MINNESOTA SEAT BELT USE SURVEY: 2019

FINAL REPORT

GREENWAY
Transportation Planning

Minnesota Seat Belt Use Survey: 2019 Final Report

J1073 | August 2019

Submitted to:

Office of Traffic Safety
445 Minnesota Street, Suite 150
St. Paul, MN 55101-5150

By:

Greenway Transportation Planning
VHB, Inc.
Lawrence Cook, Ph.D.

Greenway Transportation Planning
1338 Keston St, Saint Paul, MN 55108
Tel +1 651 788 7801
www.greenway-consulting.com

Contents

1. Introduction

The study reported here is the 2019 implementation of the National Highway Traffic Safety Administration's (NHTSA) Uniform Criteria for State Observational Surveys of Seat Belt Use (reported in Title 23: Highways, Part 1340 of the Code of Federal Regulations). Minnesota's survey design was accepted by NHTSA on March 30, 2012. New sites were selected and approved by NHTSA on February 21, 2017. There were no changes in methodology and the same sites were used for the 2019 survey.

The focus of the report is to present data analyses of seat belt use by front seat occupants (driver and outermost passengers), both overall and within categories defined by:

- Vehicle type
- Age
- Gender
- Seating Position
- Time of Day
- Day of Week

The report includes data analyses reporting cell phone use by drivers.

2. Methods

2.1. Sample Design

The research design conforms to the requirements of the Uniform Criteria. As planned, the sample data collection sites were updated in 2017 (after five years). The selected approach includes a stratified systematic probability proportional to size (PPS) sample of observation sites described below.

Using 2014 Road Segment data provided by MnDOT, a listing of county road segments was developed. Each segment was identified by road functional classification (Interstate/Primary, Arterial/Secondary, and Local), by Average Annual Daily Traffic (AADT) and segment length. This descriptive information allowed for stratification of road segments.

A systematic probability proportional to size (PPS) sample was adopted to select the road segments to be used as observation sites.

The research design conformed to the requirements of the Uniform Criteria. The selected approach includes a stratified systematic PPS sample of observation sites described below.

1. Minnesota's counties were listed in descending order based on the average number of motor vehicle crash-related fatalities for the period of 2010 to 2014. Fatality Analysis Reporting System (FARS) data were used to determine the average number of crash-related fatalities per county. The 54 counties accounting for about 85 percent of Minnesota's total passenger vehicle occupant fatalities compose the sampling frame.
2. Using 2014 Road Segment data provided by MnDOT, a listing of county road segments was developed. Each segment was identified by road functional classification (Interstate/Primary, Arterial/Secondary, and Local), by Average Annual Daily Traffic (AADT) and segment length. This descriptive information allowed for stratification of road segments.
3. Counties were stratified based on calculated 2014 vehicle-miles-traveled (VMT) for each county. As in previous years, three levels (high, medium, and low VMT) were used, except in Hennepin County, which was treated as its own stratum. High, medium, or low traffic volume designations were determined by calculating the total VMT for the remaining 53 counties, then sorting the remaining counties highest VMT to lowest. Cut points were then determined, which created three strata with roughly equal VMT based on an analysis looking for cut points in the data for county VMT (after excluding Hennepin County from the analysis).
4. Road segments were selected randomly and with PPS from all segments in the sampling frame. The road segments were stratified by functional classification (Interstate/Primary, Arterial/Secondary, and Local). This process resulted in the selection of 240 road segments (4 strata x 60 sites per stratum).
5. Additional stages of random selection were used to determine each site's observation time of day, day of week and direction of direction.

2.2. County Selection

The 54 counties accounting for 85.5 percent of the total fatalities represented the first stage of sampling. These counties were stratified into four groups according to their VMT. The strata, counties, their daily vehicle-miles-traveled (DVMT), and stratum total DVMT are shown in Table 1. County and Regional Vehicle Miles Traveled, by Stratum, for County Selection.

Table 1- County and Regional Vehicle Miles Traveled, by Stratum, for County Selection

Strata	County	County DVMT
Hennepin County	Hennepin	**30,787,748**
High VMT	Ramsey	12,296,484
High VMT	Dakota	10,742,955
High VMT	Anoka	8,267,551
High VMT	Washington	6,435,833
Total High VMT		**37,742,823**
Med VMT	St. Louis	5,835,807
Med VMT	Stearns	5,097,136
Med VMT	Wright	4,055,010
Med VMT	Olmsted	3,934,327
Med VMT	Scott	3,551,707
Med VMT	Sherburne	2,443,966
Med VMT	Carver	2,372,672
Med VMT	Otter Tail	2,224,865
Med VMT	Crow Wing	2,180,917
Med VMT	Chisago	2,112,333
Med VMT	Clay	2,051,186
Med VMT	Rice	1,960,352
Total Med VMT		**37,820,280**
Low VMT	Goodhue	1,814,534
Low VMT	Blue Earth	1,679,659
Low VMT	Winona	1,649,152
Low VMT	Douglas	1,621,568
Low VMT	Freeborn	1,534,487
Low VMT	Pine	1,501,447
Low VMT	Steele	1,449,781
Low VMT	Itasca	1,358,057
Low VMT	Carlton	1,339,551
Low VMT	Morrison	1,334,017
Low VMT	Kandiyohi	1,329,340
Low VMT	Benton	1,288,209

Strata	County	County DVMT
Low VMT	Cass	1,202,142
Low VMT	Beltrami	1,160,402
Low VMT	Mower	1,147,076
Low VMT	Polk	1,121,882
Low VMT	Becker	1,105,329
Low VMT	Mille Lacs	1,099,469
Low VMT	Nicollet	1,058,637
Low VMT	Isanti	1,031,488
Low VMT	McLeod	961,778
Low VMT	Nobles	865,717
Low VMT	Martin	853,837
Low VMT	Lyon	779,986
Low VMT	Hubbard	736,804
Low VMT	Jackson	713,046
Low VMT	Aitkin	702,209
Low VMT	Meeker	701,375
Low VMT	Brown	642,880
Low VMT	Redwood	610,693
Low VMT	Dodge	600,372
Low VMT	Wabasha	575,900
Low VMT	Rock	496,260
Low VMT	Lake	470,325
Low VMT	Wilkin	456,407
Low VMT	Chippewa	442,002
Low VMT	Norman	271,629
Total Low VMT		**37,707,445**

2.3. Road Segment Selection

Using all 54 counties in the sampling frame, a total of 60 road segments were selected with PPS from within each stratum. The 2014 MnDOT roadway inventory and traffic volume data was used for the selection of road segments. The available dataset exclusion option was exercised for non-public roads, unnamed roads, unpaved roads, vehicular trails, access ramps, cul-de-sacs, traffic circles, and service drives.

Road segments within each county were first stratified by functional classification (Interstate/Primary, Arterial/Secondary, and Local). Within each VMT and functional class stratum road segments were selected with PPS with the measure of size (MOS) being DVMT.

The resulting composition of the sample of each functional class within each stratum is shown in Tables 2, 3, 4 and 5.

Table 2. Road Segments Population (N), DVMT, and Number of Segments Selected (n) by Road Functional Strata: Hennepin County Stratum

Data	Interstate/ Primary	Arterial/ Secondary	Local	Total
N	185	2,229	15,465	17,879
DVMT	15,958,013	11,270,770	3,559,710	30,788,493
n	31	22	7	60

Table 3. Road Segments Population (N), DVMT, and Number of Segments Selected (n) by Road Functional Strata: High VMT Stratum

Data	Interstate/ Primary	Arterial/ Secondary	Local	Total
N	171	3,564	24,348	28,083
DVMT	14,262,521	18,815,397	4,665,856	37,743,774
n	23	30	7	60

Table 4. Road Segments Population (N), DVMT, and Number of Segments Selected (n) by Road Functional Strata: Medium VMT Stratum

Data	Interstate/ Primary	Arterial/ Secondary	Local	Total
N	91	5,290	29,611	34,992
DVMT	7,709,757	25,552,916	4,579,590	37,842,263
n	12	41	7	60

Table 5. Road Segments Population (N), DVMT, and Number of Segments Selected (n) by Road Functional Strata: Low VMT Stratum

Data	Interstate/ Primary	Arterial/ Secondary	Local	Total
N	112	8,172	13,640	21,924
DVMT	5,999,139	26,987,744	4,793,023	37,779,906
n	10	43	8	60

2.4. Reserve Sample

The reserve road segment sample consisted of two additional road segments per original road segment selected, resulting in a reserve sample of 480 road segments. These reserve segments were identified and selected based on similarity to the primary selected sample segments they would have to replace. Similarity was verified based on functional classification and DVMT. Thus, reserve road segments were selected with PPS using DVMT as MOS by the same approach as described earlier. For the purposes of data weighting, the reserve road segment inherits all probabilities of selection and weighting components up to and including the road segment stage of selection from the original road segment actually selected. Probabilities and weights for any subsequent stages of selection (e.g., the sampling of vehicles) will be determined by the reserve road segment itself. Appendix A presents the surveyed road segments.

3. Data Collection

3.1. Site Selection

Road segments were mapped according to their latitude and longitude. The selected road segments were examined using both Google and Esri mapping tools to identify an intersection or interchange that occurs within the segment. If no intersection or interchange occurred within the segment, then any suitable point within that segment was used for observation. Observation sites were selected to identify a safe and convenient location for the observer to be stationed during the survey period. Observation site selection also included cross-checking survey dates against scheduled construction activities via MnDOT's 511 Traveler Information Service and inspection of state highway GIS base maps for posted speed limits and supporting traffic control installations. Sites including an intersection or interchange were assigned to locations in the segment at or as near as possible to any controlled intersections. For interstate highways and other primary roads with interchanges, observation sites were selected to be on a ramp carrying traffic that is exiting the highway. The observed direction of travel was randomly assigned for each road segment.

For high-volume roadways (those in which an observer could not reasonably be assured of surveying all lanes of travel in the desired direction), observations were taken from the curbside or next-to-curbside lanes. This was because it was impractical (especially in free-flowing traffic at speeds over 40 mph) to observe vehicles more than two lanes distant from the observer's position. The locations of the observation sites were described on Site Assignment Screens provided to aid the observers and Quality Control (QC) Monitor in traveling to the assigned locations.

3.2. Staff Selection and Training

Three experienced observers from prior Minnesota seat belt use surveys returned for 2019 and one new observer was hired and trained. One staff member was designated as the QC Monitor responsible for monitoring observations conducted at 5 percent of all sites.

Two days of training were scheduled, Monday and Tuesday June 3-4, 2019. All observers trained for a half day at the Office of Traffic Safety, and a half day in the field on June 3, 2019. All team members reached criterion performance by the end of the first day's observations at three sites. To allow for additional practice, the new

observer trained for an additional site on the second training day (June 4, 2019) alongside the field supervisor. The first day training syllabus is listed below.

Training Syllabus (Monday, June 3, 2019)

Welcome

Review and sign observer contracts

Distribute training materials

Survey overview

Data collection techniques

a. Definitions of seat belt, booster seat use, passenger vehicles and cell phone use
b. Observation protocol
c. Weekday/weekend/rush hour/non-rush hour
d. Weather conditions
e. Duration at each site

Scheduling and rescheduling

a. Site Assignment Sheet
b. Daylight
c. Temporary impediments such as weather
d. Permanent impediments at observation sites

Site locations

a. Locating assigned sites
b. Interstate ramps and surface streets
c. Direction of travel, number of observed lanes
d. Non-intersection requirement
e. Alternate site selection

Data collection instrument

a. Explanation of features
b. Basic descriptions
c. Recording observations
d. Process for recording alternate site information
e. Supporting software applications

Data uploads

Safety and security

Timesheet and expense reports

Field practice

Field Reliability Testing

At the conclusion of the classroom portion of the training, the observers took a 12–question quiz to ensure that they understood the survey terminology, the data collection protocols and reporting requirements. All observers scored over 90 percent correct on the quiz.

