



2019 WEST VIRGINIA OBSERVATIONAL SEAT BELT SURVEY REPORT

prepared for

West Virginia Governor's Highway Safety Program

prepared by

Cambridge Systematics, Inc.

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Table of Contents

Executive Summary.....	1
Acknowledgments	2
1.0 Methodology	3
1.1 County Selection	3
1.2 Procedures	6
2.0 Results.....	9
Appendix A. Seat Belt Observational Counties and Regions	17
Appendix B. Seat Belt Observational Survey Site List	19
Appendix C. Observational Survey Collection Form	23

List of Tables

Table 1.1	Data Collection Dates	7
Table 1.2	Data Collected from Observational Surveys	8
Table 2.1	Seat Belt Use Rate	9
Table 2.2	Statewide Seat Belt Use and Nonresponse Rate.....	9
Table 2.3	Observed Rate by County	10
Table 2.4	Weighted Seat Belt Use Rate by County 2019	11
Table 2.5	Select County Observed Seat Belt Rates 2016 - 2019	12
Table 2.6	County Observed Seat Belt Rates 2018 - 2019	13
Table 2.7	Weighted Seat Belt Use Rate for Drivers with Passenger versus Without	13
Table 2.8	Driver Belt Use Rates by Gender and County	14
Table 2.9	Passengers Belt Use Rates by Gender and County	15
Table 2.10	Seat Belt Use Rate for Drivers and Passengers by Vehicle Type and Site Characteristics	16
Table 2.11	Observed Cell Phone Use by Gender and Seat Belt Use	16

Executive Summary

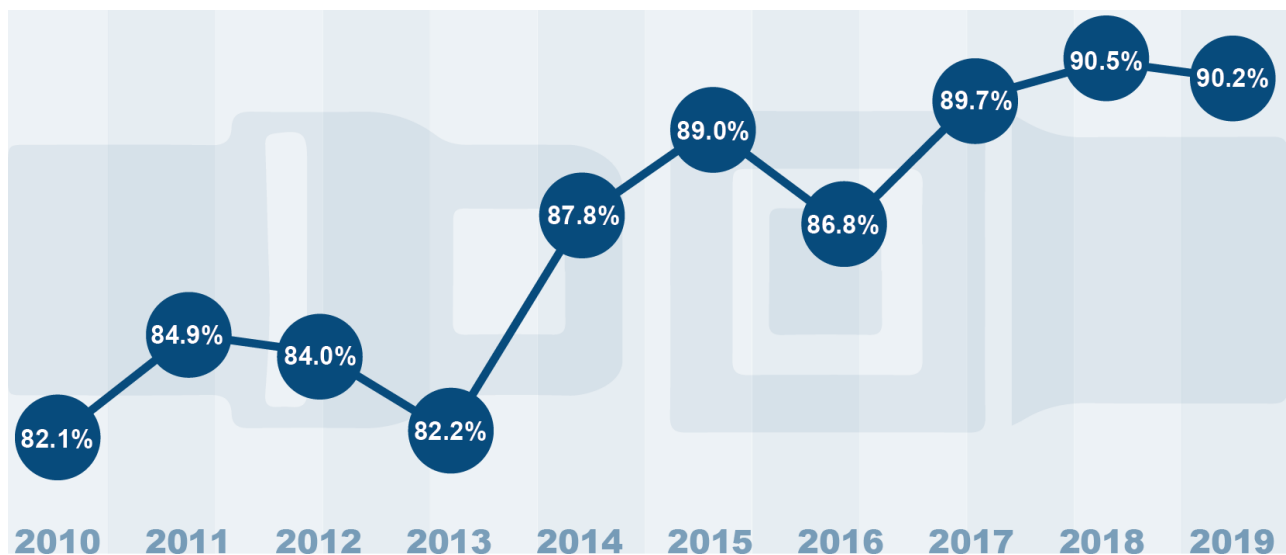
West Virginia has adopted the long-term goal of zero traffic fatalities, with an interim goal of reducing fatalities by one-half by 2030, using 2006 to 2010 as a five-year average base. According to the West Virginia Governor's Highway Safety Program (GHSP), from 2014 to 2018 the average percentage of unrestrained fatalities in the state was 31.9 percent. To reach the state's target of zero traffic fatalities, reducing nonbelt use should be one of their top priorities.

This report outlines the observed seat belt usage rate in West Virginia collected between May 28 and June 12 in 2019 during both the weekdays and weekends. This report also documents the seat belt use rate and identifies the primary sources of variation in seat belt use, allowing the GHSP and its stakeholders to develop and revise countermeasures to address unrestrained vehicle occupants.

Observers recorded seat belt information on 26,471 drivers and 7,991 onboard front seat passengers for a total of 34,462 observations. Observers were not able to record seat belt use for 95 observations, resulting in a statewide nonresponse rate of 0.28 percent for the 2019 survey, compared to a nonresponse rate of 0.39 percent for the State's 2018 survey.

The 2019 observed seat belt rate in West Virginia remained over 90 percent for the second year in a row (Figure 1.1), coming in at 90.17 percent. The rate has a standard error of 1.14 percent (relative standard error = 1.27 percent), well within the standard requirement of 2.5 percent set forth by the National Highway Traffic Safety Administration (NHTSA). This is a slight decrease from the peak observed seat belt usage rate in 2018 of 90.53 percent. All 14 counties where observations occurred had seat belt use rates between 62 percent and 99 percent in 2019.

Figure 1.1 West Virginia Observed Seat Belt Usage Rates
2010 to 2019



Source: <https://cdan.nhtsa.gov/stsi.htm#>.

Section 1 of this report discusses the sampling procedures and methods used to obtain an estimate of the seat belt use rate in West Virginia; it also describes procedures for the selection of counties, stratification of

roadways, and observation sites. Section 2 details the results of this effort, beginning with the statewide seat belt use rate and trends over several years, along with a summary of the characteristics of occupants, vehicles, and observation sites. The report concludes with an analysis of selected characteristics of vehicle occupants and observation sites. The information provided by this report will help to identify the conditions under which seat belts are more or less likely to be used, allowing safety stakeholders across the State to improve upon their strategies for addressing unrestrained vehicle occupants.

Acknowledgments

Cambridge Systematics, Inc. (CS) began a partnership with the GHSP in 2018 to aid in the selection of new survey sites. CS also was involved in the development of this report. The 2019 West Virginia Observational Seat Belt Survey Report would not have been possible without the administration and support of the GHSP staff. Specifically, CS would like to thank Bob Tipton, Director, and Barbara Lobert, Federal Programs Administrator, for their assistance in compiling the survey data, overseeing the observers, and managing the day-to-day operations of the project.

