Research Report
KTC-09-15/KSP1-09-1F

KENTUCKY TRANSPORTATION CENTER

2009 SAFETY BELT USAGE SURVEY IN KENTUCKY

UNIVERSITY OF KENTUCKY
College of Engineering

OUR MISSION

We provide services to the transportation community through research, technology transfer and education. We create and participate in partnerships to promote safe and effective transportation systems.

OUR VALUES

Teamwork
Listening and communicating along with courtesy and respect for others.

Honesty and Ethical Behavior
Delivering the highest quality products and services.

Continuous Improvement
In all that we do.

Research Report
KTC-09-15/KSP1-09-1F

2009 SAFETY BELT USAGE SURVEY IN KENTUCKY

By

Kenneth R. Agent
Transportation Research Engineer

Eric R. Green
Transportation Research Engineer

Kentucky Transportation Center
College of Engineering
University of Kentucky
Lexington, Kentucky

in cooperation with
Kentucky Transportation Cabinet
Commonwealth of Kentucky

July 2009

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

The objective of this study was to establish 2009 safety belt and child safety seat usage rates in Kentucky. The 2009 survey continues to document the results after enactment of the original "secondary enforcement" statewide mandatory safety belt law in 1994 and the subsequent change to "primary enforcement" which was enacted in 2006. Data were collected at 160 randomly selected sites in 18 counties across Kentucky. Data from the individual sites were combined into a statewide percentage considering roadway functional classification, county, and vehicle miles traveled.

The data show that the usage rate in 2009 (79.7 percent) increased several percentage points compared to 2008 (73.3 percent). The usage rate had increased from 67 percent in 2006 to 72 percent in 2007 after the enactment of "primary enforcement" legislation. The rate had increased from 42 percent in 1993 to 58 percent in 1994 after enactment of the original mandatory safety belt law.

The 2009 statewide usage rate for children under the age of four was determined to be 98.6 percent. This continues the very high rate for this age category.

Usage rates varied by highway functional classification. The highest rate of 86.0 percent was on interstates and parkways, with the lowest rate of 72.4 percent on collector roads. The rate by county varied from a high of 85.9 percent in Fayette County to a low of 65.6 percent in Knott County. The usage rate by vehicle type varied from 83.7 percent for vans to a low of 69.0 percent for pickup trucks.

The statewide usage rate for motorcycle helmets was 63.7 percent. This shows an increase from the 2008 rate of 58 percent.

1.0 INTRODUCTION AND BACKGROUND

The use of safety belts and child safety seats has been shown to be an effective means to reduce injuries to motor-vehicle occupants involved in traffic crashes. There have been various methods used in efforts to increase safety belt and safety seat usage. Past efforts have included public information campaigns, local and statewide legislation, and enforcement of the legislation. Examples of statewide enforcement and education campaigns are the "Click It or Ticket" (CIOT) and "Buckle Up Kentucky: It's the Law & It's Enforced" campaigns conducted around Memorial Day in recent years. The most recent legislation in Kentucky in this area changed the statewide legislation requiring the use of safety belts for all vehicle occupants from secondary to primary enforcement. A statewide law including secondary enforcement was passed in 1994 with the primary enforcement law passed in 2006. The 2006 primary enforcement legislation included an educational period with warning citations through December 2006 with citations with fines starting in January 2007.

The first legislation in Kentucky was a law enacted by the 1982 Kentucky General Assembly requiring use of a "child restraint system" for children 40 inches or less in height. The 1988 Kentucky General Assembly strengthened this law by adding a fine. Next, prior to the statewide law, local safety belt usage laws were enacted in several jurisdictions in Kentucky. The first such local law, with an effective date of July 1990, was enacted by the Lexington-Fayette Urban County Government. Prior to the statewide law, the combined population of the counties and cities having a local ordinance represented approximately one-third of the statewide population. The original statewide law in 1994 replaced the various local ordinances.

Statewide observational surveys were first conducted in Kentucky in 1982 and have been conducted annually to document safety belt and safety seat usage. The safety belt usage rate for drivers increased each survey year from only 4 percent in 1982 to 58 percent in 1994, following enactment of the statewide secondary law. The first decrease was in 1995 when usage decreased to 54 percent with the rate remaining fairly constant at 54 to 55 percent for 1996 through 1998. The rate then increased to 59 percent in 1999, 60 percent in 2000, 62 percent in 2001 and 2002, 66 percent in 2003 and 2004, 67 percent in 2005 and 2006, 72 percent in 2007, and 73 percent in 2008.

Statewide usage of child safety seats (CSS) or safety belts for children under four years of age increased from about 15 percent in 1982, before enactment of the mandatory child restraint law, to 30 percent for 1984 through 1986. After a financial penalty was added to the law, this percentage increased to almost 50 percent in 1988. There has been a continued increase in usage with rates such as 72 percent in 1994, 82 percent in 1997, and 98 percent in 2007. However, while usage rates are very high, studies have found problems with the proper use of child safety seats.

In recent years, the full statewide belt use and CSS use survey, based on 200 observation sites in 58 counties, has been taken in the weeks immediately after completion of the "Click It or Ticket" campaign's enforcement and publicity activities around Memorial Day. Mini-surveys (taken at 21 of the 200 statewide sites) have been taken prior to CIOT, in April, and during the enforcement portion of CIOT. The design included 200 sites in 58 counties, and the relatively large number of sites scattered in so many counties made the data collection time-consuming. The design made it difficult to measure the effects of specific programs such as CIOT, where the transient effects are likely to decay before observations can be completed.

Accordingly, a new design was proposed for collecting seat belt usage data in Kentucky. The new design, detailed in subsequent sections, follows National Highway Transportation Safety Administration (NHTSA) requirements and is generally similar to designs in other states that have been approved in recent years. The new design follows many of the elements of the most recent design.

The objective of the survey summarized in this report was to establish statewide safety belt and child safety seat usage rates in Kentucky for 2009. These rates can be compared to those determined from previous surveys. The 2009 statewide survey continues to document the change in usage associated with the change in the law to allow primary enforcement and related evaluation and enforcement.