Field reliability testing was conducted at the end of the first training day for all observers and on the second day for the new observer. On the first day, three sites were selected for reliability testing where about 100 vehicles were observed in order to assess agreement among the observers and the QC Monitor. Criterion performance was set at no greater than 5 percent disagreement on the count of vehicles and overall seat belt use percentage. The team met criterion performance on the second and third sites. The new observer and the QC monitor observed another 90 vehicles on the second training day and confirmed that the new observer continued to perform above the criterion. The seat belt use observation survey was scheduled for June 7–20, 2019.

3.3. Observation Periods and Quality Control

Observations were conducted daily between 7 a.m. and 6 p.m. Observation of seat belt use was conducted for 45 minutes per site, at up to six sites per day for each observer. Sites within close proximity were grouped as observation clusters and were randomly assigned a day of the week observation period. Start times were staggered to ensure that a representative number of weekday, weekend, rush hour and non-rush hour sites were included. The first site in each group and its observation time was randomly selected. The order for the observations of the remaining sites for the day was designed to reduce travel time and costs.

Maps showing the location of all observation sites and site assignment sheets were provided to the observers and QC Monitor. These indicated the observed road name, the crossroad included within the road segment (or nearest crossroad), assigned date, assigned time, direction of travel, and (if necessary) lanes assigned.

Data Collection

All passenger vehicles, including commercial vehicles weighing less than 10,000 pounds, were eligible for observation. The data collection input screens are shown in Appendix B. The start-up screen was designed to allow for documentation of descriptive site information, including: date, site location, site number, alternate site data, assigned traffic flow, number of lanes available and observed, start and end times for observations, and weather conditions. This form was completed by the observer at each site.

A five-minute pre-observation period was used to collect eligible vehicle counts for the lanes to be observed at each site. This period of counting was used to determine the sampling rate of vehicles at the site. In keeping with the guidance in the Preamble of the Uniform Criteria, observers were instructed to sample every Nth vehicle at locations, using the following guideline:

1. For 31 or more vehicles per five-minute count—observe every 5th vehicle.
2. For 16–30 vehicles per five-minute count—observe every 3rd vehicle.
3. For 0–15 vehicles per five-minute count—observe every vehicle.

This technique (as briefly described in the Uniform Criteria) allowed for detailed information to be gathered beyond the collection of seat belt use alone. This is in keeping with the survey designs in past years for Minnesota and gives the state additional useful information tied directly to the vehicle occupants for which seat belt use information was obtained. All relevant information was collected for all qualifying front seat occupants. The data collection screens were designed to record seat belt use and cell phone use by drivers and passengers. The apparent age and gender of all drivers and front seat passengers were collected as well.

For low-to-moderate volume locations, the observer surveyed as many lanes of traffic as possible while obtaining data on at least 90 percent of the vehicles included in the sample. For high-volume sites, the observer was instructed to survey the pre-selected lane of traffic. Only one direction of traffic was observed at any given site.

Observations were made of all drivers and right front seat occupants in eligible vehicles. This included children riding in booster seats. *The*

only right front seat occupants excluded from this study were child passengers who were traveling in child seats with harness straps. All entries were made on data entry screens.

Alternate Sites and Rescheduling

When a site could not be observed due to safety concerns, construction or inclement weather and no alternate site was immediately available, data collection was rescheduled for later in the data collection period at a similar time of day and day of week. In the event that the site was going to be unavailable for the duration of the study, then a preselected alternate site was taken from the reserve sample. One site (Site 33) was moved to an alternate location due to road construction. The alternate location was provided to the observer by the QC Monitor. Seven other sites were rescheduled due to car trouble. All observations were completed by June 28, 2019.

Quality Control Procedures

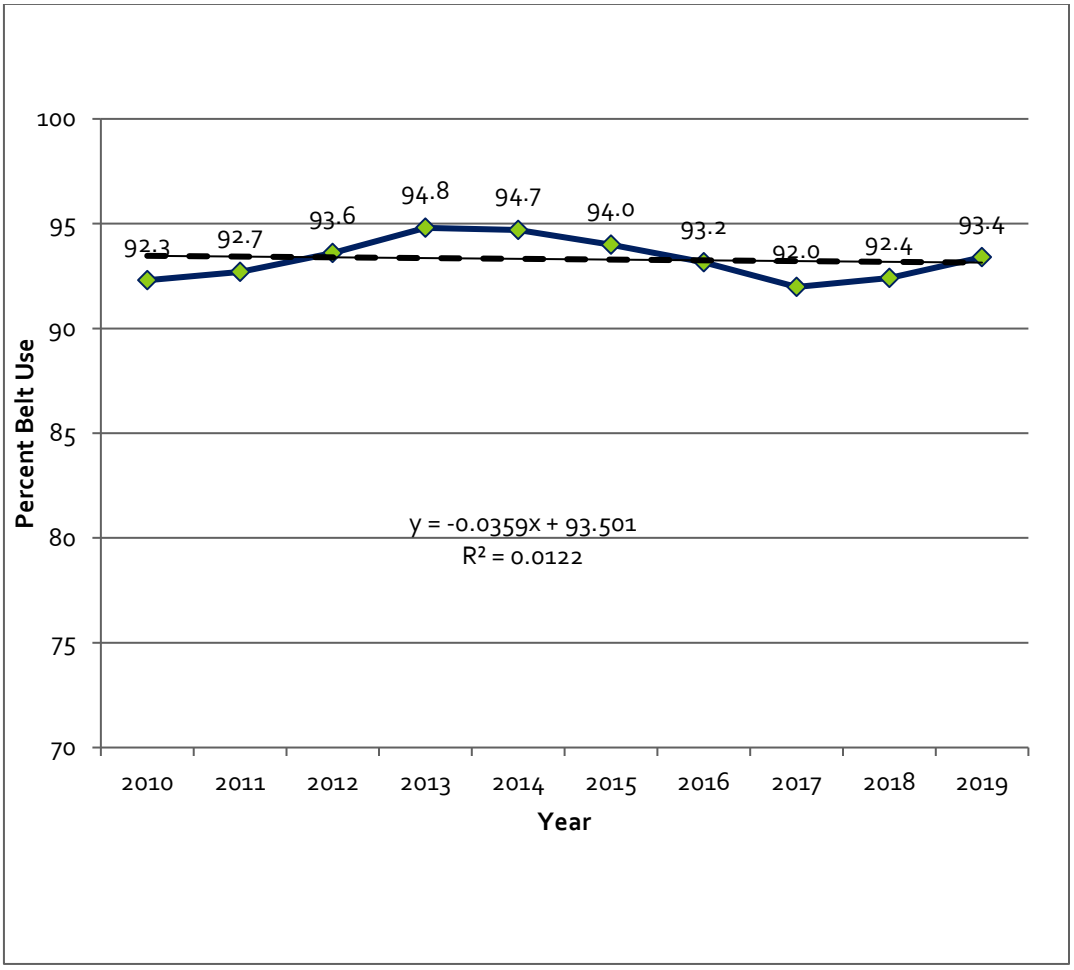
The QC Monitor made unannounced visits to 12 of the observation sites as required by the Uniform Criteria. During these visits, the QC Monitor evaluated the observer's performance from a distance (if possible) to ensure that the observer was following all survey protocol including: being on time at assigned sites, completing the data collection forms, and making accurate observations of seat belt use. The QC Monitor then worked alongside the observer to obtain comparison data of at least 30 vehicles when possible. The monitoring results are contained in a separate document provided to the Office of Traffic Safety.

4. Data Analysis

4.1. Overall Measures of Seat Belt Use

The 2019 Minnesota seat belt survey included 16,146 front seat occupant observations from 12,695 vehicles. The overall percent seat belt use was 93.4 percent (standard error = 0.55 percent; 95 percent confidence interval is 92.4 to 94.5 percent). Though slightly higher than last year, this weighted value is not statistically different from the value for 2018 (92.4 percent; 95 percent confidence interval of 91.2 to 93.7 percent). It is still one of the highest values obtained since the first seat belt observation studies were performed in Minnesota in 1986, but it does fall below the 2013-2015 values which were at or above 94 percent. Figure 1 shows the annual weighted average seat belt use and a linear trend line over the years 2010–19.

Figure 1. Seat Belt Use Percentage for 2010–19



The equation for the trend line is y= (-0.0359* YEAR) + 93.501. The downward trend is close to zero (flat) (R^2 = 0.0122). This indicates a

baseline value (pre–2010) of 93.501 percent seat belt use, and a sustained decrease of about an additional 0.036 percent seat belt use each year. In comparison to previous years; however, the trend line is flattening and changes from an annual increase to an annual decrease.

The remainder of this section provides high-level summary data in graphic format. Detailed data tables showing both weighted and unweighted data are contained in a separate document provided to the Office of Traffic Safety. In the figures that are presented here, all percentages are based on weighted data.

Figure 2 shows the weighted seat belt use rate as a function of time of day for the years 2010–19.