1.0 Methodology

In 2011, NHTSA issued new Uniform Criteria for State Observational Surveys of Seat Belt Use in Federal Register Vol. 76, No. 63 (April 1, 2011, Rules and Regulations, pages 18042–18059). This report represents West Virginia's fulfillment of the NHTSA requirement to submit a study and data collection protocol for an annual state survey to estimate passenger vehicle occupant restraint use. The current methodology is fully compliant with the Uniform Criteria and was used to implement West Virginia's 2018 seat belt survey.

The present survey design and methodology is similar to previous years but updated to meet NHTSA's updated requirements. The surveyors selected the sample using a multistage, stratified cluster sampling procedure, which was updated this year to reflect the most recent roadway network conditions. West Virginia is divided into 55 counties and 35 of the counties account for 85 percent of all passenger vehicle fatalities. The present survey draws observation sites from an updated selection of 14 counties. Surveyors selected a total of 166 observation sites, resulting in 5 to 15 sites per county during the survey period in May and June. Surveyors used the same methodology approved by NHTSA in 2018 for the 2019 survey and the results are valid through 2022 unless otherwise noted.

The 2018 observation survey design involved a five-step process. The steps included:

1. The selection of counties based on vehicle occupant fatalities and regions of the state.
2. The stratification of roads based on functional use classes.
3. The selection of specific road segments within each stratum and county.
4. The development of seat belt use estimation procedures and computations.
5. The establishment of data collection and quality procedures consistent with NHTSA requirements.

1.1 County Selection

Surveyors identified a total of 35 counties as having the most passenger vehicle occupant fatalities. These counties accounted for 85 percent of all fatalities during this time period studied. Of the 35 counties, 14 were selected for inclusion in the 2018 observation survey to represent all three regions of the state. The selection procedure involved dividing the state into three geographic regions, then allocating the number of counties by region based on the number of qualified counties in the region, and within each region making probability-proportional-to-size (PPS) selections with the odds of selection proportional to the county's total roadway length. Appendix A shows the selected counties and identified regions of the state on the map.

1.1.1 Roadway Stratification and Definitions

The 2018 survey design identified 169 total observation sites across 14 counties in the state. A large number of observation sites were necessary to meet NHTSA's requirement of having a standard error no greater than 2.5 percent. The surveyors determined the 169 sites by the mix of counties and road type distributions within counties. Consistent with NHTSA guidelines, the 2018 survey excluded rural local roads in non-Metropolitan Statistical Area counties. Road strata include Primary Roadways, Secondary Roadways, and Local Roads (excluding rural local roads in non-MSA counties). Each of the 14 counties has road segments in two or all three road strata. The weekday survey used 6 segments in Primary Roadways Strata,

4 segments in Secondary Roadways Strata, and 2 segments in Local Roads Strata (excluding rural local roads in non-MSA counties). The weekend survey added one segment in each strata. The weekday and weekend surveys together included 15 segments per county.

1.1.2 Roadway Segment and Site Selection

The surveyors used an approach to identify specific roadway segments that involved a PPS procedure, with lengths of roadways defined as the “size.” Segments were randomly drawn from county-stratum populations of road segments, with the probability of drawing any segment proportional to its portion of the total roadway lengths within the county-stratum. Sampling called for selecting twice the number of road segments required, retaining the order of selection, to provide for the necessary sample and an equal number of alternates, or “spare” segments. Surveyors selected and distributed a total of five certainty segments among the 169 primary and alternate segments across the roadway functional strata.

Prior to actual data collection, surveyors selected specific locations for data observations based on visits to the locations, maps, and/or online road level images. The direction of travel to be observed was randomly selected for each segment and/or site. Sites were selected based on having a clear view of the vehicles and taking into account observer and direction of travel of vehicles. Efforts also were made to select observation sites where traffic naturally slows in an effort to improve accuracy. When specific site locations were unusable or not able to provide a clear view of belt use, observers chose alternate locations within the road segment where they could more effectively observe the same traffic stream. Surveyors documented details and reasons for changing locations; Appendix B provides a complete list of selected primary road segments.

1.1.3 Seat Belt Rate and Standard Error Calculations

Surveyors calculated seat belt use rates using formulas based on the proportion of the state’s total roadway length “represented” by the site. Seat belt use rate calculations followed a four-step process. First, estimated rates were calculated for each road type stratum within each county. The general formula for combining observed belt use rates from observation sites on individual segments, for a single county-stratum, is shown in formula (1).

This formula is used when the county-stratum contains certainty segments; the contribution of each segment to the overall county-stratum rate is proportional to the “size” of the segment’s contribution to the entire county-stratum traffic (i.e., its roadway length, adjusted by the inverse of the probability of the segment’s being selected into the sample).

$$p_{i(j)k} = \frac{\sum_l S_{i(j)k} W_{i(j)k} p_{i(j)k}}{\sum_l S_{i(j)k} W_{i(j)k}} \quad (1)$$

Where $i(j)$ = county i within region j , k = stratum, l = site within stratum and county, $S_{i(j)k}$ = roadway length for segment l in county-stratum $i(j)k$, and $p_{i(j)k}$ = the observed seat belt use rate at site $i(j)k$ = $BS_{i(j)k}/O_{i(j)k}$ where $B_{i(j)k}$ = total number of belted occupants (drivers and outboard front seat passengers) observed at site, $O_{i(j)k}$ = total number of occupants with known belt use observed at site; and $W_{i(j)k}$ = the inverse of the probability of segment l ’s selection, as described above: (certainty segments) $W_{i(j)k} = 1.00$ or (random segments).

$$W_{i(j)k} = \frac{\sum_{m=1}^N S_{i(j)klm}}{n * S_{i(j)k}}$$

Where n = total number of segments in county-stratum $i(j)k$ excluding the certainty segments and n = number of segments to be randomly selected excluding certainty segments. In the case where there were no certainty segments in the county-stratum, formula (1) reduces to the simple formula (1a):

$$p_{i(j)k} = \frac{\sum_{l=1}^{n_{i(j)k}} p_{i(j)kl}}{n_{i(j)k}} \quad (1a)$$

Where $i(j)$ = county i within region j , k = stratum, l = site within stratum and county, $n_{i(j)k}$ = number of sites within the stratum-county combination, and $p_{i(j)k}$ = the observed seat belt use rate at site $i(j)kl$ = $BS_{i(j)kl}/O_{i(j)kl}$ where $B_{i(j)kl}$ = total number of belted occupants (drivers and outboard front seat passengers) observed at site, $O_{i(j)kl}$ = total number of occupants with known belt use observed at site.