2.0 PROCEDURE

2.1 DATA COLLECTION PROCEDURE

The original data collection procedure used in the surveys, which started in 1982, was first modified for the 1990 survey, when the number of sample sites was expanded and the observation procedure was modified so that the entire procedure would be comparable to surveys taken in other states. The data collection form was changed along with the site selection procedure. The procedure and data collection form remained the same for the 1990 through 1998 surveys. A modification starting with the 1999 survey was that the age and sex of the driver and front seat occupants would no longer be coded but the type of vehicle would be coded.

Data for the surveys collected from 1982 through 1989 were conducted at 23 sites in 19 cities across the state. In 1990, to make the survey results more comparable to measurements in other states and to include all types of roadways, it was necessary to expand the number of sites to include data from rural locations and interstates. The design included 100 sites. The distribution of the sites was based on vehicle miles traveled statewide for various categories of roads in counties with varying populations. The variables considered in the 1990 stratification process were the rural or urban

designation of the road, the functional classification of the road, vehicle miles traveled, and the county population.

In 1999, an updated sampling design plan was implemented as part of a nationwide effort by NHTSA to use a common methodology in all states to select observational sites. As part of this sampling design plan, data was collected at 200 sites, typically at intersections. For interstates and parkways, data were generally taken at the intersection of a ramp with a cross road. The basis for collecting data at intersections was that it would increase accuracy since data would be collected for vehicles either stopped or moving slowly. This design plan was used from 1999 through 2008.

The current data collection form, which was first used in the 1999 survey, is shown in Figure 1. Safety belt usage is recorded for drivers as well as front seat passengers sitting in the outboard position. These occupant positions are equipped with the combination lap belt/shoulder harness type of safety belt which enables observations to be performed more easily than positions equipped only with a lap belt (and meets NHTSA requirements). The exception is for children under four years of age, with restraint data collected for both the front and rear seats.

The type of vehicle is coded for drivers and front seat passengers. Four categories of vehicles are used: passenger car (PC), pickup (PU), van, and sports utility vehicle (SUV).

For drivers and front-seat passengers (over three years of age), usage is classified as either using a shoulder belt properly (over the shoulder; not, for example, under the arm or behind the back) or not using a restraint. For children one to three years of age, the categories include safety seat, booster seat, harness or belt, or no restraint. For children under one year of age, the categories are either safety seat or no restraint.

Two additional types of information are obtained. Starting with the 1993 survey, the use of motorcycle helmets was noted. The 1997 survey was the first in which the use of bicycle helmets was noted.

Each data collector is provided with a training period prior to beginning data collection. As part of the training, the data collectors review the guidelines and previous reports and collect trial sets of field data. The observers then collect data simultaneously at a sample of different types of locations. The data are then reviewed by the project manager before formal data collection is started.

The quality control of the data is the responsibility of the project manager. This includes a review of completed data collection forms as the survey progresses to check for any problem areas or questionable data.

The following list of guidelines for data collection is given to each observer.

1. Include the driver so the number of vehicles included in the sample will be known.

2. Data are typically collected at intersections with each observer collecting data on only one approach at the intersection or for one direction of travel for non-intersection sites.

3. Include all vehicles on the approach at low-volume locations. If the data cannot be collected in all lanes due to high volumes, split the time interval among the through lanes.

4. If traffic volume is too high to obtain data for all vehicles, record data for the next vehicle in view after recording the previous data.

5. Obtain a random sample of vehicles independent of whether the occupants are wearing a safety belt. Do not attempt to include all vehicles having an occupant wearing a safety belt at a location where all vehicles cannot be obtained.

6. Attempt to include data for children under four years of age for any vehicle in the sample in which such a child is a passenger, regardless of where the child is seated.

7. At intersections, only include vehicles either stopped or moving slowly. Obtain data from an observation point such that the occupants can be readily observed.

8. Excluding children under four years of age, collect data only for drivers and for passengers in the right-front seat (exclude the center front and rear seating positions).

9. Collect data during daylight hours on weekdays and weekends.

10. Collect one "observer hour" of data at each site. This could be one hour for one approach for a one-way road or 30 minutes for two approaches if the route has two-way traffic.

11. Begin and end data collection at a specified time.

12. Collect data for specified types of passenger motor vehicles (cars, pickup trucks, vans, and sport utility vehicles).

13. Collect data for both in-state and out-of-state vehicles.

14. If a problem such as weather or road construction prevents data from being collected on the assigned day and time for a specific location, a new day and time will be randomly selected by the project manager for data collection.

15. The time period in which data are collected at specific sites are randomly assigned to the data collectors by the project manager.

Observation schedules are set up so that sites are clustered with several sites to be completed within a single day. To the extent practicable, schedules are set up to provide balance by time of day and day of week.

If a segment could be surveyed because of construction activities, safety concerns, or some other legitimate reason, the location was abandoned. Observers were instructed to travel to a designated alternate site (same county, same road stratum) and observe at that site as nearly as possible to the assigned time, then to continue the assigned schedule by going to the next assigned site. Alternate sites were selected during the initial sampling process.

The surveys continued during mild inclement weather, as long as observations could continue to be recorded with high accuracy and observer safety. In the event of severe inclement weather, the surveys were discontinued until such time as the weather improved. Then, the surveys were resumed according to the original schedule with the next time slot and the appropriate site. If the amount of time lost was short, the observer continued the survey at the site where the disruption occurred and the remaining observations were made as closely to the scheduled time as possible.

2.2 DATA COLLECTION LOCATIONS

It was decided that data would, whenever possible, be obtained at intersections. For interstates and parkways, data were generally taken at the intersection of a ramp with a cross road. However, at rural interstate locations where the ramp volume was low and not representative of the interstate, data was taken from overpasses. The basis for collecting data at intersections was that it would increase accuracy since data would be collected for vehicles either stopped or moving slowly.

A computer file was used to select the locations. The file is the Highway Performance Monitoring System (HPMS). Characteristics of road segments for all state maintained roads are contained in this file. This information included the county, route, beginning and ending milepoint, and the number of intersections or interchanges within the segment.

