	1.7%
Burleigh	2,305	115	2,420	9.1%
Cass	4,032	815	4,847	18.3%
Grand Forks	2,181	318	2,499	9.4%
Mercer	481	146	627	2.4%
Morton	1,644	93	1,737	6.6%
Mountrail	897	195	1,092	4.1%
Nelson	406	107	513	1.9%
Pembina	698	162	860	3.2%
Ramsey	1,357	360	1,717	6.5%
Stark	1,758	342	2,100	7.9%
Stutsman	2,128	285	2,413	9.1%
Ward	1,959	342	2,301	8.7%
Wells	362	117	479	1.8%
Williams	925	121	1,046	4.0%
Total	22,722	3,758	26,480	100.0%

North Dakota Statewide Survey, June 2008
Percent Belted by County

	2008	2007	2007-2008 % Change
Stark	85.3%	63.7%	21.6%
Cass	85.0%	84.9%	0.1%
Burleigh	83.6%	81.5%	2.1%
Nelson	83.6%	91.2%	-7.6%
All Counties	81.6%	82.2%	-0.6%
Barnes	80.5%	91.6%	-11.1%
Morton	79.5%	81.4%	-1.9%
Mercer	77.6%	67.1%	10.5%
Grand Forks	75.2%	73.8%	1.4%
Ward	71.7%	78.6%	-6.9%
Mountrail	71.6%	57.7%	13.9%
Stutsman	68.6%	75.3%	-6.7%
Bottineau	68.0%	68.0%	0.0%
Wells	67.9%	68.3%	-0.4%
Williams	61.1%	65.6%	-4.5%
Ramsey	59.7%	61.2%	-1.5%
Pembina	53.5%	56.2%	-2.7%

North Dakota Statewide Survey, June 2008
Seat Belt Use by Population Density

Occupant		Population		
		Urban	Rural	Total
Driver	Belted	78.0%	84.6%	80.9%
	Not Belted	22.0%	15.4%	19.1%
	Total	100.0%	100.0%	100.0%
	Frequency	13,472	9,250	22,722
Passenger	Belted	81.7%	89.1%	85.6%
	Not Belted	18.3%	10.9%	14.4%
	Total	100.0%	100.0%	100.0%
	Frequency	1,875	1,883	3,758
All Occupants	Belted	78.5%	85.4%	81.6%
	Not Belted	21.5%	14.6%	18.4%
	Total	100.0%	100.0%	100.0%
	Frequency	15,347	11,133	26,480
% of Sample	Urban	58.0%		
	Rural	42.0%		
	Total	100.0%		

North Dakota Statewide Survey, June 2008
Percent Belted by Vehicle Occupant and Population Density

Population	Drivers		Unweighted Count	Passengers		Unweighted Count	All Occupants		Unweighted Count	Percent of Sample
	Belted	Not Belted		Belted	Not Belted		Belted	Not Belted		
Urban	78.0%	22.0%	13,472	81.7%	18.3%	1,875	78.5%	21.5%	15,347	58.0%
Rural	84.6%	15.4%	9,250	89.1%	10.9%	1,883	85.4%	14.6%	11,133	42.0%
All	80.9%	19.1%	22,722	85.6%	14.4%	3,758	81.6%	18.4%	26,480	100.0%

North Dakota Statewide Survey, June 2008
Seat Belt Use by Roadway

Occupant	Status	Type of Roadway			Total
		State	Federal	Interstate	
Drivers	Belted	74.9%	71.0%	85.2%	80.9%
	Not Belted	25.1%	29.0%	14.8%	19.1%
	Total	100.0%	100.0%	100.0%	100.0%
	Count	6,588	8,474	7,660	22,722
Passengers	Belted	70.7%	76.5%	89.8%	85.6%
	Not Belted	29.3%	23.5%	10.2%	14.4%
	Total	100.0%	100.0%	100.0%	100.0%
	Count	1,261	1,359	1,138	3,758
All Occupants	Belted	74.2%	71.8%	85.8%	81.6%
	Not Belted	25.8%	28.2%	14.2%	18.4%
	Total	100.0%	100.0%	100.0%	100.0%
	Count	7,849	9,833	8,798	26,480
Percent of Sample		29.6%	37.1%	33.2%	100.0%

North Dakota Statewide Survey, June 2008
Seat Belt Use by Gender

	Status	Gender		Total
Occupant		Male	Female	
Drivers	Belted	77.0%	87.7%	80.9%
	Not Belted	23.0%	12.3%	19.1%
	Total	100.0%	100.0%	100.0%
	Count	14,270	8,452	22,722
Passengers	Belted	76.4%	89.8%	85.6%
	Not Belted	23.6%	10.2%	14.4%
	Total	100.0%	100.0%	100.0%
	Total Count	1,344	2,414	3,758
All Occupants	Belted	76.9%	88.2%	81.6%
	Not Belted	23.1%	11.8%	18.4%
		100.0%	100.0%	100.0%
	Total Count	15,614	10,866	26,480
Percent of Sample	All Occupants	59.0%	41.0%	100.0%
	Drivers	62.8%	37.2%	100.0%
	Passengers	35.8%	64.2%	100.0%