Figure 2. Seat Belt Use Across Hours of the Day: 20010–19

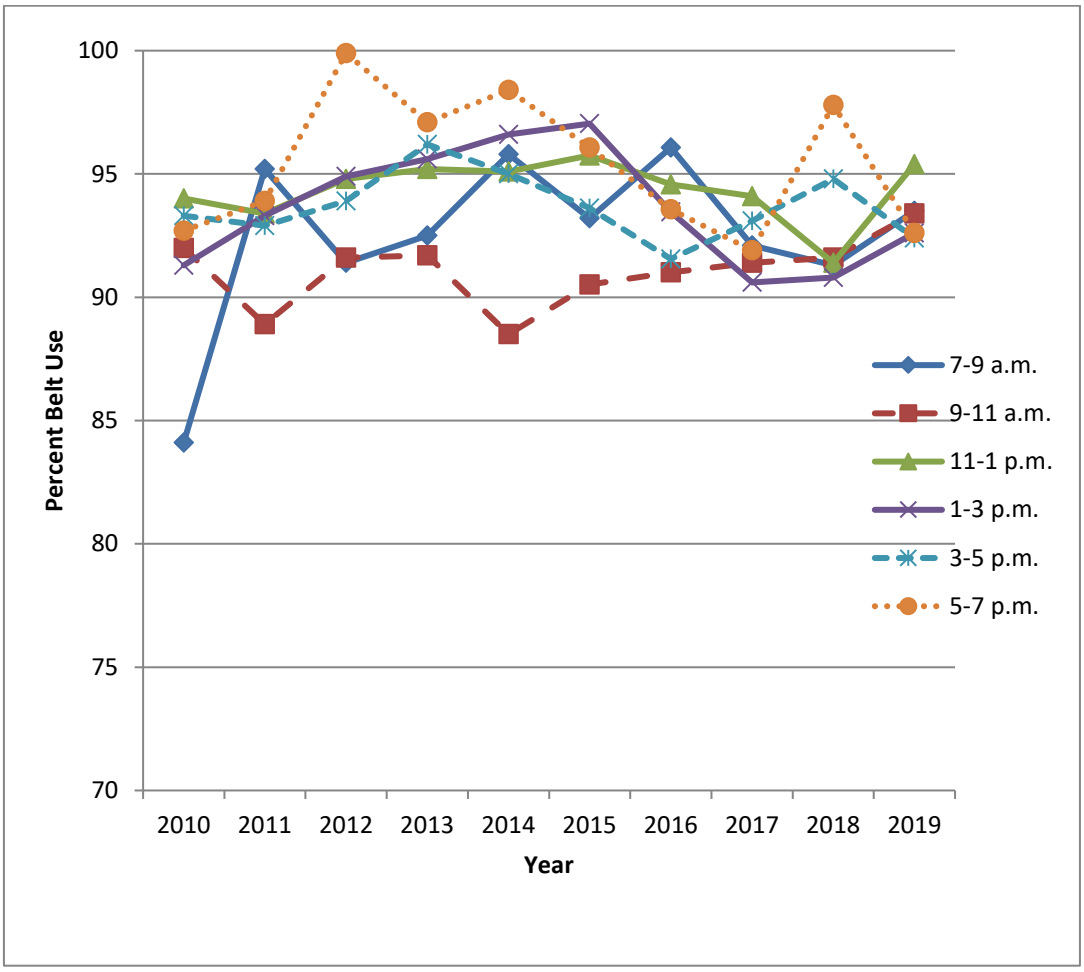
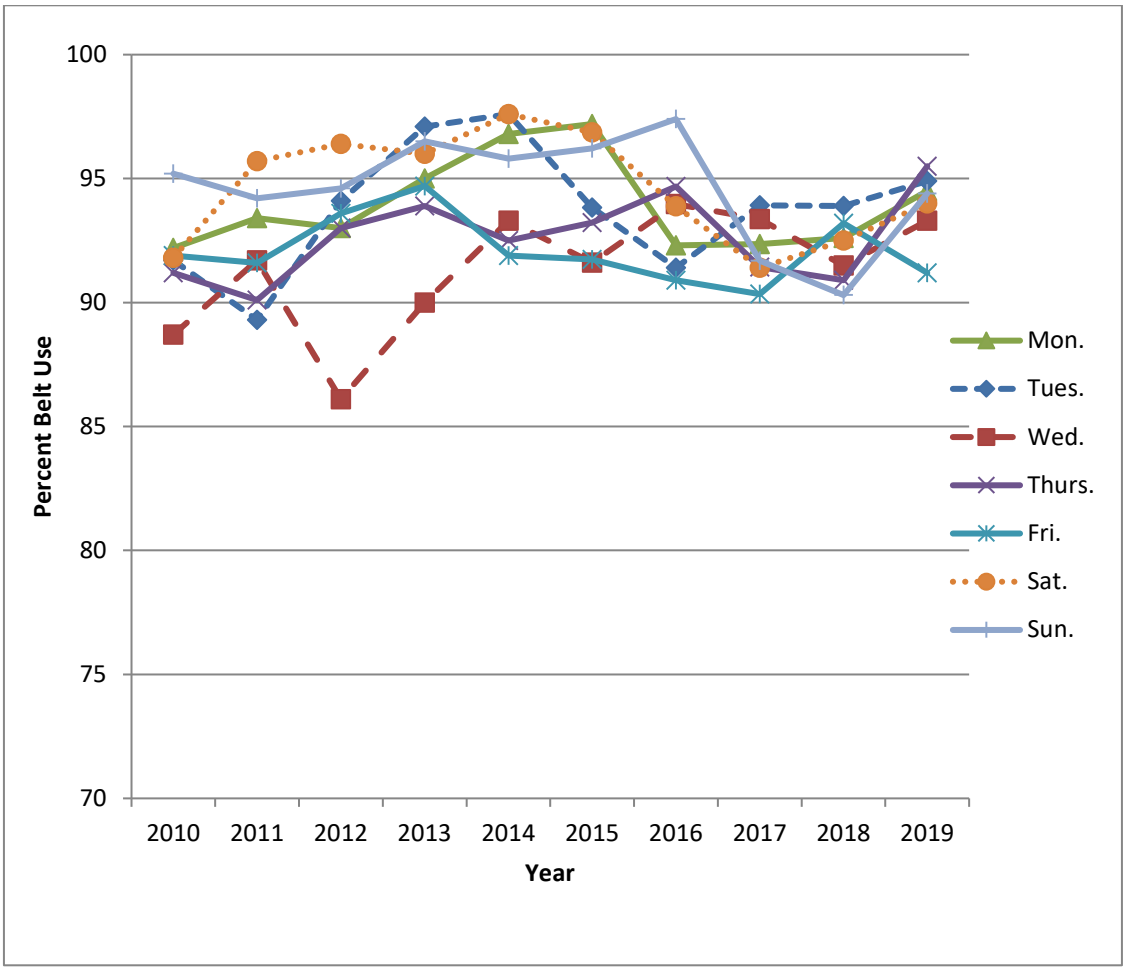


Figure 3 shows the weighted seat belt use patterns over the days of the week for the years 2010–19.

Figure 3. Seat Belt Use Across Days of the Week: 2010–19



Figures 2 and 3 both show a much smaller range of values across time periods and days of the week than seen in the preceding 9 years. There is no obvious, stable pattern across time of day or day of the week. Belt use during the 3-5 pm period was at the lower bound of the 95 percent confidence interval for the 2019 seatbelt use estimate, which was beyond the higher bound of the 95 percent confidence interval for the 2018 seatbelt use estimate. Belt use on Fridays was below the lower bound of the 95 percent confidence interval for the 2019 seatbelt use estimate. Belt use on Tuesdays was beyond the higher bound of the 95 percent confidence interval for the 2019 seatbelt use estimate. Belt use during 11-1 pm and on Thursday increased significantly in 2019, which exceeds the higher bound of the 95 percent confidence interval. All other periods and days of the week were within the interval.

Figure 4 shows the weighted seat belt use patterns as a function of occupant age for the years 2010–19.

Figure 4. Seat Belt Use Among Age Groups: 2010–19

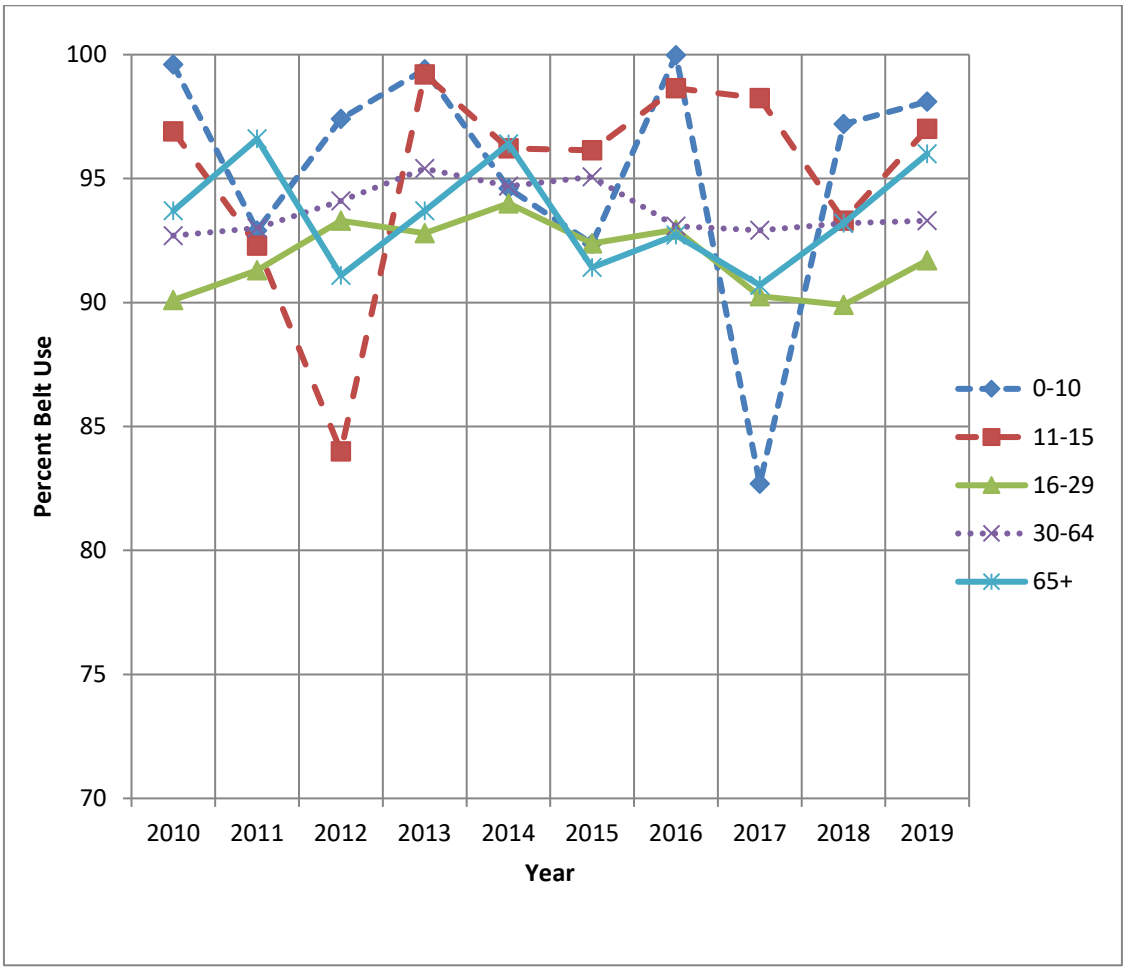
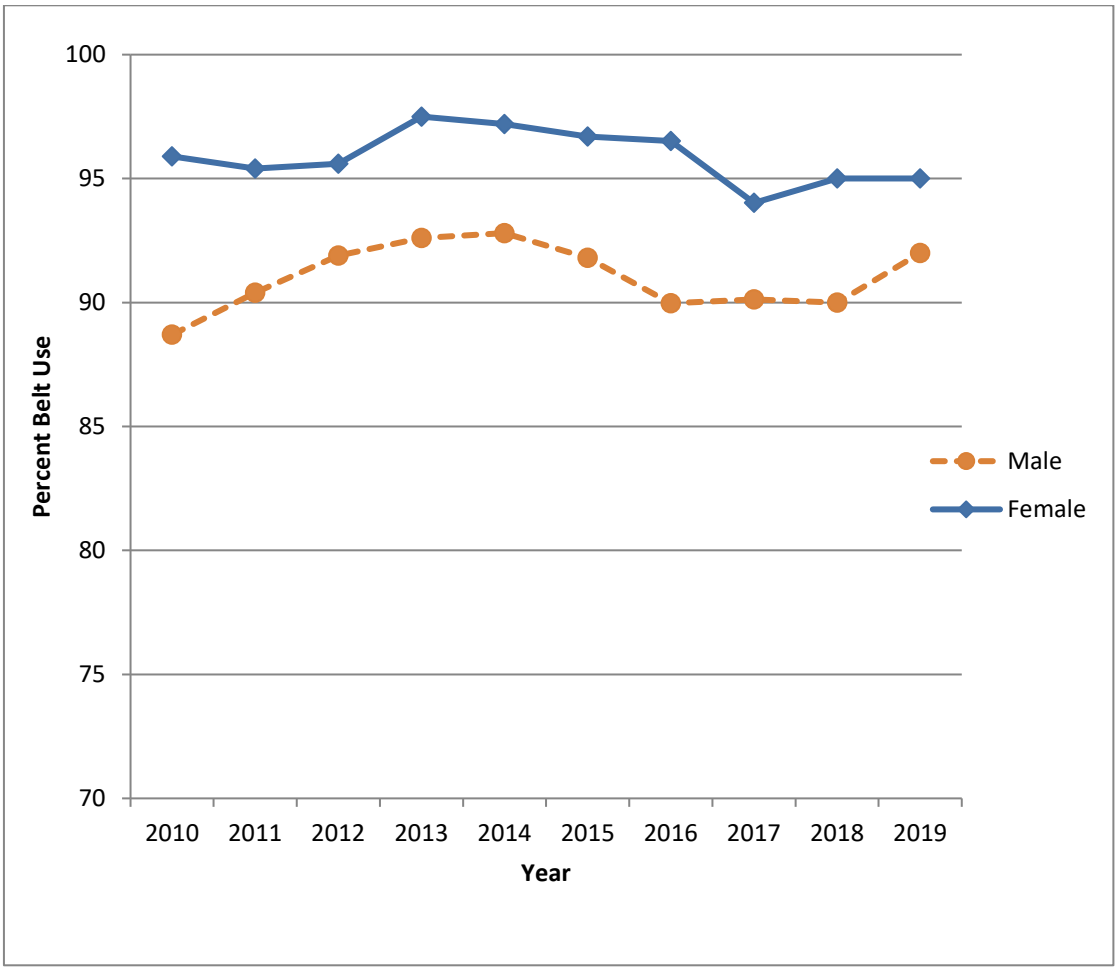


Figure 5 shows the weighted seat belt use for male and female front seat occupants for the years 2010–19.