A multi-stage area probability sampling approach was used in the survey design. In the first stage, primary sampling units were randomly selected. The primary sampling unit for the Kentucky survey is the county. Kentucky has a total of 120 counties, and county population is the measure of sampling unit size for the purpose of defining the initial set of sampling units to be considered. NHTSA guidelines allow exclusion from the survey coverage of the least populated units which represent 15 percent of the state's population. The 55 least populous counties, which collectively comprise nearly 15 percent of the state's population, are excluded from the sampling process. The 65 most populous counties, which together account for 85 percent of the state's population,

contain the set of eligible roadway segments. Appendix A shows a listing of Kentucky's 120 counties, ranked using 2008 Census estimates from most to least populous. The 65 counties which have been included in the sampling population as per the above criterion are identified in Appendix A, as well as the 55 least populated counties which have been excluded from the sampling population. The counties selected for data collection are highlighted.

Based on NHTSA guidelines for a 65 sampling unit population, a sample of 18 counties was selected. The 18-county sample was chosen using a two-step procedure. First, the two largest counties (Jefferson and Fayette), comprising nearly one-fourth of the state's population, were automatically placed into the first category. Then, 16 additional counties were selected from the remaining 63 eligible counties to make up the second category of the survey sample, with probability for selection proportional to the population of the county. The selection was done without replacement.

Once the 18 survey counties were chosen, second stage sampling of individual route segments in each of the counties was performed. The qualifying route segments comprising the sampling population were identified from the Kentucky HPMS file. The 160 sites were made up of 16 sites in each of the two largest counties and 8 sites in each of the remaining 16 counties. Segments were selected to sample across roadway functional class strata according to the criteria and procedures described below. The sample sites within each county-stratum were selected without replacement. The 18 counties and the number of sites in each are shown in Table 1.

Roadway segments were divided into the following four functional classification groups:

Road Class Stratum	Description
1	Interstates and Parkways
2	Other Principal Arterials
3	Minor Arterials
4	Collectors

For a given county, segments were randomly chosen from each of the four classification groups. The number of sites per stratum within each county are in proportion to the distribution of vehicle miles traveled (VMT) across strata within the county, with the guideline that no more than half of the segments in a county are from one stratum. Twice as many segments as needed were chosen (two segments for county-strata with only one required segment). The order of selection was retained; the first segments chosen are the primary observation sites and, whenever replacements were needed, they were taken in the order chosen. Six of the proposed counties have no road segments in the "Interstates and Parkways" stratum. In those cases, the sites were distributed among the other classes according to VMT. Table 2 lists, for each county-

stratum, total VMT and numbers of road segment observation sites. A listing of the 160 survey locations is given in Appendix B. A map showing the counties where data were collected is presented in Figure 2.

2.3 SEAT BELT USAGE RATE AND VARIABILITY CALCULATIONS

Calculation of Overall Seat Belt Usage Rate

Seat belt usage rates were calculated using formulas based on the proportion of the state's total VMT "represented" by the site. Seat belt use rate calculations follow a four-step process.

First, estimated rates were calculated for each of the road strata within each county. Observed usage rates for all of the sites within each stratum-county combination were combined by simple averaging, as shown in formula (1). (Since the sites' original probability of inclusion in the sample was proportional to their VMT, averaging their usage rates makes use of that sampling probability to reflect their different VMTs).

$$p_{i(j)k} = \sum_{l=1}^{n_{i(j)k}} p_{i(j)kl} / n_{i(j)k} \qquad (1)$$

where *i(j)* = county *i* within category *j* (category 1 = the 2 certain-selection counties, Jefferson and Fayette Counties, and category 2 = the 16 random-selection counties); *k* = road functional class stratum; *l* = site within stratum and county; $n_{i(j)k}$ = number of sites within the stratum-county combination; and $p_{i(j)kl}$ = the observed seat belt use rate at site *i(j)kl* = $B_{i(j)kl}/O_{i(j)kl}$ (where $B_{i(j)kl}$ = total number of belted occupants (drivers and outboard front-seat passengers) observed at the site and $O_{i(j)kl}$ = total number of occupants whose belt use was observed at the site).

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

$$p_{i(j)} = \frac{\sum_k VMT_{i(j)k}\, p_{i(j)k}}{\sum_k VMT_{i(j)k}} \qquad (2)$$

where $VMT_{i(j)k}$ = VMT of all roads in stratum *k* in county *i(j)*, and $p_{i(j)k}$ = seat belt use rate for stratum *k* in county *i(j)*.

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

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

where $VMT_{i(j)}$ = total VMT for county i in region j and $W_{i(j)}$ = the inverse of the probability of the county's selection: $W_{i(1)} = 1$ for the certainty counties and $W_{i(2)} = \frac{\sum_{l=1}^{63} Pop_{l(2)}}{16 * Pop_{i(2)}}$ where 63 = the number of high population counties in category 2 and 16 = the number of those counties to be selected.

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

$$p = \frac{\sum_{j=1}^{2} VMT_j p_j}{\sum_{j=1}^{2} VMT_j} \quad (4)$$

The result is a combination of the individual site seat belt usage rates weighted to reflect each site's importance in the total state VMT.

Estimates of subgroups of occupants, such as drivers or passengers and vehicle type (passenger car, pickup, etc.) were calculated in the same way.

Calculation of the Standard Error of the Overall Seat Belt Use Rate

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

$$\hat{\sigma}_{\hat{p}} = [\frac{n-1}{n} \sum_{i=1}^{n} (\hat{p}_i - \hat{p})^2]^{1/2} \quad (5)$$

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., 160; and $\hat{p}_i$ = the estimated statewide belt use proportion with site i excluded from the calculation.

The relative error rate, i.e., $\hat{\sigma}_{\hat{p}} / \hat{p}$, was also calculated, as well as the 95% confidence interval, i.e., $\hat{p} \pm 1.96\hat{\sigma}_{\hat{p}}$. These values are reported for the overall statewide seatbelt use rate.

3.0 SURVEY RESULTS

Usage rates for all front seat occupants (drivers and passengers) for the various types of highways and road classifications are summarized in Table 3. The overall statewide rate in 2009, using the data collected at 160 sites and the described weighting procedure, was 79.7 percent. The 95 percent confidence interval was plus or minus 0.98 percent (78.8 to 80.7). The sample size of all front seat occupants was 81,886. The highest rate by the functional classification of the highway was 86.0 percent for interstates and parkways with the lowest 72.4 percent for collector roads.