Second, a county-by-county seat belt use rate, $p_{i(j)k}$, was obtained by combining county-stratum seat belt use rates across strata within counties, weighted by the stratum's relative contribution to total county roadway length:

$$p_{i(j)} = \frac{\sum_k S_{i(j)k} p_{i(j)k}}{\sum_k S_{i(j)k}} \quad (2)$$

Where $S_{i(j)k}$ = roadway length for all roads in stratum k in county $i(j)$, $p_{i(j)k}$ = the observed seat belt use rate for stratum k in county $i(j)$.

In the third step, category-weighted seat belt use rates for each region of counties were obtained by combining and weighting the rates from the sampled counties in each region by their roadway length and probabilities of being selected:

$$p_j = \frac{\sum_i S_{i(j)} W_{i(j)} p_{i(j)}}{\sum_i S_{i(j)} W_{i(j)}} \quad (3)$$

Where $S_{i(j)k}$ = roadway length for all roads k in county i and region j , $W_{i(j)}$ = the inverse of the probability of the county's selection: $W_{i(j)} = 1$ for certainty counties; and:

$$W_{i(j)} = \frac{\sum_{l=1}^{N_{(j)}} S_{i(j)l}}{n_{i(j)} * S_{i(j)}}$$

Where $N_{(j)}$ = the number of high-fatality counties in region j and $n_{i(j)}$ = the number of those counties selected.

Finally, the statewide seat belt use proportion was calculated by combining the category proportions weighted by their proportion of statewide roadway length:

$$p = \frac{\sum_{j=1}^3 S_j p_j}{\sum_{j=1}^3 S_j} \quad (4)$$

The result was a combination of the individual site seat belt use rates weighted to reflect each site's importance in total state roadway length.

Standard error of estimate values was estimated through a jackknife approach, based on the general formula:

$$\hat{\sigma}_{\hat{p}} = \left[\frac{n-1}{n} \sum_{i=1}^n (\hat{p}_i - \hat{p})^2 \right]^{1/2}$$

Where $\hat{\sigma}_{\hat{p}}$ = standard deviation (standard error) of the estimated statewide seat belt use proportion $\hat{p}$ (equivalent to p in the notation of formulas 1–4), n = the number of sites, i.e., 169, and $\hat{p}_i$ = the estimated statewide seat belt use proportion with site i excluded from the calculation. The relative error rate, i.e., was calculated, as well as the 95 percent confidence interval, i.e., $\hat{p} \pm 1.96\hat{\sigma}_{\hat{p}}$. These values are reported for the overall statewide seat belt use rate.

1.2 Procedures

Specific data collection procedures were established prior to the initiation of data collection, guided by the updated 2011 Uniform Criteria for State Observational Surveys of Seat Belt Use established by NHTSA.

1.2.1 Observers

The seat belt survey observers were hired under the direction of the GHSP. These observers performed all field data collection. Prior to any data collection, all observers received approximately one day of training by Cambridge Systematics staff. The observers received classroom instruction and several hours in the field practicing observation on May 10, 2018. The staff developed training to adhere to the observation procedures found in the Uniform Criteria for State Observational Surveys of Seat Belt Use (23 CFR § 1340.7). The topics covered in this training were:

- Review requirements and purpose of the observational seat belt survey.
- Review observation procedures and survey data to be collected.
- Discuss survey scenarios.
- Review survey application.
- Review survey dates and submission process.

Observation protocols dictate that all survey data must be collected through direct observation, surveys must occur at the selected observation sites, surveys must occur on the day and time indicated, and observations should last exactly one hour for each survey site. If the observation point was on a heavily traveled roadway making it difficult for the observer to note every vehicle, a reference point on the roadway in the appropriate lane should be chosen. That same reference point then would be used for the remainder of the observations.

The safety of the observers was a priority and covered in the training as well. All observers were to wear a reflective vest and not stand in a location that would impede traffic. Observers were advised that if

construction or weather conditions, such as heavy rain or fog, were present that it was permissible, after notifying GHSP, to reschedule or request an alternate site for the same day and time.

To ensure quality control, the staff assessed accuracy of observers at the end of classroom training in May. This was done by conducting observations outside the training facility and comparing the simultaneous observations of the same traffic by different observers. Staff identified any differences noted after the observation was completed and discussed and resolved them with the observers.

Lastly, per 23 CFR § 1340.7, observer quality control was overseen by GHSP monitors who went into the field and conducted random unannounced visits at no less than five percent of observation sites. These unannounced visits confirmed that observers were conducting observations at the location, day, and time established in the planning and selection phase. For the 2019 survey, the observer staff remained the same as the previous year. The observers were provided with the PowerPoint presentation from 2018 to serve as a refresher for adherence to the observation procedures found in the Uniform Criteria for State Observational Surveys of Seat Belt Use (23 CFR § 1340.7).

1.2.2 Observation Schedule

Using the new survey sites approved by NHTSA in March of 2018, Cambridge Systematics worked with the GHSP to establish the observation schedule for 2019. Observations were scheduled between 7:00 a.m. and 6:00 p.m. Exact timing of the observation periods was subject to adjustment so that the resulting number of sites being observed throughout the chosen timeframe were approximately equal. Whenever possible, three to five sites within relative proximity to each other were scheduled for one observer on any day. The days of the week assigned were balanced to similar counties to ensure all days of the week have similar clusters. The first site in any cluster to be observed each day was randomly selected, and the additional sites were assigned in an order that provided balance by type of site and time of day while minimizing travel distance and time.

Table 1.1 Data Collection Dates

Dates	Notes
May 29–June 12, 2019	Data collected during weekdays and weekends

1.2.3 Data Collection Application

To improve not only the timeliness of the observed seat belt usage rate results, but also the uniformity and accuracy of the data collected, observers used a survey application (App) on tablet computers. The survey App (see Appendix C) was specifically tailored for West Virginia’s observers and did not materially change between its use in the 2018 survey and the 2019 survey. Cambridge Systematics worked with the App developer to provide them with all of the specific 2019 survey site information. The observers were able to select their survey site from a list; the App provided a map overview of the area to conduct the survey and, if applicable, the survey direction.