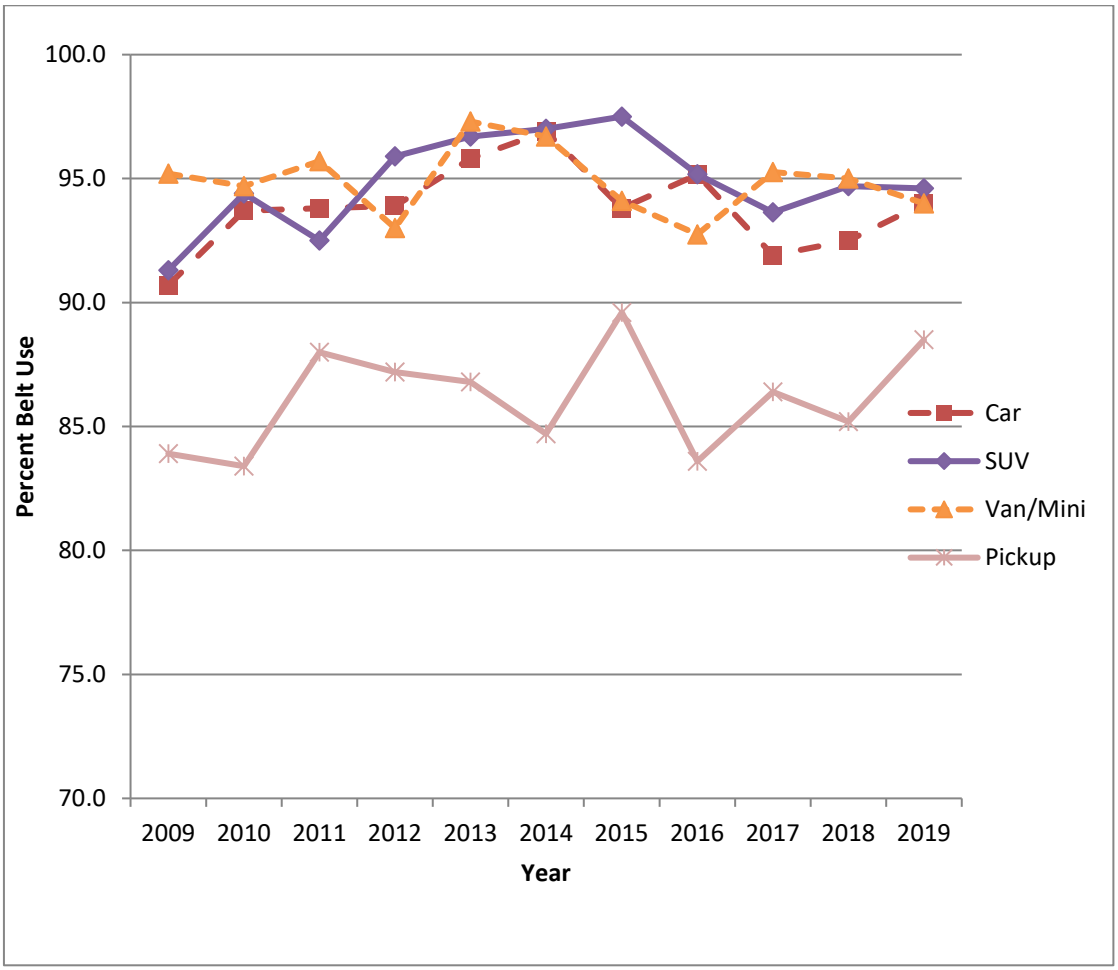
Figure 5. Seat Belt Use as a Function of Gender: 2010–19



As in prior years, female front seat occupants were more likely to wear a seatbelt than males. In 2019, male's percentage belt use increased two percent while female's percentage belt use remained the same compared to 2018. The gap between male's and female's belt use has remained relatively stable across all years between three and six percentage points.

Figure 6 shows the weighted seat belt use for front seat occupants of pickup trucks, vans/minivans, SUVs, and cars for the years 2010–19.

Figure 6. Seat Belt Use as a Function of Vehicle Type: 2010–19



As in prior years, pickup truck occupants were least likely to wear a seatbelt; the seatbelt use of pickup truck occupants increased 3.3 percent compared to 2018. In no year has seatbelt use by pickup truck occupants exceeded 90 percent.

4.2. Seat Belt Use Summary Tables

To support comparing seat belt use results between this 2019 survey and prior years, this section presents data tables that are equivalent to those produced last year.

Table 6 presents the seat belt use results for each stratum. The seat belt use values and Ns are the unweighted (actual) number of front seat occupants observed. The presentation in the body of this report of both weighted and unweighted values was determined by a close examination of the results to identify areas of analysis where the unweighted values appear to offer a more accurate representation of the information for policy makers. All of the analyses (both weighted and unweighted) appear in a separate report provided to the Office of Traffic Safety.

Table 6. Unweighted Seat Belt Use Rates and Ns as a Function of Stratum, Roadway Type

Stratum	Location/Road Type	N	Percent
Hennepin	Primary	2,456	93.5%
Hennepin	Secondary	1,433	93.3%
Hennepin	Local	121	91.7%
High VMT	Primary	1,763	94.7%
High VMT	Secondary	2,100	95.5%
High VMT	Local	74	92.5%
Med VMT	Primary	737	92.7%
Med VMT	Secondary	2,988	94.4%
Med VMT	Local	193	93.2%
Low VMT	Primary	387	92.8%
Low VMT	Secondary	2,635	93.0%
Low VMT	Local	274	94.8%
Overall	Statewide	15,161	93.9%

Table 7 presents the number of observations as a function of Site Type, Time of Day, Day of Week, Weather, Sex, Age and Position in the Vehicle. Please note that missing records were excluded from the table. Table 8 presents the resulting weighted seat belt use percentages.

Table 7. Number of Observations (N) as a Function of Subgroup, Vehicle Type

Group/ Subgroup	All Vehicles	Car	Pickup Truck	SUV	Van/ Minivan
Overall	16,146	5,729	2,626	6,231	1,536
Site Type					
Intersection	9,304	3,142	1,653	3,594	899
Mid-Block	967	332	164	378	93
Ramp	5,875	2,255	809	2,259	544
Time of Day					
7–9 a.m.	733	251	119	286	77
9–11 a.m.	3,425	1,192	557	1,302	370
11 a.m.–1 p.m.	4,181	1,399	706	1,704	368
1–3 p.m.	3,481	1,250	574	1,333	318
3–5 p.m.	3,213	1,192	540	1,173	304
5–6 p.m.	1,113	445	130	433	99
Day of Week					
Monday	2,502	911	367	941	280
Tuesday	2,027	787	307	729	202
Wednesday	2,995	1,151	411	1,182	244
Thursday	1,688	508	302	698	180
Friday	2,831	1,122	394	1,032	278
Saturday	2,172	720	382	856	211
Sunday	1,931	530	463	793	141
Weather					
Sunny	9,627	3,543	1,426	3,671	973
Cloudy	5,628	1,878	1,041	2,219	483
Rainy	891	308	159	341	80
Gender					
Male	8,642	3,020	2,030	2,703	879
Female	7,483	2,704	594	3,517	654
Age					
0-10	130	33	28	54	14
11-15	251	76	36	100	39
16-29	3,837	1,876	447	1,242	268
30-64	9,517	2,865	1,744	3,863	1,026
65+	2,384	870	365	961	188
Position					
Driver	12,695	4,649	2,027	4,827	1,176
Passenger	3,451	1,080	599	1,404	360

Table 8. Weighted Seat Belt Use Rates (%) as a Function of Subgroup, Vehicle Type

Group/ Subgroup	All Vehicles	Car	Pickup Truck	SUV	Van/ Minivan
Overall	93.4%	94.0%	88.5%	94.6%	94.0%
Site Type					
Intersection	93.1%	93.8%	87.9%	94.4%	93.3%
Mid-Block	95.9%	96.0%	91.5%	97.1%	96.1%
Ramp	92.0%	92.4%	90.4%	90.6%	97.6%
Time of Day					
7–9 a.m.	93.5%	93.3%	89.5%	93.9%	97.6%
9–11 a.m.	93.3%	92.2%	90.2%	96.1%	90.9%
11 a.m.–1 p.m.	95.4%	94.5%	91.1%	96.6%	97.2%
1–3 p.m.	92.6%	94.9%	89.6%	90.9%	95.2%
3–5 p.m.	92.4%	92.6%	87.0%	93.6%	93.4%
5–7 p.m.	92.6%	97.6%	76.0%	95.1%	90.7%
Day of Week					
Monday	94.5%	94.9%	91.0%	95.4%	95.4%
Tuesday	94.9%	94.0%	83.5%	98.7%	94.8%
Wednesday	93.3%	92.9%	88.1%	95.2%	97.9%
Thursday	95.5%	96.4%	89.6%	97.1%	91.8%
Friday	91.1%	94.4%	83.5%	88.9%	92.3%
Saturday	94.0%	94.7%	88.6%	96.3%	91.2%
Sunday	94.4%	89.5%	94.9%	96.5%	99.0%
Weather					
Sunny	93.0%	93.8%	86.4%	94.7%	92.6%
Cloudy	93.9%	94.3%	92.1%	93.8%	95.7%
Rainy	95.3%	94.3%	86.4%	97.0%	99.8%
Sex					
Male	92.0%	93.2%	87.1%	94.2%	90.5%
Female	95.0%	94.8%	93.3%	94.8%	98.2%
Age					
0-10	98.1%	99.3%	99.6%	100.0%	87.4%
11-15	97.0%	93.6%	90.8%	99.3%	100.0%
16-29	91.7%	94.3%	81.1%	89.7%	98.3%
30-64	93.3%	93.3%	88.7%	95.4%	91.9%
65+	96.0%	95.1%	95.3%	96.7%	97.0%
Position					
Driver	93.8%	94.5%	88.6%	95.1%	92.9%
Passenger	92.3%	91.7%	88.0%	92.8%	97.8%

4.3. Driver Cell Phone Use

Table 9 shows unweighted cell phone use by drivers of passenger vehicles in 2019.