The overall statewide rate for drivers in 2009 was 80.3 percent. Drivers accounted for 78.7 percent of front seat occupants so they dominated the percentage determined for all front seat occupants. The usage rate for front seat passengers was 77.4 percent.

Usage rates for children under four years of age are given in Table 4. These rates are for children in both the front and the rear seats. The usage rate for children under one year of age (97.3 percent) was slightly lower than that for children one to three years of age (98.6 percent). The usage rate for the combination of these categories, or children under four years of age, was 98.6 percent.

The sample size for children under four years of age was 508. This age category corresponds to the children for which the mandatory child restraint law would apply. The 2009 usage rate of 98.6 percent is the highest percentage found and compares to the previous high of 97.7 percent in 2008. This percentage was about 15 percent in 1982 before enactment of the child restraint law, increased to approximately 30 percent after enactment of the law having no penalty, and increased again to almost 50 percent in 1988 after the addition of a monetary penalty to the child restraint law.

A summary of the data collected is given in Appendix C. For each of the 160 data sites, the usage rate and sample size are given for all front seat occupants, drivers, front-seat passengers, and children under four years of age (both front and rear seat). The relative error and confidence interval are given for the "all front seat occupant" category. Usage rates for front seat occupants ranged from 53.9 percent (a rural location in Knox County) to 91.8 percent (an interstate location in Bullitt County). There were only seven sites which had a usage rate below 60 percent with all at rural locations. There were 78 sites which had a usage rate of 80 percent or higher. The highest rate found on a non-interstate or parkway was 89 percent on an arterial roadway in Daviess County.

A substantial difference in usage rate (for all front seat occupants) was noted when vehicle type and road class were considered (Table 5). The rate varied substantially from 83.7 for vans and 82.3 percent for sport utility vehicles to 69.0 percent for pickup trucks. The rate for passenger cars was 82.6 percent. It can be seen that use of safety belts is much lower in pickup trucks than any other vehicle type, and pickup trucks made up about 21 percent of the sample. The largest portion of the sample was for passenger cars with 47 percent followed by 21 percent for sport utility vehicles and 11 percent for vans.

Usage rate by county is shown in Table 6. The rate varied from a high of 85.9 percent in Fayette County to a low of 65.6 percent in Knott County. The usage rate by county and vehicle type is given in Table 7. The rates varied from a high of 90.2 percent for vans in Daviess County to 52.8 percent for pickups in Knox County.

While the data collection procedure changed in 1990, 1999, and 2009, the usage rate in 2009 can still be compared to the statewide rates from past years (Table 8). The previous studies showed that statewide driver usage rates have dramatically increased from 4 percent in 1982 to 80 percent in 2009. The changes over the years have been related to changes in legislation and increased enforcement and education.

For the past several years a mini-survey of 21 sites (out of the 200 sites for the full survey) has been conducted. This mini-survey was conducted this year to compare to the new procedure. The results are given in Appendix D. A usage rate of 79.9 percent was determined which compares very closely to the 79.7 percent found using the new procedure. This is an increase from 75.6 percent at the mini-survey sites in 2008. This data confirms the results found using the new procedure and the increase which occurred in 2009.

Helmet use by motorcyclists was also observed. Kentucky had a statewide law requiring the use of a helmet by a motorcyclist until it was repealed starting July 15, 1998. The results of surveys taken during the mandatory usage period had found a usage rate of over 95 percent. Data were taken in 1998 both before and after the effective date of the repeal. Prior to July 15, 1998 only 10 of the 240 observed motorcyclists were not wearing a helmet (giving a usage rate of 96 percent). After this date, 29 of 148 motorcyclists were observed not wearing a helmet giving a usage rate of 76 percent. The motorcycle helmet usage for 1999 through 2009 is given in Table 9. Usage has remained close to 60 percent over those years.

Bicycle helmet use was observed while data were being collected. Only 29 bicyclists were observed with 14 using helmets (48 percent). This rate is higher than found in previous surveys. The very small sample size does not allow any conclusions about trends but does support the opinion that the usage rate has been very low.

4.0 SUMMARY

Observations were taken at 160 sites across Kentucky to obtain safety belt usage rates. The 2009 survey resulted in a sample size of 81,886 front seat occupants (including 64,419 drivers). The data collection procedure and site selection criteria were based on national criteria. The usage rate for all front seat occupants was 79.7 percent.

A "secondary enforcement" statewide safety belt law was passed in Kentucky in 1994 with a law allowing "primary enforcement" enacted in 2006. Prior to the original 2004 statewide law, there were local ordinances passed in several cities and counties which covered approximately one-third of the statewide population. The increase in usage over the past 27 years (as shown in Table 8) can be directly related to the changes in legislation.

Usage was highest on interstates and lowest on local roads. When type of vehicle was considered, usage was highest for vans and sport utility vehicles and lowest for pickup trucks. Usage was higher in the more urban counties compared to the most rural.

The statewide usage rate for children under the age of four (including both the front and rear seat) was determined to be 98.6 percent in 2009. This very high rate has existed for many years. One reason for the very high usage for small children is that primary, rather than secondary, enforcement has applied for many years.

The motorcycle helmet law was repealed in 1998. There had been a very high compliance with the requirement to wear a helmet (over 95 percent), but the helmet usage percentage has decreased (with 64 percent in 2009). This shows the large decrease in usage related to the repeal of the mandatory usage law. The percentage of a small sample of bicyclists observed wearing a safety helmet was low.

5.0 RECOMMENDATIONS

The data show that the level of safety belt usage in 2009 is the highest since the start of the surveys in 1982. The large increase in 2009 compared to 2008 (73.3 to 79.7 percent) can be related to increased education and to the enforcement of the primary enforcement law. The data support maintaining the education and enforcement efforts. The variation by county and vehicle type show where more emphasis should be placed.