As part of the May 2018 observer training, staff conducted an in-class review of the App, followed by a one-hour period of testing the App and submitting results. Information collected on the survey App included information on the specific observation site and vehicle and occupant information (Appendix C).

Table 1.2 Data Collected from Observational Surveys

Observation Site	Vehicle and Occupant
Observer's name	Vehicle type (i.e., car, pick-up, SUV, van)
Site number, city name, and notes	Driver and front seat passenger gender
Weather condition (i.e., clear, foggy, cloudy, light rain)	Driver and front seat passenger seat belt use (i.e., yes, no, unknown)
Direction of travel observed	Driver cell phone in use (i.e., yes, no, unknown)
Time observation started/ended	

2.0 Results

This section presents the results of the analysis on the 34,462 vehicle and occupant observations made in 2019. Surveyors have made an extensive effort to summarize the characteristics of occupants, vehicles, and observation sites. The table below provides the seat belt use rate based on the weighted sample of observations. In addition to the overall seat belt use rate, this section presents descriptions of the weighted belt use rate by roadway type (i.e., functional class), region, county, and vehicle type. The presentation begins with a description of the sample, including the known and unknown number of occupants, their use of a seat belt, and the nonresponse rate for the survey. This information is followed by a brief analysis of the total sample of both drivers and passengers by county.

Table 2.1 Seat Belt Use Rate

Statistic	Values	Notes
WV Statewide Seat Belt Use Rate	90.17%	
Standard Error	1.14%	<2.50%
Relative Error Rate	1.27%	(0.0114 / 0.9017)
95 Percent Confidence Interval Upper Bound	92.4%	0.9017 + 1.96*0.0114
95 Percent Confidence Interval Lower Bound	87.9%	0.9017 - 1.96*0.0114

The table below provides a description of the number of occupants using and not using a seat belt and the statewide nonresponse rate. Observers were able to ascertain seat belt use for 34,367 occupants, including 26,471 drivers and 7,991 front seat passengers. However, observers were not able to record seat belt use for 95 observations. This resulted in a statewide nonresponse rate of 0.18 percent for the 2019 survey.

Table 2.2 Statewide Seat Belt Use and Nonresponse Rate

Statistic	Values	Notes
Total Occupants with Unknown Seat Belt Status	95	
Total Occupants Observed	34,367	
Sample Nonresponse Rate	0.28%	
Statewide Nonresponse Rate (Weighted)	0.18%	< 10%

The table below displays the total number and percentage of observed front seat occupants. As shown, a total of 26,471 drivers and 7,991 outboard front seat passengers were observed. These observations were compiled across 166 observation sites and 14 counties. Greater than 10 percent of observations occurred in three counties, Putnam (15.7 percent), Lewis (14.5 percent), and Boone (14.0 percent). These counties were followed by Randolph (9.6 percent), Braxton (9.6 percent), and Mingo (9.0 percent).

Table 2.3 Observed Rate by County

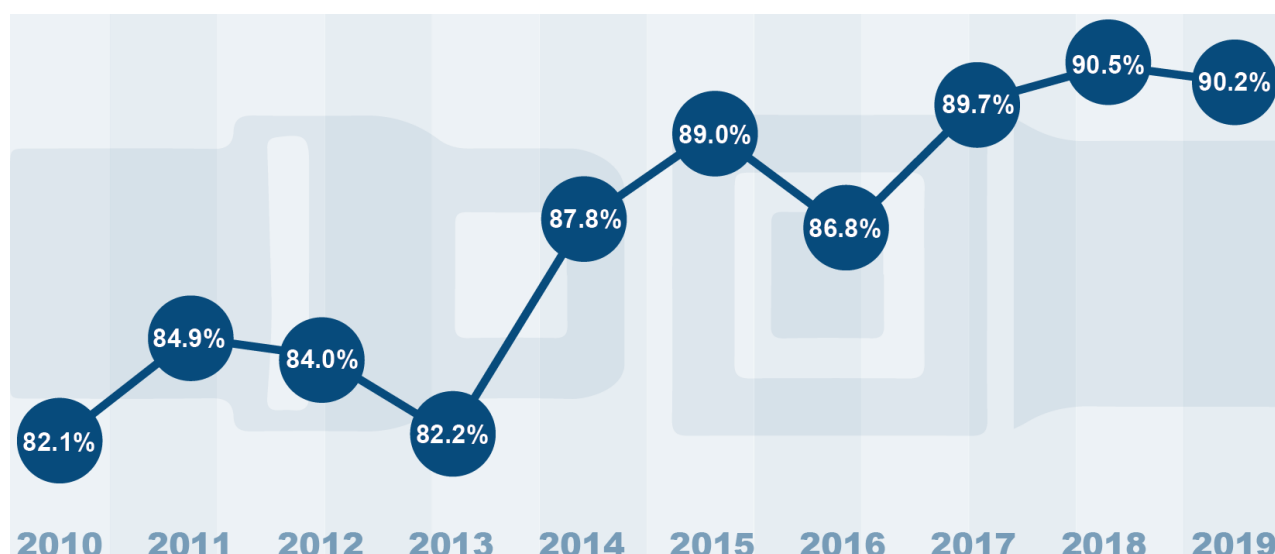
County	Drivers		Passengers		Total	
	N	%	N	%	N	%
Berkeley	1,809	6.8%	520	6.5%	2,329	6.8%
Boone	3,831	14.5%	989	12.4%	4,820	14.0%
Braxton	2,458	9.3%	863	10.8%	3,321	9.6%
Greenbrier	753	2.8%	183	2.3%	936	2.7%
Harrison	181	0.7%	83	1.0%	264	0.8%
Jackson	195	0.7%	70	0.9%	265	0.8%
Lewis	3,920	14.8%	1,086	13.6%	5,006	14.5%
McDowell	1,897	7.2%	924	11.6%	2,821	8.2%
Mingo	2,086	7.9%	1,023	12.8%	3,109	9.0%
Monongalia	251	0.9%	56	0.7%	307	0.9%
Pendleton	439	1.7%	133	1.7%	572	1.7%
Putnam	4,350	16.4%	1,048	13.1%	5,398	15.7%
Raleigh	1,683	6.4%	328	4.1%	2,011	5.8%
Randolph	2,618	9.9%	685	8.6%	3,303	9.6%
Total	26,471	100.0%	7,991	100.0%	34,462	100.0%

Historically over time West Virginia has seen its weighted seat belt use rate climb. In 1992, the usage rate was at 32 percent and climbed to 49.5 percent in 2000. In 2007 and 2008, the weighted seat belt use rate reached a near high of 89.6 percent and 89.5 percent respectively. The current rate of 90.17 percent achieved in 2019 is only slightly lower than the highest observed seat belt use rate West Virginia has ever achieved in 2018 of 90.5 percent.