Table 9. Unweighted Cell Phone Use Rate by Vehicle Type

Vehicle Type	Value	Handheld	Hands-Free	None	Total
Car	Count	241	56	4,105	4,402
Car	%	5.5%	1.3%	92.3%	100%
Pick Up	Count	89	14	1,709	1,812
Pick Up	%	4.9%	0.8%	94.3%	100%
SUV	Count	234	58	4,296	4,588
SUV	%	5.1%	1.3%	93.6%	100%
Van/Minivan	Count	68	24	1,018	1,110
Van/Minivan	%	6.1%	2.2%	91.7%	100%
Missing	Count	0	1	14	15
Missing	%	0.00%	6.7%	93.3%	100%
All vehicles	Count	632	153	11,142	11,927
All vehicles	%	5.3%	1.3%	93.2%	100%

The majority of drivers were not using a cell phone. Roughly one in 18 (5.5 percent) drivers were observed to be using a handheld cell phone. One in 80 were judged to be using a hands-free cell phone. This is, naturally, a difficult judgment for the observers to make and is particularly difficult when there are passengers in the vehicle (i.e., one cannot tell if the conversation is between vehicle occupants only or if an occupant is using a hands-free cell phone).

Table 10 shows unweighted counts of and percentages of seat belt and phone use among drivers.

Table 10. Driver Unweighted Cell Phone Use by Seat Belt Use

Phone Use	Value	Belted	Unbelted	Total	% Phone Use
Handheld	Count	632	68	700	5.5%
Handheld	%	90.3%	9.7%	100%	
Hands-Free	Count	153	7	160	1.3%
Hands-Free	%	95.6%	4.4%	100%	
None	Count	11,142	693	11,835	93.2%
None	%	94.1%	5.9%	100%	
Overall	Count	11,927	768	12,695	100%
Overall	%	94.0%	6.1%	100%	

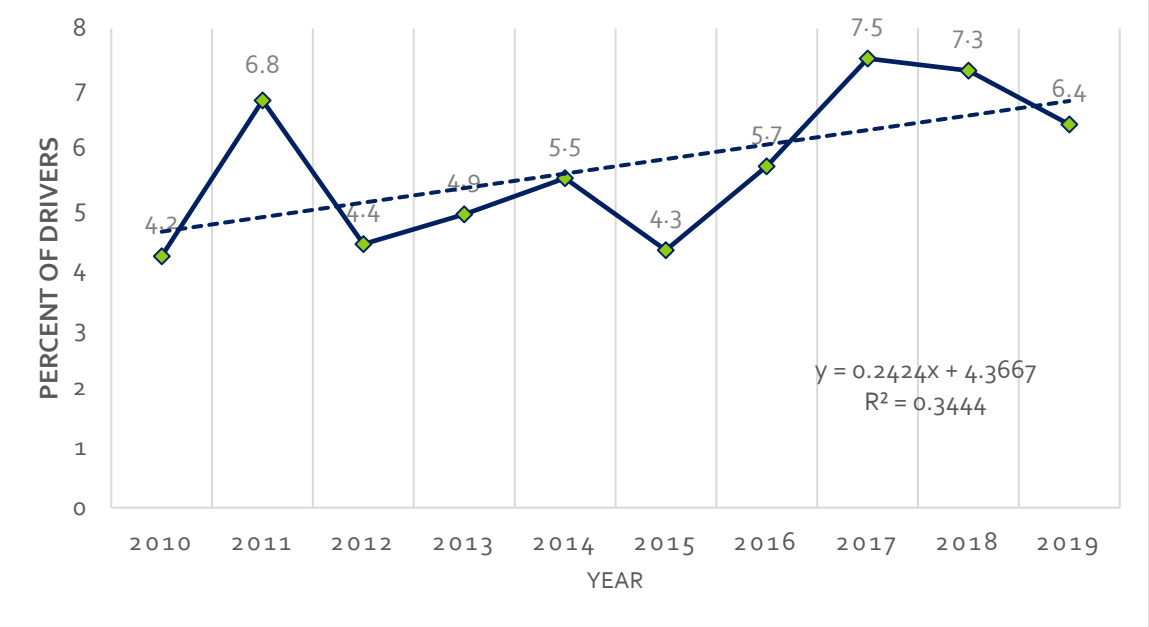
As with 2018, in 2019, drivers using a handheld cell phone were less likely to be belted than drivers who were not using a cell phone, or were using a cell phone in hands-free mode.

Figure 7 shows the trend across years 2010–19 in driver's use of handheld cell phones from the annual June seat belt observation surveys using weighted data. At 6.4 percent the 2019 drivers' percentage of handheld cell phone use is 0.9 percent lower than the cell phone use recorded in 2018 but is one of the highest in prior years. Across years, there is a noticeable upward trend, as shown in the linear trend line displayed in the figure. The equation for this trend line is:

Cell phone use percentage = 0.2424(YEAR) + 4.3667 (R^2=0.3444)

This indicates that cell phone use is increasing on average about 0.24 percentage points per year. However, the strength of the correlation between years and cell phone use is not high as shown by the moderate value of R^2. In addition, the increase in the trend may be accelerating since the same trend line last year predicted a 0.19 percentage point increase per year. The value of 2019 is below the value predicted by linear trend.

Figure 7. Driver's Handheld Cell Phone Use (Weighted Data): 2010–19



5. Discussion

The 2019 Minnesota Seat Belt Use Survey succeeded in continuing use of the 2012 updated methodology and in meeting the NHTSA accuracy requirements. As with any methodological change, there is the danger that results gathered with the new procedures will not be strictly comparable to those from prior years; however, this appears not to be a concern with the 2012 through 2019 data for Minnesota. The seat belt use rate estimates and overall measures of variability are in line with the data reported in recent years. In fact, it is safe to say that seat belt use rates in Minnesota have achieved the 90 percent-plus level, but that current year's results are below the previous peak years.

The 2019 study also shows results that are in keeping with the trend in usage rates among specific segments of the population. For the ninth year in a row, seat belt use among male front seat occupants was at or above 90 percent. Female front seat occupants achieved a similar level (92 percent) in 2007 and reached the highest recorded value in 2013 of 97.5 percent. Female front seat passengers' seat belt use dropped slightly in 2014 to 97.2 percent and continued to drop slightly in 2015 to 96.7 percent, in 2016 to 96.5 percent and in 2017 to 94.0 percent. In 2018, females experienced a slightly increased in belt use rate (95 percent). In 2019, female front seat occupants' seat belt use remained the same as in 2018. Both male and female front seat occupants contributed to maintaining the overall level of seat belt use rate in 2019. The gap between male and female front seat occupants' seat belt use levels decreased to 3 percentage points, from 5 percentage points in 2018. It is the smallest gap that have been observed since 2003. It is encouraging to see both male and female front seat occupants maintaining high seat belt use rates. Male seatbelt use rates increased compared to 2018, contributing to the (non-significant) increase in overall seatbelt use rate this year.

Vehicle choice continues to be related to seat belt use rates for front seat occupants. As in past years, the 2019 data show that occupants of pickup trucks are less likely to wear a seat belt than occupants of other vehicle types in the survey (cars, SUVs, and vans/minivans). Seat belt use among pickup truck occupants increased to 88.5 percent in 2019, from 85.2 percent in 2018. It is the second highest recorded value since 2003. Interestingly, pickup truck occupants are the only group that *reduced* their rate of seatbelt use in inclement weather—

this result may be an artifact of a small number of observations in the relevant cell of data. Seat belt use by occupants of vans/minivans decreased slightly in 2019 to 94.0 percent, from 95.0 percent in 2018. Seatbelt use by occupants of cars rose from 92.5 percent in 2018 to 94.0 percent in 2019. SUVs occupants achieved a 94.6 percent seat belt use rate in 2019. Small differences from year to year, and the direction of those changes, should be interpreted with caution. All of the changes noted are well within the 95 percent confidence limits for the data and could simply be an artifact of sample weighting rather than an indication of an important shift in behavior. It is clear that front seat occupants of passenger cars and pickup trucks were accounted for the (non-significant) increase in overall belt use rates for 2019.

Seat belt use varies across age groups, but the pattern is not stable from year to year—that is, there is no reliably best or worst age group for seat belt use among front seat occupants across years. In 2019, occupants aged 0-10 years old were more likely to be belted (98.1 percent seatbelt use) than any other age group. In 2017, that age group had the worst belt use rate at 82.7 percent. There are many non-behavioral reasons why the rates vary so much from year to year, including the fact that weighted summary data tend to vary dramatically when separated into multiple categories (i.e., when the N becomes smaller in each cell of the summary table).

Seat belt use also varies across hours of the day and days of the week. The pattern across years is not stable—there is no reliably high or low day of the week or hour of the day. In 2019, the 11 a.m.– 1 p.m. time interval was the highest of the day for seat belt use (95.4 percent), rising from one of the lowest rates (91.4 percent) in 2018. In 2019, Friday was the lowest of the week for seat belt use. The most likely explanation for the pattern of differences among time periods across the years is that the sampling and weighting can magnify small changes.

In summary, Minnesota's seat belt use rate has climbed steadily over the years but seems to have leveled off "above 90 percent." There are some stable patterns within the data (such as pickup truck occupants consistently showing lower seat belt use rates than occupants of other vehicle types and females' seat belt use being reliably higher than that for males). The reader is cautioned to be aware that there may be a practical upper limit to the seat belt use levels achievable within a given population. Looking at the data for 2019 in comparison to prior

years, with the female front seat occupants' seat belt use rate staying the same as last year's 95.0 percent but remaining lower than 2016's 96.5 percent and 2013's record high, it is possible that female front seat occupants are reducing their seatbelt use. It is clear that males and females both could increase seatbelt use rates as both have achieved higher rates in the past. Against the overall trend of gradual increases, therefore, there may be a point at which Minnesota's rate stabilizes. At that point, it could be expected that the annual rate will fluctuate up and down around that practical upper-limit.

It is also worth considering that the achievable maximum seat belt use rate for males may be lower than that achieved by females. If so, the pattern for male usage rates will stabilize at some value less than whatever value is achieved by females and the statewide value (a combination of usage rates for males and females). There is no reason to suspect that the rates in 2019 represent the maximum achievable for either males or females. Based on past data, the realistic upper limit may be about 95 percent. Stabilizing at about that level would require both males and females to increase belt use compared to the recent years' results.

Handheld cell phone use by drivers has shown an increase across the years from 2008 to now; the weighted value of 7.5 percent in 2017 set a record. In 2019, the handheld cell phone use rate decreased to 6.4 percent, but remains higher than most of previous years. Based on the trend analysis, Minnesota is experiencing a percentage-point increase in cell phone use about every four years (slope of the line is 0.24). The increase is accelerating as the slope was 0.19 in 2018. This correlation between years and cell phone use is not particularly strong (the R^2 is 0.34 indicating a moderate correlation). The increase over years may just reflect increased use of cell phones in general.