Figure 1. Data Collection Form

SAFETY BELT DATA COLLECTION FORM

Date:_____ Starting Time:_____ Ending Time:_____ Int #: _____

Location:_____ Sheet #: _____

Observer:_____ Comment: _____

DRIVER USAGE

Vehicle	Harness or Belt	None
PC		
PU		
VAN		
SUV		

FRONT-SEAT OCCUPANT USAGE (OVER 3 YEARS OF AGE)

Vehicle	Harness or Belt	None
PC		
PU		
VAN		
SUV		

USAGE FOR CHILDREN (1-3 YEARS OF AGE)

Position	Safety Seat	Booster Seat	Harness or Belt	None
FRONT				
REAR				

USAGE FOR INFANTS (UNDER 1 YEAR OF AGE)

Position	Safety Seat	None
FRONT		
REAR		

USAGE OF MOTORCYCLE HELMET

YES	No

USAGE OF BICYCLE HELMET

YES	No

4/1998

Figure 2. Selected Counties for Seatbelt Sites

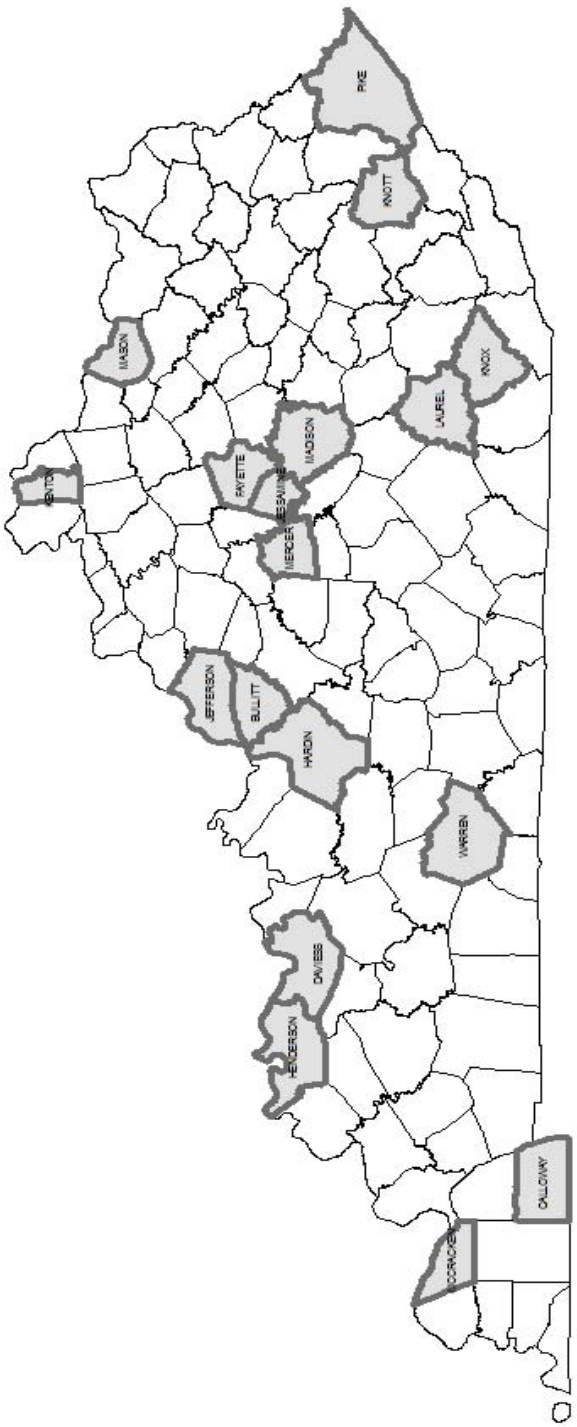

Table 1. Survey Counties

	Geographical Area	Number of Observational Sites
1	**Jefferson County**	**16***
2	**Fayette County**	**16***
3	Knott County	8**
4	Calloway County	8**
5	McCracken County	8**
6	Kenton County	8**
7	Jessamine County	8**
8	Daviess County	8**
9	Mason County	8**
10	Henderson County	8**
11	Bullitt County	8**
12	Madison County	8**
13	Mercer County	8**
14	Warren County	8**
15	Knox County	8**
16	Laurel County	8**
17	Pike County	8**
18	Hardin County	8**
	Total Observational Sites	160

* Certainty counties were allotted 16 observational sites
** Remaining counties were allotted 8 observational sites

Table 2. Number of Site Allocations per Road Class (by County)

County	Sites Allocated	County VMT (excl. local)	Road Class Stratum	County-Stratum VMT	Number of Sites if Allocated by VMT	**Adjusted Number of Sites**
Jefferson	**16**	5,662,204,013	1	3,428,202,911	9.69	**8**
			2	1,566,486,454	4.43	**5**
			3	579,805,454	1.64	**2**
			4	87,709,194	0.25	**1**
Fayette	**16**	2,037,784,505	1	1,029,408,590	8.08	**8**
			2	787,888,177	6.19	**6**
			3	127,945,572	1.00	**1**
			4	92,542,166	0.73	**1**
Knott	**8**	179,437,128	1	0	0.00	**0**
			2	76,675,145	3.42	**4**
			3	27,965,271	1.25	**1**
			4	74,796,712	3.33	**3**
Calloway	**8**	225,344,385	1	0	0.00	**0**
			2	122,621,989	4.35	**4**
			3	24,724,978	0.88	**1**
			4	77,997,418	2.77	**3**
McCracken	**8**	654,652,877	1	222,383,178	2.72	**3**
			2	234,563,650	2.87	**3**
			3	111,779,953	1.37	**1**
			4	85,926,095	1.05	**1**
Kenton	**8**	1,334,349,118	1	881,553,987	5.29	**4**
			2	184,867,682	1.11	**2**
			3	164,856,523	0.99	**1**
			4	103,070,925	0.62	**1**
Jessamine	**8**	305,461,484	1	0	0.00	**0**
			2	167,871,821	4.40	**4**
			3	81,446,197	2.13	**2**
			4	56,143,466	1.47	**2**
Daviess	**8**	602,740,652	1	136,543,073	1.81	**2**
			2	246,801,576	3.28	**3**
			3	87,825,388	1.17	**1**
			4	131,570,615	1.75	**2**
Mason	**8**	189,886,599	1	0	0.00	**0**
			2	105,884,656	4.46	**4**
			3	53,221,561	2.24	**2**
			4	30,780,382	1.30	**2**

Table 2. Number of Site Allocations per Road Class (by County) (continued)