Unfortunately, it took nearly 10 years for the state to climb back up to 90 percent. In 2009, the observed seat belt usage rate fell 2.5 percent to 87 percent and fell again in 2010 to 82.1 percent.

As can be seen in Figure 2.1, the 2010 seat belt use rate declined further to 82.1 percent—the lowest observed rate since 2004—before rising again to 84.9 percent in 2011 and 84.0 percent in 2012. The rate for 2013 was 82.2 percent. In 2014, the rate began to climb again into the high eighties until a slight downturn in 2016. The current rate of 90.17 percent achieved in 2019 is only slightly lower than the highest observed seat belt use rate West Virginia has ever achieved in 2018 of 90.5 percent.

Figure 2.1 Observed Seat Belt Usage Rates
2010 to 2019



Source: <https://cdan.nhtsa.gov/stsi.htm#>.

The percent weighted seat belt use rate for all vehicle occupants by county for 2019 is shown in Table 2.4. Berkeley and Randolph Counties were observed with the highest rate at 99.7 percent. The lowest rate came from Harrison County with an observed rate of 62.2 percent. Of the 11 counties where observations took place, 10 of them had an observed rate greater than 90 percent.

Table 2.4 Weighted Seat Belt Use Rate by County
2019

County	2019 Seat Belt Use Rate
Berkeley	99.7%
Boone	93.1%
Braxton	92.7%
Greenbrier	94.9%
Harrison	62.2%
Jackson	90.1%
Lewis	95.8%
McDowell	80.5%
Mingo	72.1%
Monongalia	97.2%
Pendleton	98.5%
Putnam	90.5%
Raleigh	97.1%
Randolph	99.7%
Total	90.2%

Table 2.5 displays the weighted seat belt use rate by county for 2016 to 2019. However, since new survey sites were selected in 2018, some counties may not have current information. Of the 14 counties where observations occurred in 2018, 7 counties were where observations occurred in 2016 and 2017. Of these 7 counties with historical trends, 4 counties (Berkeley, Harrison, Monongalia, and Raleigh) had a higher observed rate than 2017. Since the new survey sites and counties used in 2018 are valid for 5 years, moving forward a more comprehensive comparison of the observed seat belt rate for all 14 counties will be available.

Table 2.5 Select County Observed Seat Belt Rates 2016 - 2019

County	2016	2017	2018	2019
Berkeley	88.4%	89.0%	91.6%	99.7%
Boone	90.0%	88.7%	88.4%	93.1%
Cabell	92.9%	92.9%		
Fayette	86.9%	90.2%		
Greenbrier	91.3%	90.6%	88.5%	94.9%
Harrison	81.6%	82.1%	88.5%	62.2%
Jackson	85.6%	93.5%	93.3%	90.1%
Jefferson	84.6%	88.5%		
Kanawha	84.6%	92.0%		
Mason	90.9%	99.0%		
Mercer	88.5%	90.3%		
Monongalia	77.0%	80.7%	95.4%	97.2%
Raleigh	86.9%	89.5%	92.7%	97.1%
Wood	81.8%	86.4%		
Total	86.8%	89.7%	90.5%	90.2%

Table 2.6 shows the survey results for the 14 counties where observations occurred in 2018 and 2019. Although two years of observation is not long enough to make solid conclusions, some inferences can be made. Most noticeably was a nearly 26 point drop in Harrison county and a 20 point drop in the observed seat belt use in Mingo County from 2018 to 2019. These drops fall well outside the expected standard deviation. GHSP may want to consider looking further into these areas of significant lower observed seat belt usage rate areas and implement programmatic countermeasures.

Table 2.6 County Observed Seat Belt Rates 2018 - 2019

County	2018	2019
Berkeley	91.6%	99.7%
Boone	88.4%	93.1%
Braxton	93.8%	92.7%
Greenbrier	88.5%	94.9%
Harrison	88.5%	62.2%
Jackson	93.3%	90.1%
Lewis	91.3%	95.8%
McDowell	72.0%	80.5%
Mingo	91.7%	72.1%
Monongalia	95.4%	97.2%
Pendleton	91.3%	98.5%
Putnam	96.0%	90.5%
Raleigh	92.7%	97.1%
Randolph	97.0%	99.7%
Total	90.5%	90.2%

2.1.1 Characteristics of Belted Drivers and Passengers

This section analyzes various characteristics of drivers and passengers and their relationship to belt use to identify variation in seat belt usage by occupant, site characteristics, and vehicle type. Surveyors anticipate that this information will help to identify the conditions where seat belts are more or less likely to be used in the state to help develop appropriate countermeasures in education and enforcement.

When segmenting the data by seat belt rate for drivers with or without a passenger in the front seat, observers made some interesting conclusions. In the 2018 survey, male drivers had a 4.5 point higher seat belt rate with a passenger than when driving alone. Conversely, female drivers had a 12.6 point lower seat belt rate with a passenger than without. For the 2019 survey, male drivers had a 3.5 point lower seat belt rate with a passenger than driving alone. Female drivers had a 0.9 point higher seat belt rate with a passenger than without. In comparing the 2 years of data, no solid conclusions can be made. As additional years' worth of data become available, stronger conclusions and correlations may be possible.

Table 2.7 Weighted Seat Belt Use Rate for Drivers with Passenger versus Without

	Driver with Passenger	Driver without Passenger
Male	88.6%	91.9%
Female	94.4%	93.5%

Generally speaking, male drivers were less likely to use seat belts compared to female drivers (Table 2.8). This finding is consistent with previous observational surveys in West Virginia over the past several years.

Male drivers (86.5 percent) continued to be less likely to be observed wearing a seat belt in comparison to female drivers at 92.5 percent. However, in Table 2.9 passenger rates for both male and females were identical at 91.3 percent.

Table 2.8 shows the distribution of the driver's seat belt use by gender and county in 2019. Of all 14 counties studied, the belt use rate for males (86.5 percent) was slightly lower than females (92.5 percent). Of these same counties, females had a higher seat belt rate in nine counties. In Boone, Harrison, Monongalia, and Raleigh counties, females had a lower seat belt rate than males. The largest disparity occurred in Mingo County, which saw a 43.2 point difference in the observed rate with males at 45.5 percent and females at 88.7 percent. Reviewing previous years' data may suggest that the gender gap among drivers is shrinking.