APPENDIX A

List of Road Segment Samples by Stratum

ID[1]	Road Type	County	Observation Site	Route Number	Beg. Ref. Point	End Ref. Point
Hennepin County Stratum						
1	Primary	Hennepin	NB I-94 & MN 101 off ramp RT	100000094	208.15	214.05
2	Primary	Hennepin	NB I-94 & Maple Grove Pway off ramp RT	100000094	214.05	216.33
3	Primary	Hennepin	SB I-94 & Bottineau Blvd off ramp	100000094	220.38	221.28
4	Primary	Hennepin	SB I-94 & Shingle Creek Pkway off ramp T/RT	100000094	223.22	224.90
5	Primary	Hennepin	SB I-94 & Dowling Ave off ramp RT	100000094	227.39	228.77
6	Primary	Hennepin	SB I-94 & W Broadway Ave off ramp RT	100000094	229.80	232.06
7	Primary	Hennepin	NB I-94 & Hennepin Ave off ramp RT	100000094	232.86	233.44
8	Primary	Hennepin	SB I-94 & Huron Blvd off ramp	100000094	235.57	236.14
9	Primary	Hennepin	EB I-394 & Plymouth Rd off ramp RT	100000394	0.00	0.73
10	Primary	Hennepin	WB I-394 & Xenia Ave off ramp RT	100000394	4.61	5.86
11	Primary	Hennepin	WB I-494 & Nicollet Ave off ramp RT	100000494	3.95	4.52
12	Primary	Hennepin	EB I-494 & Penn Ave off ramp RT	100000494	5.29	6.03
13	Primary	Hennepin	SB I-494 & MN 62 off ramp RT	100000494	13.66	16.02
14	Primary	Hennepin	NB I-494 & Carlson Pkway off ramp RT	100000494	17.62	19.77
15	Primary	Hennepin	NB I-494 & CR 6 off ramp RT	100000494	20.18	21.47
16	Primary	Hennepin	SB I-494 & MN 55 off ramp RT	100000494	22.06	23.34
17	Primary	Hennepin	SB I-494 & Rockford Rd off ramp RT	100000494	23.34	27.99
18[R]	Primary	Hennepin	SB I-35W & 46 St off ramp	0100000035W	13.90	15.22
19	Primary	Hennepin	NB I-35W & New Brighton Blvd off ramp RT	0100000035W	19.28	20.26
20	Primary	Hennepin	SB US 169 & Anderson Lake Pkway off ramp RT	200000169	118.41	120.02
21	Primary	Hennepin	NB US 169 & Betty Crocker Dr off ramp RT/LT	200000169	127.84	128.32

ID[1]	Road Type	County	Observation Site	Route Number	Beg. Ref. Point	End Ref. Point
22	Primary	Hennepin	SB US 169 & Plymouth Ave off ramp	200000169	129.13	130.18
23	Primary	Hennepin	NB US 169 & 36th Ave off ramp RT	200000169	130.18	132.10
24	Primary	Hennepin	SB US 169 & Elm Creek Blvd off ramp RT	200000169	136.63	137.23
25	Primary	Hennepin	SB US 169 & 109th Ave RT	200000169	139.39	141.07
26	Primary	Hennepin	EB MN 5 & Post Rd off ramp	300000005	61.31	62.71
27	Primary	Hennepin	EB MN 62 & 28th Ave off ramp	300000062	113.68	114.51
28	Primary	Hennepin	NB MN 100 & 70th St off ramp RT	300000100	0.39	1.38
29	Primary	Hennepin	SB MN 100 & Edina Industrial Blvd off ramp RT	300000100	1.38	2.07
30	Primary	Hennepin	NB MN 100 & Exelsior Blvd off ramp RT	300000100	3.83	6.03
31	Primary	Hennepin	SB MN 100 & France Ave N off ramp RT	300000100	12.57	14.07
32	Secondary	Hennepin	NB MN 55 & 38th St RT	300000055	194.61	195.72
33[R]	Secondary	Hennepin	NB MN 65 & S 10th St RT	300000065	0.00	0.62
34	Secondary	Hennepin	NB Eden Prairie Rd & Scenic Heights Rd RT	427000004	1.71	2.55
35	Secondary	Hennepin	NB Noble Pkway & 97th Ave N T/RT	427000012	1.21	1.63
36	Secondary	Hennepin	EB Shoreline Dr & Hidden Vale Ln	427000015	5.40	6.45
37	Secondary	Hennepin	NB France Ave S & W 90th St RT	427000017	1.16	2.19
38	Secondary	Hennepin	NB CR 19 Manitou Rd & Wood Duck Ln	427000019	1.19	2.61
39	Secondary	Hennepin	NB CR 19 & CR 10 Woodland Trl RT	427000019	17.95	19.94
40	Secondary	Hennepin	SB Normandale Blvd & W 98th St RT	427000034	1.26	3.05
41	Secondary	Hennepin	SB Normandale Blvd & W 84th St RT	427000034	3.05	3.54
42	Secondary	Hennepin	SB Nicollet Ave & E 76th St RT	427000052	2.52	3.46
43	Secondary	Hennepin	SB Baker Rd & MN62 Townline Rd RT	427000060	2.29	3.29
44	Secondary	Hennepin	SB W Broadway Ave & Brooklyn Ave RT	427000103	0.00	1.00
45	Secondary	Hennepin	WB Brooklyn Blvd & Bottineau Blvd RT	427000152	0.00	0.36

ID[1]	Road Type	County	Observation Site	Route Number	Beg. Ref. Point	End Ref. Point
46	Secondary	Hennepin	EB W 76th & Xerxes Ave	511050136	2.20	2.30
47	Secondary	Hennepin	WB W50th St & Arden Ave	511050141	0.82	1.10
48	Secondary	Hennepin	EB Weaver Lake Rd & E Fish Lake Rd RT	524300102	2.72	3.04
49	Secondary	Hennepin	SB Vicksburg Ln N & 32nd Ave RT	531050156	1.84	2.64
50	Secondary	Hennepin	EB Brookdale Dr N & Xerxes Ave N RT	504650101	0.81	1.87
51	Secondary	Hennepin	SB La Salle Ave & W Grant St	525850159	0.50	0.88
52	Secondary	Hennepin	NB Bloomington Ave S & E 28th ST	525850160	2.98	3.47
53	Secondary	Hennepin	EB Old Rockford Rd & Dunkirk Ln N	531050173	0.48	1.24
54	Local	Hennepin	SB Fernbrook Ln & Rockford Rd T/RT	531050164	2.24	2.77
55	Local	Hennepin	SB 5th Ave S & E 96th St	1003850622	0.00	0.63
56	Local	Hennepin	SB Stevens Ave S & E 90th St	1003850626	0.00	1.28
57	Local	Hennepin	WB Triton Dr & Lilac Dr N	1014950015	0.00	0.51
58	Local	Hennepin	NB N Newton Ave & N 8th Ave	1025850328	0.00	1.12
59	Local	Hennepin	EB Traffic St NE & Taft St NE	1025850455	0.00	0.52
60	Local	Hennepin	WB Seymour Dr & Birch Rd	1026100431	0.00	0.27
High VMT Stratum						
61	Primary	Dakota	NB I-35W & Kenwood Trail off ramp RT	100000035	84.50	85.61
62	Primary	Anoka	NB I-35 & MN 97 Lake Dr NE off ramp RT	100000035	127.50	129.30
63	Primary	Ramsey	WB I-94 & Lexington Ave off ramp LT	100000094	240.23	242.04
64	Primary	Ramsey	WB I-94 & Marion St off ramp LT	100000094	242.04	242.55
65	Primary	Washington	EB I-94 & Radio Dr off ramp LT	100000094	249.75	251.07
66	Primary	Dakota	EB I-494 & Maxwell Ave off ramp RT	100000494	63.41	64.21
67	Primary	Dakota	WB I-494 & Concord St S off ramp RT	100000494	64.21	64.83
68	Primary	Dakota	WB I-494 & Dodd Rd off ramp RT	100000494	66.64	67.47
69	Primary	Ramsey	WB I-694 & Silver Lake Rd NW off ramp RT	100000694	37.75	39.81

ID[1]	Road Type	County	Observation Site	Route Number	Beg. Ref. Point	End Ref. Point
70	Primary	Ramsey	WB I-694 & Lexington Ave Rd N off ramp RT	100000694	42.97	43.78
71	Primary	Ramsey	EB I-694 & White Bear Ave Rd N off ramp RT	100000694	48.68	49.46
72	Primary	Dakota	SB I-35E & Cliff Rd N off ramp RT	0100000035E	93.54	94.63
73	Primary	Ramsey	NB I-35E & Randolph Ave off ramp RT	0100000035E	104.26	105.22
74	Primary	Ramsey	NB I-35E & Co Rd E East off ramp RT	0100000035E	114.95	115.67
75	Primary	Ramsey	SB I-35E & Co Rd E East off ramp RT	0100000035E	115.67	117.28
76	Primary	Ramsey	SB I-35W & Co Rd D West off ramp RT	0100000035W	24.38	25.02
77	Primary	Anoka	SB I-35W & Co Rd I West off ramp RT	0100000035W	30.04	30.76
78	Primary	Anoka	NB I-35W & 95th Ave NE off ramp RT	0100000035W	30.76	31.84
79	Primary	Anoka	SB I-35W & 95th Ave NE off ramp RT	0100000035W	31.84	33.44
80	Primary	Anoka	SB US 10 & Armstrong Blvd NW off ramp RT	200000010	219.81	222.19
81	Primary	Dakota	SB US 52 & Mendota Rd E off ramp RT	200000052	126.22	127.83
82	Primary	Ramsey	EB MN 36 & Hamline Ave off ramp	300000036	1.24	1.67
83	Primary	Dakota	SB MN 77 & Cliff Rd off ramp RT	300000077	2.85	4.90
84	Secondary	Washington	SB US 61 & W 3rd St RT	200000061	117.16	118.86
85	Secondary	Washington	WB MN 36 & Hilton Trl off ramp	300000036	12.81	16.78
86	Secondary	Washington	EB MN 36 & N Osgood Ave N RT	300000036	18.77	19.49
87	Secondary	Washington	NB MN 36 & Nelson St E	300000036	20.63	21.53
88	Secondary	Anoka	NB MN 65 & Osborne Rd NE RT	300000065	9.53	11.54
89	Secondary	Anoka	NB MN 65 & 125th Ave NE RT	300000065	16.31	17.17
90	Secondary	Dakota	WB CR 42 & Portland Ave S RT	419000042	2.72	3.70
91	Secondary	Washington	NB US 61 & CR 97 210th St N	200000061	154.90	159.29
92	Secondary	Anoka	NB MN 47 & Alpine Dr NW RT	300000047	22.73	23.94
93	Secondary	Ramsey	SB Snelling Ave N & Lydia Ave N RT	300000051	9.08	9.59