North Dakota Statewide Survey, June 2008
Percent Belted by Gender and Vehicle Type

Drivers		Gender Male	Female	Percent Difference (F-M)
	Autos	78.5%	87.0%	8.5%
	Vans	90.4%	91.2%	0.8%
	SUVs	81.7%	89.2%	7.5%
	Pickups	67.8%	81.3%	13.5%
	All	77.0%	87.7%	10.7%
Passengers	Autos	78.0%	83.5%	5.5%
	Vans	91.6%	95.6%	4.0%
	SUVs	75.1%	87.7%	12.6%
	Pickups	66.7%	83.4%	16.7%
	All	76.4%	89.8%	13.4%
All Occupants	Autos	78.5%	86.3%	7.8%
	Vans	90.5%	92.3%	1.8%
	SUVs	81.1%	88.9%	7.8%
	Pickups	67.7%	82.1%	14.4%
	All	76.9%	88.2%	11.3%

All percents are weighted percents.

North Dakota Statewide Survey, June 2008
Male Seat Belt Use

		Vehicle type				
						Total
Occupant	Status	Auto	Van	SUV	Pickup	
Drivers	Belted	78.5%	90.4%	81.7%	67.8%	77.0%
	Not Belted	21.5%	9.6%	18.3%	32.2%	23.0%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%
	Count	5,467	1,326	1,919	5,558	14,270
Passengers	Belted	78.0%	91.6%	75.1%	66.7%	76.4%
	Not Belted	22.0%	8.4%	24.9%	33.3%	23.6%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%
	Count	562	126	185	471	1,344
All Occupants	Belted	78.5%	90.5%	81.1%	67.7%	76.9%
	Not Belted	21.5%	9.5%	18.9%	32.3%	23.1%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%
	Count	6,029	1,452	2,104	6,029	15,614

North Dakota Statewide Survey, June 2008
Female Seat Belt Use

		Vehicle type				Total
Occupant	Status	Auto	Van	SUV	Pickup	
Drivers	Belted	87.0%	91.2%	89.2%	81.3%	87.7%
	Not Belted	13.0%	8.8%	10.8%	18.7%	12.3%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%
	Count	4,891	1,126	1,836	599	8,452
Passengers	Belted	83.5%	95.6%	87.7%	83.4%	89.8%
	Not Belted	16.5%	4.4%	12.3%	16.6%	10.2%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%
	Count	1,208	393	423	390	2,414
All Occupants	Belted	86.3%	92.3%	88.9%	82.1%	88.2%
	Not Belted	13.7%	7.7%	11.1%	17.9%	11.8%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%
	Count	6,099	1,519	2,259	989	10,866

SURVEY INSTRUMENT

North Dakota Safety Belt Survey
DLN Consulting, Inc. - Dickinson, ND

Year	___ ___ ___ ___	Page	____ of ____
County	___ ___	Observer Name	_____
Intersection	___ ___ ___	County	_____
Population Density	___	Site #	_____
Roadway		Day / Date	
Day		Time Started	
Observer	___ ___	Time Ended	_____
Weight	___ ___ ___ ___	Observer Comments:	
VMT	___ ___ ___ ___		

Case# ___ ___ ___ ___ ___

Driver		Passenger	
(1) Auto	(2) Van	(3) SUV	(4) PU
(1) M	(2) F	(1) M	(2) F
(1) Y	(2) N	(1) Y	(2) N

Case# ___ ___ ___ ___ ___

Driver		Passenger	
(1) Auto	(2) Van	(3) SUV	(4) PU
(1) M	(2) F	(1) M	(2) F
(1) Y	(2) N	(1) Y	(2) N

Case# ___ ___ ___ ___ ___

Driver		Passenger	
(1) Auto	(2) Van	(3) SUV	(4) PU
(1) M	(2) F	(1) M	(2) F
(1) Y	(2) N	(1) Y	(2) N

Case# ___ ___ ___ ___ ___

Driver		Passenger	
(1) Auto	(2) Van	(3) SUV	(4) PU
(1) M	(2) F	(1) M	(2) F
(1) Y	(2) N	(1) Y	(2) N

Case# ___ ___ ___ ___ ___

Driver		Passenger	
(1) Auto	(2) Van	(3) SUV	(4) PU
(1) M	(2) F	(1) M	(2) F
(1) Y	(2) N	(1) Y	(2) N

Case# ___ ___ ___ ___ ___

Driver		Passenger	
(1) Auto	(2) Van	(3) SUV	(4) PU
(1) M	(2) F	(1) M	(2) F
(1) Y	(2) N	(1) Y	(2) N

Case# ___ ___ ___ ___ ___

Driver		Passenger	
(1) Auto	(2) Van	(3) SUV	(4) PU
(1) M	(2) F	(1) M	(2) F
(1) Y	(2) N	(1) Y	(2) N

Case# ___ ___ ___ ___ ___

Driver		Passenger	
(1) Auto	(2) Van	(3) SUV	(4) PU
(1) M	(2) F	(1) M	(2) F
(1) Y	(2) N	(1) Y	(2) N