Table 2.8 Driver Belt Use Rates by Gender and County

	Drivers		
	Male %	Female %	Total %
Berkeley	99.7%	99.7%	99.7%
Boone	95.3%	85.3%	91.7%
Braxton	90.3%	94.9%	91.7%
Greenbrier	92.2%	99.9%	94.0%
Harrison	54.7%	62.2%	65.1%
Jackson	87.0%	93.6%	89.5%
Lewis	84.4%	99.7%	95.0%
McDowell	82.8%	91.2%	83.1%
Mingo	45.5%	88.7%	73.7%
Monongalia	97.6%	96.8%	97.2%
Pendleton	96.5%	100.0%	98.2%
Putnam	90.1%	91.4%	90.5%
Raleigh	97.7%	96.8%	97.9%
Randolph	99.5%	100.0%	99.6%
Total	86.5%	92.5%	90.4%

The following Table (2.9) displays the results of seat belt use for passengers by gender and county. Comparable to the results for drivers, the findings illustrate similarities between seat belt use of drivers and passengers by gender. As noted previously with drivers, of the 14 counties studied, the belt use rate for males (91.3 percent) and females (91.3 percent) are identical based on the algorithm used for all sites in the same county and same road stratum weight. Because of weighting the total safety belt usage rate did not fall between the two categories of male and female. Of these same counties, once again females had a slightly higher rate in seven counties. The largest disparity was seen in Mingo County, where the female observed seat belt rate (48.1 percent) lagged males (96.6 percent) by 48.5 points.

Table 2.9 Passengers Belt Use Rates by Gender and County

	Passengers		
	Male %	Female %	Total %
Berkeley	99.7%	99.6%	99.7%
Boone	100.0%	99.6%	99.8%
Braxton	92.2%	96.4%	95.1%
Greenbrier	99.4%	100.0%	99.7%
Harrison	54.9%	54.6%	54.7%
Jackson	99.0%	93.8%	94.8%
Lewis	99.5%	99.8%	96.9%
McDowell	76.4%	97.6%	76.8%
Mingo	96.6%	48.1%	71.8%
Monongalia	84.1%	99.5%	97.3%
Pendleton	100.0%	100.0%	100.0%
Putnam	84.9%	94.0%	91.6%
Raleigh	90.3%	97.2%	93.5%
Randolph	99.6%	99.8%	99.8%
Total	91.3%	91.3%	90.7%

As with most of the nation, West Virginia saw its lowest seat belt usage rate in pickup trucks (90.9 percent), followed by cars (93.9 percent), SUVs (95.5 percent), and vans (96.5 percent). Geographically, the Eastern panhandle saw the highest seat belt usage rate (99.1 percent), followed by the Southern region of the state (89.6 percent), with the lowest usage rate coming from the Northern region of the State at 88 percent. A map of the state's regions can be found in Appendix A. When reviewing roadway functional class, local roadways had the lowest observed seat belt rate at 88.9 percent, followed by secondary roadways at 92.7 percent, with primary roadways showing the highest rate with 94.6 percent.

Table 2.10 Seat Belt Use Rate for Drivers and Passengers by Vehicle Type and Site Characteristics

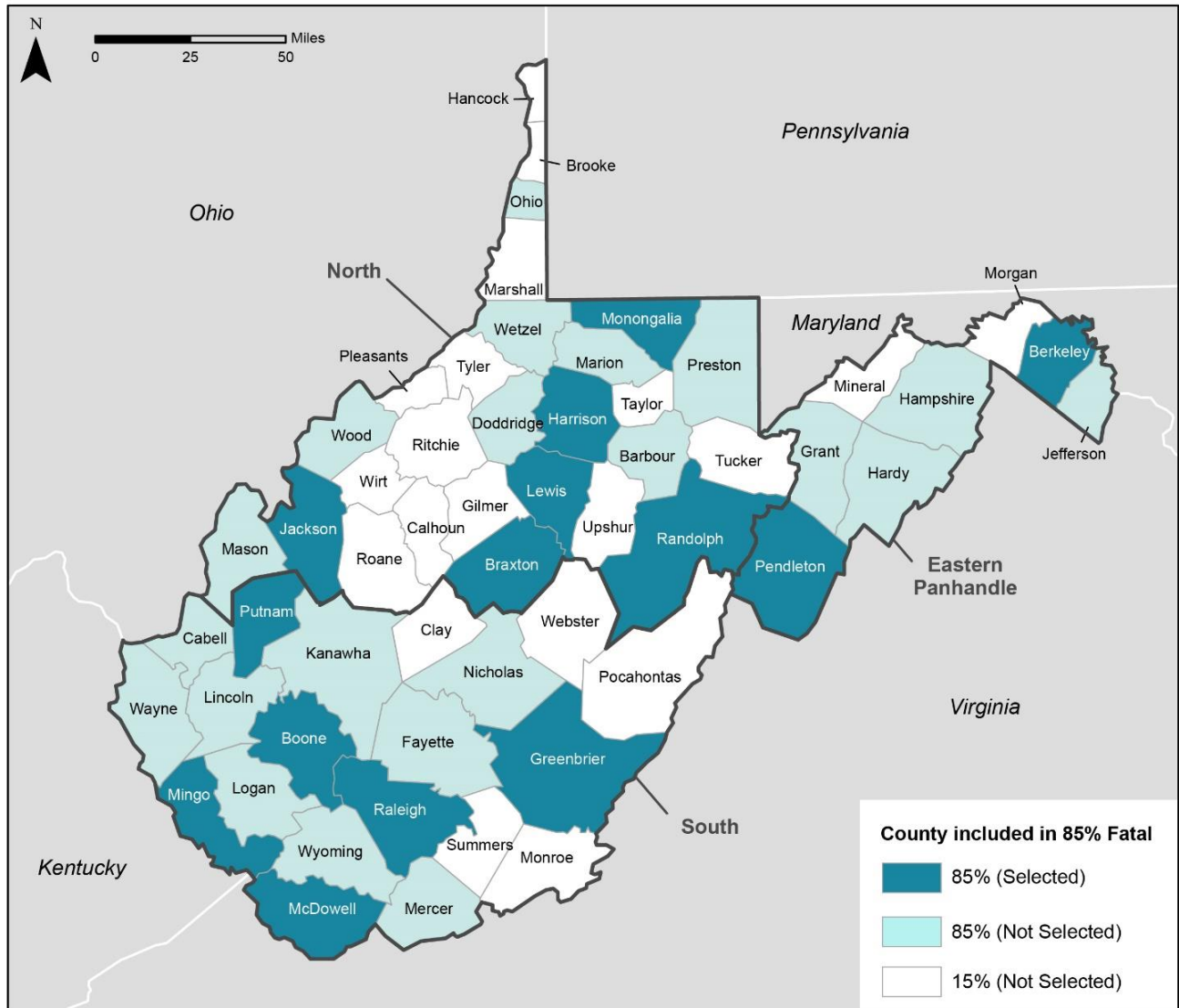
Vehicle Type and Site Characteristics	Driver	Passenger	Total
Vehicle Type			
Car	93.6%	96.5%	93.9%
Pickup Truck	90.3%	94.7%	90.9%
SUV	96.7%	98.3%	95.5%
Van	95.3%	97.2%	96.5%
Region			
Eastern Panhandle	88.5%	88.8%	88.0%
North	89.7%	89.8%	89.6%
South	98.9%	99.8%	99.1%
Functional Class			
Primary	93.9%	96.7%	94.6%
Secondary	91.7%	95.2%	92.7%
Local	89.4%	88.3%	88.9%