ID[1]	Road Type	County	Observation Site	Route Number	Beg. Ref. Point	End Ref. Point
94	Secondary	Anoka	SB Central Ave & 44th Ave NE	300000065	6.88	7.50
95	Secondary	Dakota	NB Dodd Rd & Yankee Doodle Rd RT	300000149	0.86	1.95
96	Secondary	Anoka	NB Lake George Blvd & Bridge St NW	402000009	9.62	11.66
97	Secondary	Anoka	SB Coon Creek Blvd NW & Main St NW RT	402000018	2.37	3.18
98	Secondary	Anoka	EB CR 26 227th Ave NE & Typo Creek Dr NE	402000026	3.45	6.54
99	Secondary	Dakota	EB Lone Oak Rd & Neil Armstrong Blvd RT	419000026	1.77	2.02
100	Secondary	Dakota	EB Cliff Rd & Ranhcliff Rd RT	419000032	4.02	4.78
101	Secondary	Dakota	SB Diamond Path W & 140th St W	419000033	1.00	2.33
102	Secondary	Dakota	EB 212th St W & Denmark Ave RT	419000050	8.15	9.14
103	Secondary	Ramsey	EB CR E West & Victoria St N T/RT	462000015	4.13	4.82
104	Secondary	Ramsey	EB CR C East & Cypress St N	462000023	6.44	7.14
105	Secondary	Ramsey	WB Larpenteur Ave E & Jessie St	462000030	5.82	6.42
106	Secondary	Ramsey	NB Hodgson Rd & MN 96 RT	462000049	7.38	8.66
107	Secondary	Ramsey	NB McKnight Rd N & Conway Ave RT	462000068	3.45	3.76
108	Secondary	Washington	NB Stonebridge Trl N & St Croix Ave W	482000005	2.68	2.81
109	Secondary	Dakota	WB Wescott Rd & Lexington Ave S RT	510630106	1.03	1.81
110	Secondary	Washington	WB Myrtle St & Owen St N	536750104	0.00	0.44
111	Secondary	Dakota	NB MN 13 & Riverside Ln	300000013	109.38	110.18
112	Secondary	Washington	WB Frenchman Rd & Victor Hugo Blvd RT	482000008	0.00	1.41
113	Secondary	Anoka	EB Green Valley Rd & St Francis Blvd NW	702000063	0.00	1.14
114	Local	Anoka	WB Rum River Dr & Dunham Dr	1000950204	0.00	0.81
115	Local	Dakota	SB Hayes Dr & 27th Ave S	1005370005	0.00	0.41

ID[1]	Road Type	County	Observation Site	Route Number	Beg. Ref. Point	End Ref. Point
116	Local	Washington	EB Pinehurst Rd & Donegal Dr	1041730191	0.00	1.65
117	Local	Dakota	NB Isosceles Ave & Irwindale Way	1021500958	0.00	0.23
118	Local	Ramsey	NB Saratoga St S & Summit Ave	1034250334	0.00	1.37
119	Local	Ramsey	WB Dayton Ave & Hamline Ave	1034251549	0.00	0.52
120	Local	Washington	WB Oxford Rd & Sunbury Dr	1041730643	0.00	0.62
Medium VMT Stratum						
121	Primary	Rice	NB I-35 & CR 1 Millersburg Blvd off ramp RT	100000035	59.11	66.46
122	Primary	Chisago	SB I-35 & E Viking Blvd off ramp RT	100000035	135.55	139.98
123	Primary	Chisago	NB I-35 & CR 10 Stark Rd off ramp	100000035	147.93	152.44
124	Primary	St Louis	NB I-35 & N Central Ave off Ramp	100000035	251.23	252.05
125	Primary	Clay	SB I-94 & CR 10 90th Ave S off ramp	100000094	6.23	15.44
126	Primary	Wilkin	NB I-94 & MN 34 off ramp	100000094	24.54	27.00
127	Primary	Stearns	SB I-94 & CR 11 1st Ave S off ramp	100000094	131.08	140.70
128	Primary	Wright	SB I-94 & CR 8 Elder Ave NW off ramp	100000094	178.95	184.13
129	Primary	Wright	SB I-94 & MN 25 CR 8 off ramp RT	100000094	184.13	193.92
130	Primary	Wright	NB I-94 & CR 37 60th St NE off ramp RT	100000094	202.54	205.43
131	Primary	Wright	SB I-94 & MN 241 45th St NE off ramp	100000094	205.43	206.01
132	Primary	Carver	EB US 212 & Powers Blvd RT	200000212	148.92	151.83
133	Secondary	Chisago	EB US 8 Lake Blvd & Redwing Ave RT	200000008	14.29	16.56
134	Secondary	Clay	WB US10 & CR 9 RT	200000010	12.96	21.12
135	Secondary	Sherburne	SB US 10 & MN 24 RT	200000010	182.09	190.04
136	Secondary	Olmsted	SB US 52 & Union St NE	200000052	35.58	38.95
137	Secondary	Olmsted	SB US 52 & CR 12 Ash Rd NW LT	200000052	69.06	69.85
138	Secondary	St Louis	SB US 53 & Haines Rd RT	200000053	6.97	8.32

ID[1]	Road Type	County	Observation Site	Route Number	Beg. Ref. Point	End Ref. Point
139	Secondary	St Louis	SB US 53 & MN 53 (Bus) LT	200000053	68.65	70.86
140	Secondary	Olmsted	NB US 63 & 9th St SE	200000063	27.27	28.26
141	Secondary	Scott	NB US 169 & Chestnut Blvd RT	200000169	103.61	105.96
142	Secondary	Scott	WB US 169 & Canterbury Rd S RT	200000169	111.97	113.69
143	Secondary	St Louis	WB US 169 & CR 67 RT	200000169	344.29	351.20
144	Secondary	Scott	EB MN13 & Lynn Ave RT	300000013	91.97	94.04
145	Secondary	Stearns	SB MN 23 & CR 82 RT	300000023	187.45	195.62
146	Secondary	St Louis	NB MN 23 & W Gary St	300000023	335.71	338.04
147	Secondary	St Louis	NB MN 23 & N 62nd Ave	300000023	340.55	341.47
148	Secondary	Crow Wing	WB MN 210 & Chippewa St	300000210	121.72	122.46
149	Secondary	Scott	WB Egan Dr & Vernon Dr RT	470000042	7.36	8.25
150	Secondary	Olmsted	NB S Broadway & 12th St SE RT	532350201	1.62	1.98
151	Secondary	Chisago	NB US 61 & Wyoming Trail RT	200000061	162.94	164.56
152	Secondary	Rice	WB MN 19 & Baldwin St NE	300000019	163.10	168.59
153	Secondary	Wright	NB MN 24 & US 94 on ramp RT	300000024	34.17	43.50
154	Secondary	Sherburne	SB MN 25 & US 10	300000025	80.62	86.02
155	Secondary	Olmsted	EB MN 30 & US 52	300000030	229.66	236.52
156	Secondary	St Louis	SB MN 73 & 13th St NW	300000073	93.38	114.48
157	Secondary	Carver	NB MN 284 & Sparrow Rd	300000284	2.94	5.18
158	Secondary	Carver	WB CR 20 & Paul Ave	410000020	11.34	13.71
159	Secondary	Olmsted	WB Collegeview Rd & E Center St RT	455000009	0.00	0.49
160	Secondary	Otter Tail	SB CR 88 & N Tower Rd	456000088	0.00	1.67
161	Secondary	St Louis	SB Midway Rd & MN 194 RT	469000013	7.57	10.72
162	Secondary	Scott	WB 217th St E/Lucerne Blvd & Texas Ave	470000008	13.55	15.21
163	Secondary	Scott	SB Canterbury Rd S & 17th Ave E RT	470000083	1.53	3.74
164	Secondary	Stearns	WB 3rd St N & 13th Ave N	473000081	0.45	0.65

ID[1]	Road Type	County	Observation Site	Route Number	Beg. Ref. Point	End Ref. Point
165	Secondary	Wright	WB CR 39 NE & Labeaux Ave NE LT	486000039	25.00	26.52
166	Secondary	St Louis	NB W Superior St & S Lake Ave	510400171	0.52	0.69
167	Secondary	Clay	NB 34th St & US 10 RT	526450135	2.07	2.59
168	Secondary	Rice	EB Jefferson Pkway E & Raider Dr	528500117	0.96	1.32
169	Secondary	Stearns	SB 25th Ave N & 5th St N	533800132	1.64	2.15
170	Secondary	Stearns	NB 10th Ave N & 1st St N	539450103	0.92	1.31
171	Secondary	Crow Wing	SB CR 20 & McKay Rd	418000020	0.69	3.78
172	Secondary	Otter Tail	SB CR 14 & CR 1	456000014	2.71	6.50
173	Secondary	St Louis	WB MN 52 Comstock Lake Rd & US 53	469000052	15.81	18.60
174	Local	Carver	WB Hundermark Rd & Hemingway Dr	506450108	0.44	1.06
175	Local	Carver	WB 78th St & Arboretum Rd	538950104	0.00	0.35
176	Local	St Louis	EB W Gary St & CR 23	1010400049	1.09	1.25
177	Local	Olmsted	SB W Frontage Rd & 43rd St NW	532350131	0.00	1.14
178	Local	Olmsted	SB E Frontage Rd & 22nd Ave NW	532350130	0.00	0.79
179	Local	Sherburne	WB Natures Edge Rd & CR 6	1007100014	0.00	0.18
180	Local	Carver	SB Laketown Rd & CR 10	810000136	0.00	0.52
Low VMT Stratum						
181	Primary	Pine	SB I-35 & MN 48 off ramp RT	100000035	182.95	191.38
182	Primary	Pine	SB I-35 & MN 23 off ramp	100000035	191.38	195.62
183	Primary	Carlton	SB I-35 & CR 46 off ramp	100000035	209.67	214.91
184	Primary	Rock	WB I-90 & CR 6 off ramp	100000090	5.25	12.48
185	Primary	Freeborn	WB I-90 & MN 109 off ramp	100000090	146.29	154.74
186	Primary	Mower	WB I-90 & CR 46 off ramp	100000090	166.32	175.49
187	Primary	Mower	WB I-90 & CR 56 off ramp	100000090	183.56	187.49
188	Primary	Winona	EB I-90 & CR 29 off ramp	100000090	232.50	242.24
189	Primary	Winona	WB I-90 & MN 76 off ramp	100000090	257.90	266.24

ID[1]	Road Type	County	Observation Site	Route Number	Beg. Ref. Point	End Ref. Point
190	Primary	Wilkin	NB I-94 & MN 108 off ramp	100000094	32.50	38.23
191	Secondary	Becker	NB US 10 & 2nd St RT	200000010	28.63	43.36
192	Secondary	Becker	SB US 10 & US 59 RT	200000010	43.36	44.54
193	Secondary	Redwood	EB US 14 & US 71 T/RT	200000014	58.89	67.54
194	Secondary	Wabasha	NB US 61 & S Oak St	200000061	60.23	70.59
195	Secondary	Mower	SB US 63 & MN 16	200000063	18.65	23.21
196	Secondary	Kandiyohi	SB US 71 & 1st St	200000071	121.15	124.28
197	Secondary	Beltrami	NB US 71 & US 2 RT	200000071	304.05	307.03
198	Secondary	McLeod	WB MN 7 & CR 2	300000007	150.99	157.89
199	Secondary	McLeod	NB MN 22 & Doran St	300000022	107.28	114.37
200	Secondary	McLeod	SB MN 22 & Ames St	300000022	114.37	118.25
201	Secondary	Cass	NB MN 34 & MN 200 RT	300000034	93.47	102.97
202	Secondary	Winona	SB MN 43 & CR 12 RT	300000043	36.58	40.93
203	Secondary	Winona	NB MN 43 & E 8th St	300000043	43.39	43.74
204	Secondary	Lake	NB MN 61 & Ruth St	300000061	36.78	50.43
205	Secondary	Cass	NB MN 371 & Railroad St	300000371	101.20	104.23
206	Secondary	Norman	NB US 75 & Southview Dr	200000075	270.82	277.84
207	Secondary	Polk	SB US 75 & McKinley Ave	200000075	292.05	302.62
208	Secondary	Beltrami	WB MN 1 & West St	300000001	119.44	122.33
209	Secondary	Dodge	WB MN 30 & US 56	300000030	200.27	203.56
210	Secondary	Dodge	SB US 56 & MN 30 RT	300000056	46.36	54.36
211	Secondary	Isanti	WB CR 95 1st Ave E & Flanders St NE RT	300000095	42.98	49.46
212	Secondary	Douglas	SB McKay Ave S & 7th Ave E	421000046	3.45	4.95
213	Secondary	Meeker	NB CR 2 & MN 55	447000002	0.00	8.70
214	Secondary	Martin	NB Albion Ave & E Belle Vue Rd	512400110	1.16	1.80
215	Secondary	Nicollet	NB Lor Ray Dr & US 14 RT	528550117	0.41	0.63