Henderson	**8**	419,993,200	1	125,760,931	2.40	**3**
			2	174,912,763	3.33	**3**
			3	63,157,348	1.20	**1**
			4	56,162,157	1.07	**1**
Bullitt	**8**	775,709,682	1	488,512,652	5.04	**4**
			2	129,479,561	1.34	**2**
			3	103,252,166	1.06	**1**
			4	54,465,304	0.56	**1**
Madison	**8**	856,419,740	1	461,576,486	4.31	**4**
			2	144,133,180	1.35	**1**
			3	177,822,202	1.66	**2**
			4	72,887,872	0.68	**1**
Mercer	**8**	181,201,996	1	16,672,470	0.74	**1**
			2	110,799,013	4.89	**4**
			3	20,283,349	0.90	**1**
			4	33,447,164	1.48	**2**
Warren	**8**	1,151,750,666	1	555,176,045	3.86	**4**
			2	210,819,131	1.46	**1**
			3	216,445,264	1.50	**2**
			4	169,310,226	1.18	**1**
Knox	**8**	258,196,709	1	0	0.00	**0**
			2	171,673,943	5.32	**4**
			3	6,051,320	0.19	**1**
			4	80,471,446	2.49	**3**
Laurel	**8**	737,805,854	1	343,237,792	3.72	**4**
			2	104,908,513	1.14	**1**
			3	86,681,538	0.94	**1**
			4	202,978,010	2.20	**2**
Pike	**8**	689,274,190	1	0	0.00	**0**
			2	400,718,551	4.65	**4**
			3	77,534,043	0.90	**1**
			4	211,021,597	2.45	**3**
Hardin	**8**	1,113,356,778	1	510,918,645	3.67	**3**
			2	240,082,313	1.73	**2**
			3	208,398,866	1.50	**2**
			4	153,956,954	1.11	**1**

Totals	**160**	17,375,569,577	1	8,199,946,761	51.32	**48**
			2	5,181,188,117	59.69	**57**
			3	2,219,196,993	22.52	**24**
			4	1,775,237,706	26.47	**31**

TABLE 3. USAGE RATE FOR FRONT-SEAT OCCUPANTS (BY ROAD CLASS)

ROAD CLASSIFICATION	PERCENT USAGE BY TYPE		
	DRIVERS	PASSENGERS*	ALL*
Interstates and Other Expressways	86.4	84.0	86.0
Other Principal Arterials	78.8	76.5	78.4
Minor Arterials	77.6	70.5	76.1
Collectors	72.7	71.4	72.4
All	80.3	77.4	79.7

TABLE 4. USAGE RATE FOR CHILDREN (FRONT AND REAR) BY ROAD CLASS

ROAD CLASSIFICATION	PERCENT USAGE BY AGE (YEARS)		
	UNDER 1	1 TO 3	UNDER 4
Interstates and Other Expressways	99.7	99.9	99.9
Other Principal Arterials	95.8	98.9	98.1
Minor Arterials	99.3	99.2	99.5
Collectors	98.1	99.4	99.6
All	97.3	98.6	98.6

TABLE 5. USAGE RATE FOR FRONT-SEAT OCCUPANTS (BY ROAD CLASS AND VEHICLE TYPE)

ROAD CLASSIFICATION	PERCENT USAGE BY VEHICLE TYPE				
	PC	PU	VAN	SUV	ALL*
Interstates and Other Expressways	88.0	75.3	87.9	88.7	86.0
Other Principal Arterials	81.0	67.8	81.0	81.8	78.4
Minor Arterials	78.9	67.5	79.2	78.0	76.1
Collectors	77.5	61.2	81.6	71.9	72.4
All	82.6	69.0	83.7	82.3	79.7

*Including children under four

TABLE 6. USAGE RATE FOR FRONT-SEAT OCCUPANTS (BY COUNTY)

COUNTY	PERCENT USAGE BY TYPE		
	DRIVERS	PASSENGERS*	ALL*
Bullitt	81.5	78.8	80.8
Calloway	77.9	74.3	77.4
Daviess	84.9	82.9	84.6
Fayette	86.2	84.3	85.9
Hardin	83.5	84.1	83.6
Henderson	77.3	76.2	77.1
Jefferson	82.7	77.7	81.8
Jessamine	77.9	79.2	78.2
Kenton	84.3	81.1	83.5
Knott	66.0	63.9	65.6
Knox	67.5	65.1	66.9
Laurel	75.8	74.7	75.4
Madison	84.8	80.8	83.8
Mason	75.2	73.0	74.7
McCracken	82.5	77.6	81.8
Mercer	74.2	72.9	73.8
Pike	67.3	67.9	67.5
Warren	82.2	80.8	81.7
All	80.3	77.4	79.7

*Including children under four

TABLE 7. USAGE RATE FOR FRONT-SEAT OCCUPANTS (BY COUNTY AND VEHICLE TYPE)

COUNTY	PERCENT USAGE BY VEHICLE TYPE				
	PC	PU	VAN	SUV	ALL*
Bullitt	84.4	69.8	83.7	81.6	80.8
Calloway	82.6	65.4	89.2	78.0	77.4
Daviess	87.0	73.4	90.2	89.2	84.6
Fayette	87.5	78.8	84.3	87.7	85.9
Hardin	85.5	75.9	86.8	80.8	83.6
Henderson	82.8	66.2	87.2	80.7	77.1
Jefferson	83.7	70.1	83.7	84.7	81.8
Jessamine	84.0	64.1	82.6	79.4	78.2
Kenton	84.7	75.9	81.8	87.1	83.5
Knott	68.3	57.6	81.6	67.2	65.6
Knox	71.3	52.8	77.4	71.1	66.9
Laurel	79.3	62.1	81.2	80.0	75.4
Madison	87.0	73.6	86.5	86.6	83.8
Mason	78.2	62.2	82.5	78.7	74.7
McCracken	84.0	73.8	87.6	84.1	81.8
Mercer	79.5	61.0	76.3	76.7	73.8
Pike	75.0	56.0	79.9	72.0	67.5
Warren	84.1	70.4	84.6	84.9	81.7
All	82.6	69.0	83.7	82.3	79.7

*Including children under four

TABLE 8. TREND IN STATEWIDE USAGE RATES

	PERCENT USING SAFETY BELTS		
YEAR	ALL FRONT SEAT OCCUPANTS	DRIVERS	CHILDREN UNDER FOUR YEARS OF AGE*
1982	**	4	15
1983	**	6	24
1984	**	7	30
1985	9	9	29
1986	13	13	30
1988	20	21	48
1989	25	26	49
1990	33	32	57
1991	39	39	57
1992	40	41	62
1993	42	42	61
1994	58	58	72
1995	54	54	66
1996	55	55	79
1997	54	54	82
1998	54	54	80
1999	59	59	89
2000	60	60	87
2001	62	62	89
2002	62	62	93
2003	66	65	95
2004	66	66	96
2005	67	67	94
2006	67	68	94
2007	72	72	98
2008	73	74	98
2009	80	80	99

*Children using either safety seat or safety belt. Children seated in front or rear seat.
**Data not available.