Cell phone use while driving is one form of distracted driving. The seat belt observers also were able to capture observed cell phone use during the survey. The table below notes the number of observations of driver cell phone use and no cell phone use and breaks it down by gender and whether a seat belt was in use. Males had an observed cell phone use of 2.8 percent, whereas females had a slightly higher observed use of 3.8 percent. Of drivers using a cell phone, 92.5 percent were using a seat belt, whereas, drivers not using a cell phone were observed using a seat belt 94.8 percent of the time. This could suggest a correlation between belted drivers being less likely to use a cell phone while driving.

Table 2.11 Observed Cell Phone Use by Gender and Seat Belt Use

	Cell Phone Use		No Cell Phone Use	
	Number	Percent	Number	Percent
Gender				
Male Driver	453	56.7%	16,004	64.0%
Female Driver	346	43.3%	9,009	36.0%
Seat Belt Use				
Use	737	92.5%	23,733	94.8%
Not Use	60	7.5%	1,292	5.2%

Appendix A. Seat Belt Observational Counties and Regions



Appendix B. Seat Belt Observational Survey Site List

Site #	Site Type	Date Observed	Inverse of Prob. of Selection ($W_{i(j)kl}$)	Number of Drivers	Number of Front Passengers	Number of Occupants Belted	Number of Occupants Unbelted	Number of Occupants with Unknown Belt Use
1	Original	6/1/2019	45.73	224	51	274	1	0
2	Original	6/1/2019	77.34	227	62	288	1	0
3	Original	6/5/2019	86.00	102	14	109	7	0
4	Original	6/1/2019	89.22	177	50	224	3	0
5	Alternate	6/12/2019	1987.46	14	5	18	1	0
6	Original	6/5/2019	5987.25	9	1	9	1	0
9	Original	6/2/2019	6.92	381	231	597	14	1
10	Original	6/4/2019	11.62	142	81	215	8	0
11	Original	6/2/2019	13.48	434	216	635	14	1
12	Original	6/2/2019	14.65	407	247	633	19	2
13	Original	6/2/2019	20.87	254	136	378	8	4
14	Original	6/3/2019	21.04	168	40	201	6	1
15	Original	6/4/2019	44.88	54	8	59	3	0
16	Original	6/4/2019	82.90	75	22	93	4	0
17	Original	6/3/2019	152.65	88	28	106	9	1
18	Original	6/4/2019	169.86	39	6	41	4	0
19	Original	6/3/2019	192.90	33	6	38	1	0
20	Original	6/3/2019	230.83	11	2	12	1	0
24	Original	6/8/2019	45.03	15	7	18	4	0
25	Original	6/5/2019	51.15	104	49	133	20	0
26	Original	6/8/2019	54.77	21	10	25	6	0
27	Original	6/8/2019	56.46	35	14	44	5	0
28	Original	6/5/2019	19.40	3	2	3	2	0
29	Original	6/5/2019	35.55	3	1	4	0	0
32	Alternate	6/2/2019	88.65	42	12	47	7	0
33	Original	5/28/2019	37.09	19	8	18	9	0
34	Original	6/2/2019	55.63	6	4	10	0	0
35	Original	5/28/2019	86.91	68	30	86	12	0
36	Alternate	5/28/2019	522.31	57	14	56	15	0
37	Original	6/2/2019	57.08	3	2	3	2	0
40	Original	5/30/2019	3.68	644	167	788	23	0
41	Original	6/1/2019	9.97	309	162	457	14	0
42	Original	5/31/2019	10.16	115	40	147	8	0
43	Original	5/30/2019	11.99	555	98	614	37	2

Site #	Site Type	Date Observed	Inverse of Prob. of Selection ($W_{i(j)kl}$)	Number of Drivers	Number of Front Passengers	Number of Occupants Belted	Number of Occupants Unbelted	Number of Occupants with Unknown Belt Use
44	Original	5/31/2019	12.98	96	17	106	7	0
45	Original	5/31/2019	15.68	340	68	374	34	0
46	Original	5/30/2019	25.24	203	28	226	4	1
47	Original	6/1/2019	40.44	66	32	98	0	0
48	Original	6/1/2019	47.97	21	7	27	1	0
49	Original	5/30/2019	166.57	195	48	211	31	1
50	Alternate	6/1/2019	375.38	32	11	36	7	0
51	Alternate	5/31/2019	1375.13	42	7	47	2	0
55	Original	6/9/2019	13.28	213	74	279	8	0
56	Original	6/9/2019	15.77	264	44	297	11	0
57	Original	6/9/2019	17.64	281	71	337	15	0
58	Original	6/3/2019	17.82	250	83	307	25	1
59	Original	6/3/2019	18.17	207	85	283	9	0
60	Original	6/3/2019	30.04	207	67	264	10	0
61	Original	6/4/2019	19.17	62	11	67	6	0
62	Original	6/4/2019	26.82	11	3	13	1	0
63	Original	6/3/2019	40.74	17	3	20	0	0
64	Original	6/9/2019	49.22	133	42	168	7	0
65	Original	5/28/2019	580.68	10	2	12	0	0
66	Original	5/28/2019	7527.69	154	35	179	10	0
70	Original	6/1/2019	6.46	207	75	266	16	0
71	Original	6/1/2019	6.67	410	252	628	34	0
72	Original	6/1/2019	8.88	164	116	269	10	1
73	Original	6/1/2019	9.63	222	94	304	12	0
74	Alternate	5/31/2019	29.60	317	199	480	35	1
75	Original	6/1/2019	11.99	178	43	210	11	0
76	Original	5/31/2019	13.44	109	73	176	6	0
77	Original	5/31/2019	20.21	81	12	86	4	3
78	Original	5/31/2019	38.16	104	20	99	23	2
79	Original	5/31/2019	53.25	105	40	130	15	0
82	Original	5/28/2019	3.77	508	146	621	29	4
83	Original	6/4/2019	11.68	608	149	707	50	0
84	Original	6/12/2019	12.49	653	141	765	26	3
85	Original	6/3/2019	13.16	504	142	619	26	1
86	Original	6/3/2019	22.41	528	105	588	43	2
87	Original	5/29/2019	23.02	569	152	683	33	5
88	Original	6/3/2019	22.07	461	85	518	27	1