ID[1]	Road Type	County	Observation Site	Route Number	Beg. Ref. Point	End Ref. Point
216	Secondary	Benton	SB Wilson Ave & 2nd St SE	533800106	0.27	0.51
217	Secondary	Douglas	EB MN 27 & CR 45 T/RT	0300000827A	0.00	0.22
218	Secondary	Meeker	SB MN 24 & MN 22	300000024	0.00	1.49
219	Secondary	Goodhue	SB MN 57 & County 30 Blvd	300000057	20.72	24.58
220	Secondary	Brown	SB MN 258 & CR 17 E	300000258	0.00	7.86
221	Secondary	Douglas	EB CR 82 & CR 45 T/RT	421000082	20.73	22.49
222	Secondary	Jackson	SB 490th Ave & 780th St	432000017	8.20	18.20
223	Secondary	McLeod	NB 1st St N & Fairlawn Ave E	443000116	0.54	0.92
224	Secondary	Martin	WB CR 26 & Burton Lane	446000026	25.79	30.78
225	Secondary	Martin	SB MN 263 & US I-90 RT	446000027	12.68	16.18
226	Secondary	Morrison	WB Iris Rd & US 10	449000035	0.00	4.66
227	Secondary	Mower	SB CR 8 & MN 16	450000008	13.98	16.97
228	Secondary	Steele	SB CR 45 & MN 30	474000045	5.47	7.47
229	Secondary	Morrison	SB Hilton Rd & Riverview Terrace	749000258	8.45	9.00
230	Secondary	Becker	EB CR 58/37 & CR 37 LT/T	403000058	0.00	4.06
231	Secondary	Goodhue	SB County 7 Blvd & US 52	425000007	0.00	3.67
232	Secondary	Itasca	SB CR 48 & CR 19	431000048	0.00	2.01
233	Secondary	Norman	EB CR 23 & MN 200	454000023	4.08	12.11
234	Local	Blue Earth	NB Long St & Belle Ave	524200148	0.00	0.50
235	Local	Steele	SB 24 Ave NW & W Bridge St	529800137	1.47	2.25
236	Local	Polk	WB 265th St SW & 240th Ave SW	860000855	1.82	2.67
237	Local	Freeborn	EB Lake Shore Dr/Garden Lane	1000450170	0.00	1.46
238	Local	Mower	WB 6th St NW/14th St SW	1001500059	0.00	1.15
239	Local	Winona	NB 47th Ave & 6th St	1015200010	0.00	0.30
240	Local	Nobles	WB Miller St & 14th St	1041900015	0.00	0.59

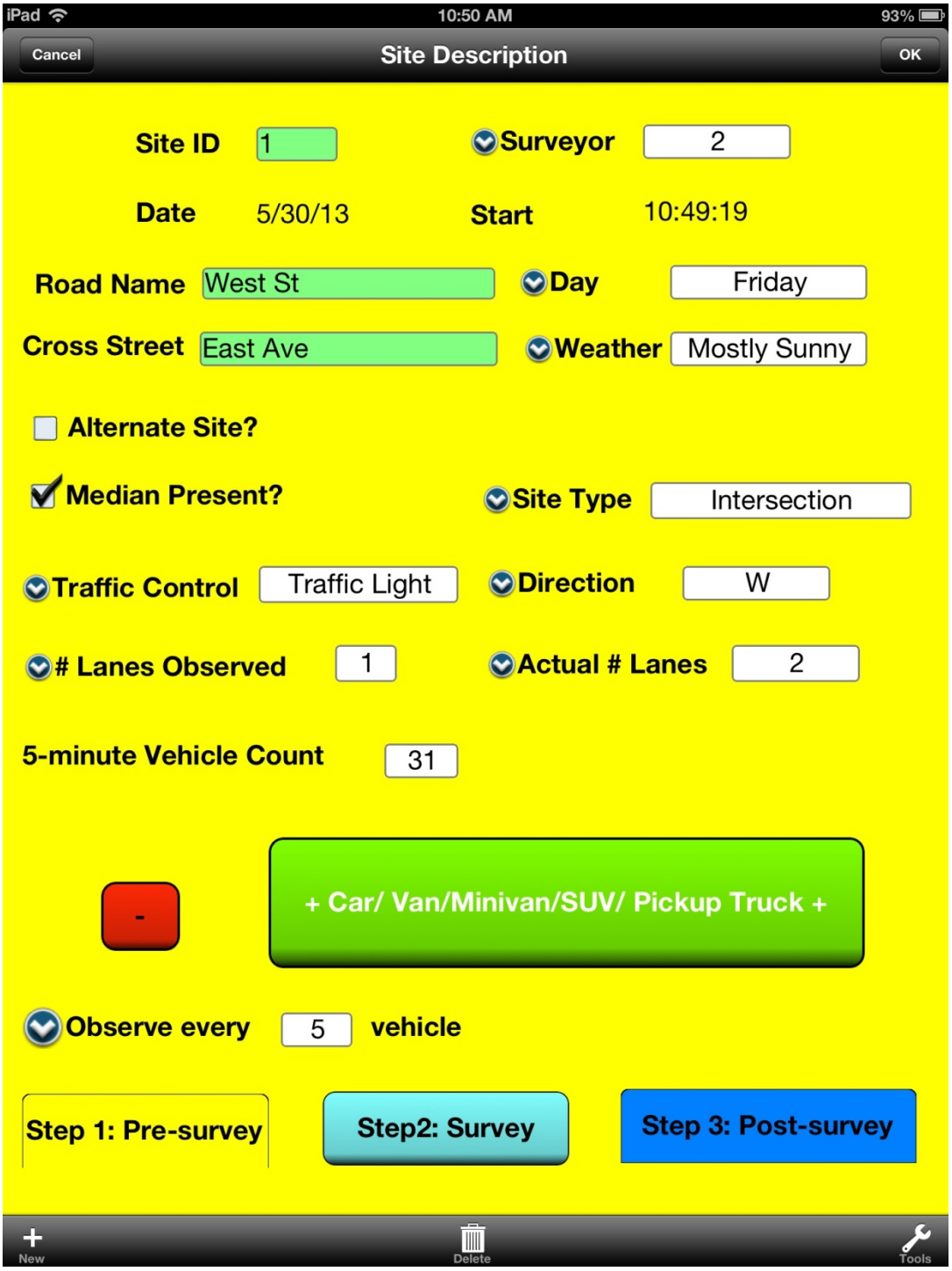
Note: [1] R indicates alternative site used,

APPENDIX B

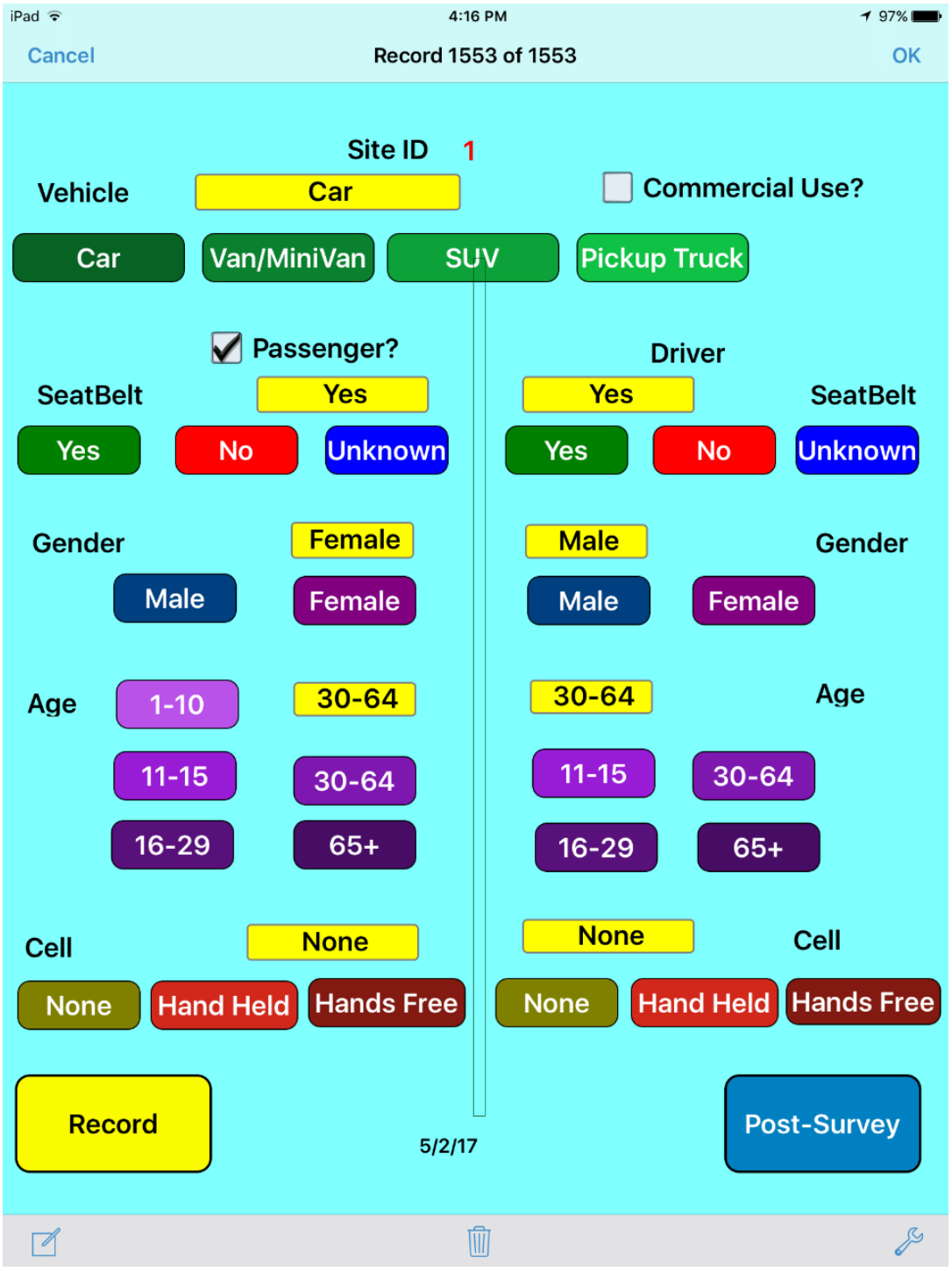
Data Collection Forms

Minnesota Seat Belt Use Observation Forms:

Site Description Form



Survey Form


iPad
4:16 PM
97%
Cancel
Record 1553 of 1553
OK
Site ID 1
Vehicle
Car
Commercial Use?
Car
Van/MiniVan
SUV
Pickup Truck
Passenger?
Driver
SeatBelt
Yes
Yes
SeatBelt
Yes
No
Unknown
Yes
No
Unknown
Gender
Female
Male
Gender
Male
Female
Male
Female
Age
1-10
30-64
30-64
Age
11-15
30-64
11-15
30-64
16-29
65+
16-29
65+
Cell
None
None
Cell
None
Hand Held
Hands Free
None
Hand Held
Hands Free
Record
5/2/17
Post-Survey

Post-Survey Form