TABLE 9. TREND IN MOTORCYCLE HELMET USAGE

	PERCENT USING HELMET	
YEAR	SAMPLE SIZE	PERCENT USAGE
1999	452	65
2000	427	70
2001	395	56
2002	596	57
2003	512	56
2004	631	58
2005	918	59
2006	949	60
2007	897	56
2008	1244	58
2009	537	64

Appendix A:

County Populations

APPENDIX A. Population of Kentucky Counties (2008 Census Estimates)

County	Population	Percent Total	Cumulative Percent Total
Jefferson	**713,877**	**16.72**	**16.72**
Fayette	**282,114**	**6.61**	**23.33**
Kenton	**157,629**	**3.69**	**27.02**
Boone	115,231	2.70	29.72
Warren	**105,862**	**2.48**	**32.20**
Hardin	**98,546**	**2.31**	**34.51**
Daviess	**94,418**	**2.21**	**36.72**
Campbell	87,038	2.04	38.76
Madison	**82,192**	**1.93**	**40.68**
Christian	79,820	1.87	42.55
Bullitt	**75,028**	**1.76**	**44.31**
Pike	**65,331**	**1.53**	**45.84**
McCracken	**65,109**	**1.53**	**47.37**
Pulaski	60,851	1.43	48.79
Laurel	**57,586**	**1.35**	**50.14**
Oldham	56,874	1.33	51.47
Franklin	48,844	1.14	52.62
Boyd	48,560	1.14	53.75
Jessamine	**46,716**	**1.09**	**54.85**
Hopkins	46,338	1.09	55.93
Henderson	**45,462**	**1.06**	**57.00**
Scott	44,549	1.04	58.04
Nelson	43,113	1.01	59.05
Floyd	42,094	0.99	60.04
Barren	41,566	0.97	61.01
Shelby	41,157	0.96	61.98
Whitley	38,668	0.91	62.88
Graves	37,487	0.88	63.76
Greenup	37,388	0.88	64.64
Calloway	**36,240**	**0.85**	**65.48**
Clark	35,691	0.84	66.32
Knox	**32,810**	**0.77**	**67.09**
Marshall	31,189	0.73	67.82
Muhlenberg	31,187	0.73	68.55
Harlan	30,783	0.72	69.27
Perry	29,241	0.68	69.96
Bell	29,055	0.68	70.64
Boyle	28,933	0.68	71.31
Carter	27,454	0.64	71.96
Logan	27,117	0.64	72.59

County	Population	Percent Total	Cumulative Percent Total
Meade	27,043	0.63	73.23
Montgomery	25,618	0.60	73.83
Grant	25,549	0.60	74.42
Grayson	25,497	0.60	75.02
Lincoln	25,072	0.59	75.61
Woodford	24,526	0.57	76.18
Taylor	24,069	0.56	76.75
Johnson	24,056	0.56	77.31
Clay	23,930	0.56	77.87
Letcher	23,890	0.56	78.43
Ohio	23,789	0.56	78.99
Rowan	22,733	0.53	79.52
Mercer	**21,920**	**0.51**	**80.03**
Anderson	21,347	0.50	80.53
Wayne	20,696	0.48	81.02
Bourbon	19,828	0.46	81.48
Breckinridge	19,132	0.45	81.93
Allen	19,090	0.45	82.38
Marion	19,063	0.45	82.82
Harrison	18,654	0.44	83.26
Hart	18,561	0.43	83.70
Adair	17,773	0.42	84.11
Mason	**17,414**	**0.41**	**84.52**
Knott	**17,385**	**0.41**	**84.93**
Spencer	17,382	0.41	85.34
McCreary	17,315	0.41	85.74
Russell	17,296	0.41	86.15
Garrard	17,021	0.40	86.54
Simpson	17,019	0.40	86.94
Rockcastle	16,788	0.39	87.34
Lawrence	16,443	0.39	87.72
Casey	16,214	0.38	88.10
Breathitt	15,813	0.37	88.47
Henry	15,741	0.37	88.84
Union	15,024	0.35	89.19
Pendleton	14,992	0.35	89.54
Estill	14,948	0.35	89.89
Fleming	14,735	0.35	90.24
Morgan	14,156	0.33	90.57
Powell	13,859	0.32	90.89
Lewis	13,807	0.32	91.22
Larue	13,722	0.32	91.54

County	Population	Percent Total	Cumulative Percent Total
Webster	13,669	0.32	91.86
Jackson	13,645	0.32	92.18
Trigg	13,418	0.31	92.49
Butler	13,276	0.31	92.80
Magoffin	13,151	0.31	93.11
Caldwell	12,866	0.30	93.41
Todd	12,173	0.29	93.70
Edmonson	12,085	0.28	93.98
Bath	11,750	0.28	94.26
Leslie	11,639	0.27	94.53
Green	11,613	0.27	94.80
Martin	11,602	0.27	95.07
Washington	11,595	0.27	95.35
Monroe	11,547	0.27	95.62
Owen	11,432	0.27	95.88
Carroll	10,627	0.25	96.13
Metcalfe	10,288	0.24	96.37
McLean	9,681	0.23	96.60
Livingston	9,591	0.22	96.83
Clinton	9,568	0.22	97.05
Crittenden	9,244	0.22	97.27
Trimble	9,012	0.21	97.48
Hancock	8,663	0.20	97.68
Bracken	8,569	0.20	97.88
Ballard	8,323	0.19	98.08
Lyon	8,245	0.19	98.27
Gallatin	8,071	0.19	98.46
Lee	7,414	0.17	98.63
Elliott	7,280	0.17	98.80
Wolfe	6,989	0.16	98.97
Fulton	6,855	0.16	99.13
Cumberland	6,817	0.16	99.29
Nicholas	6,811	0.16	99.45
Menifee	6,744	0.16	99.60
Carlisle	5,162	0.12	99.72
Hickman	4,936	0.12	99.84
Owsley	4,634	0.11	99.95
Robertson	2,202	0.05	100.00
KENTUCKY	**4,269,245**		

*Highlighted counties are those included for belt use observation.