Site #	Site Type	Date Observed	Inverse of Prob. of Selection ($W_{i(j)kl}$)	Number of Drivers	Number of Front Passengers	Number of Occupants Belted	Number of Occupants Unbelted	Number of Occupants with Unknown Belt Use
89	Original	5/28/2019	32.71	83	21	96	7	1
90	Alternate	5/28/2019	84.86	82	20	92	10	0
91	Original	5/29/2019	72.81	338	83	402	17	2
92	Alternate	5/29/2019	500.11	6	2	6	2	0
93	Original	6/3/2019	3883.04	10	2	5	7	0
97	Original	6/1/2019	6.36	308	53	339	20	2
98	Original	6/6/2019	6.72	250	23	265	7	1
99	Original	6/10/2019	7.27	103	31	114	20	0
100	Original	6/10/2019	9.07	48	14	50	12	0
101	Original	6/10/2019	9.29	156	68	202	22	0
102	Original	6/10/2019	20.32	87	33	105	14	1
103	Original	6/6/2019	15.99	208	20	214	14	0
104	Original	6/6/2019	26.06	64	9	69	3	1
105	Original	6/6/2019	27.30	131	16	135	11	1
106	Original	6/1/2019	37.93	122	17	125	13	1
107	Original	6/1/2019	142.22	58	20	69	8	1
108	Original	6/1/2019	419.00	148	24	151	16	5
112	Original	5/29/2019	1.16	195	40	218	9	8
113	Original	6/9/2019	1.23	536	210	706	40	0
114	Original	5/30/2019	2.03	213	82	288	7	0
115	Original	5/29/2019	4.89	225	49	267	7	0
116	Original	6/9/2019	5.57	787	280	1029	37	1
117	Original	5/30/2019	6.65	233	130	356	6	1
118	Original	5/29/2019	10.16	48	8	54	2	0
119	Alternate	5/30/2019	60.76	25	6	30	1	0
120	Original	5/30/2019	55.98	36	10	43	3	0
121	Alternate	6/9/2019	66.36	149	46	176	18	1
122	Alternate	6/9/2019	116.28	1	0	1	0	0
123	Alternate	5/29/2019	113.68	10	2	11	1	0
127	Original	6/6/2019	4.86	308	80	349	33	6
128	Original	6/6/2019	7.79	523	146	588	75	6
129	Original	6/6/2019	8.08	563	130	655	37	1
130	Original	5/29/2019	17.28	407	160	514	48	5
131	Original	5/31/2019	18.18	632	178	778	31	1
132	Original	5/31/2019	20.99	624	168	756	34	2
133	Original	5/29/2019	20.10	189	63	228	22	2
134	Original	5/30/2019	20.85	183	47	203	22	5

Site #	Site Type	Date Observed	Inverse of Prob. of Selection ($W_{i(j)kl}$)	Number of Drivers	Number of Front Passengers	Number of Occupants Belted	Number of Occupants Unbelted	Number of Occupants with Unknown Belt Use
135	Original	5/29/2019	21.20	67	24	83	8	0
136	Original	5/31/2019	21.78	281	65	332	14	0
137	Alternate	5/29/2019	7655.12	4	3	7	0	0
138	Alternate	5/31/2019	9124.74	139	22	154	7	0
142	Original	6/4/2019	14.12	7	3	9	1	0
143	Original	6/3/2019	17.33	71	20	89	2	0
144	Original	6/3/2019	26.74	127	21	145	3	0
145	Alternate	6/3/2019	217.84	207	84	287	4	0
146	Original	6/3/2019	361.60	19	5	24	0	0
147	Original	6/4/2019	735.98	8	0	8	0	0
148	Alternate	6/4/2019	25.84	585	94	672	7	0
149	Original	6/4/2019	3.54	427	98	517	8	0
150	Alternate	6/1/2019	26.09	134	40	160	14	0
151	Original	6/5/2019	9.86	584	170	752	2	0
152	Alternate	6/5/2019	33.39	474	78	549	3	0
153	Original	6/1/2019	22.01	493	209	663	38	1
154	Alternate	6/5/2019	33.05	340	93	428	5	0
155	Original	6/1/2019	32.87	212	57	254	14	1
156	Original	6/4/2019	41.09	312	78	388	2	0
157	Original	6/1/2019	51.48	229	60	263	26	0
158	Alternate	6/5/2019	7208.46	26	5	31	0	0
159	Original	6/4/2019	1090.31	15	7	22	0	0
163	Alternate	6/10/2019	54.15	89	26	113	2	0
164	Original	6/10/2019	23.07	45	8	53	0	0
165	Original	6/10/2019	23.98	39	7	45	1	0
166	Original	6/10/2019	26.69	78	15	91	2	0
Total				26,471	7,991	32,711	1,656	95

Appendix C. Observational Survey Collection Form

AT&T

10:51 AM

53%

WVGHSP

Step 1: Pre-Survey

Step 2: Survey

Step 3: Post-Survey

Step 4: Finished

Exit

59:30

Pause

Vehicle Type

Driver

Passenger

	Gender	Seat Belt	Cell Phone in Use	Gender	Seat Belt
Car					
Truck	Male	Yes	Yes	Male	Yes
Van	Female	No	No	Female	No
SUV	Unknown	Unknown	Unknown	Unknown	Unknown

2

Clear Selections

Next Vehicle