Appendix B:

Survey Locations

APPENDIX B. SURVEY LOCATIONS

Site Number	Road Classification	County	Road Surveyed	Reference
1	Interstates and Other Expressways	Bullitt	I-65	Exit 105 (KY 61)
2	Interstates and Other Expressways	Bullitt	I-65	Exit 117 (KY 44)
3	Interstates and Other Expressways	Bullitt	I-65	Exit 121 (1526)
4	Interstates and Other Expressways	Bullitt	I-65	Exit 112 (KY 245)
5	Other Principal Arterials	Bullitt	KY-44	KY 61 (N Buckman St)
6	Other Principal Arterials	Bullitt	US-31E	KY 44
7	Minor Arterials	Bullitt	KY-1450	KY 1526 (Brooks Hill Rd / John D. Harper Blvd)
8	Collectors	Bullitt	W Blue Lick Rd (KY 2673)	KY 61
9	Other Principal Arterials	Calloway	US-641	KY 80
10	Other Principal Arterials	Calloway	US-641 (12th St)	KY 94 (Main St)
11	Other Principal Arterials	Calloway	KY-121	Lowe's Dr
12	Other Principal Arterials	Calloway	US-641 (12th St)	Glendale Rd
13	Minor Arterials	Calloway	KY-822 (16th St)	KY 94 (Main St)
14	Collectors	Calloway	KY-822 (16th St)	KY 821 (Sycamore St)
15	Collectors	Calloway	KY-2075 (4th St)	US-641
16	Collectors	Calloway	KY-121	US 641 (Glendale Rd)
17	Interstates and Other Expressways	Daviess	US-60B	US 60 (T-intersection)
18	Interstates and Other Expressways	Daviess	US-60B	US 431 (Frederica St)
19	Other Principal Arterials	Daviess	US-60	KY 331 (Industrial Dr)
20	Other Principal Arterials	Daviess	US-431 (Frederica St)	Tamarack Rd
21	Other Principal Arterials	Daviess	KY-54 (Leitchfield Rd)	KY 3143 (Fairview Dr)
22	Minor Arterials	Daviess	KY-2698 (Carter Rd)	Buckland Square
23	Collectors	Daviess	KY-298	Breckenridge St
24	Collectors	Daviess	KY-1432 (Burlew Blvd)	KY 2155 (New Hartford Rd)
25	Interstates and Other Expressways	Fayette	I-75	Exit 104 (KY418/Walnut Hill Rd
26	Interstates and Other Expressways	Fayette	KY-4	Exit 2 (US 68/Harrodsburg Rd)
27	Interstates and Other Expressways	Fayette	I-75	Exit 10 (KY418-Athens)
28	Interstates and Other Expressways	Fayette	KY-4	Exit 18 (KY 1974/Tates Creek Rd)
29	Interstates and Other Expressways	Fayette	KY-4	Exit 6 (KY 1681/Old Frankfort Pk)
30	Interstates and Other Expressways	Fayette	I-75	Exit 115 (KY 922/Newtown Pk)
31	Interstates and Other Expressways	Fayette	I-64	Exit 87 (KY 859/Haley Rd)
32	Interstates and Other Expressways	Fayette	KY-4	Exit 14 (US 25/Richmond Rd)
33	Other Principal Arterials	Fayette	US-60	Sir Barton Way
34	Other Principal Arterials	Fayette	US-60	Walton Ave
35	Other Principal Arterials	Fayette	KY-1974	Cooper Dr
36	Other Principal Arterials	Fayette	KY-1974	Armstrong Mill Rd
37	Other Principal Arterials	Fayette	KY-922	Nandino Blvd/Lexmark Dr
38	Other Principal Arterials	Fayette	US-25	Upper St
39	Minor Arterials	Fayette	US-421	Masterson Station Dr.
40	Collectors	Fayette	KY-1968 (Parkers Mill Rd)	Man O War Blvd
41	Interstates and Other Expressways	Hardin	I-65	Exit 86 (Glendale)
42	Interstates and Other Expressways	Hardin	WK-9001	US 31WB (Elizabethtown Bypass over WK Pkwy)
43	Interstates and Other Expressways	Hardin	I-65	Exit 94 (US 62/Bardstown Rd over I-65)
44	Other Principal Arterials	Hardin	KY-61	Sportsmans Lane Road
45	Other Principal Arterials	Hardin	US-31W	Walmart Dr (Towne Mall)
46	Minor Arterials	Hardin	KY-251	Poplar Street (4 way stop)
47	Minor Arterials	Hardin	US-62	Ring Rd
48	Collectors	Hardin	KY-224	US 31W (T-intersection)
49	Interstates and Other Expressways	Henderson	EB-9004	KY-425
50	Interstates and Other Expressways	Henderson	AU-9005	Exit 10
51	Interstates and Other Expressways	Henderson	US-41	Marywood Dr
52	Other Principal Arterials	Henderson	KY-425 (Henderson Bypass)	US 41
53	Other Principal Arterials	Henderson	US-41A	5th St
54	Other Principal Arterials	Henderson	US-60	KY 425/KY 136 (Bypass)
55	Minor Arterials	Henderson	US-41A	KY 425
56	Collectors	Henderson	KY-136	US 41
57	Interstates and Other Expressways	Jefferson	I-64	Exit 10 (Cannons Ln)
58	Interstates and Other Expressways	Jefferson	I-65	Exit 128 (Fern Valley Rd)
59	Interstates and Other Expressways	Jefferson	I-64	Exit 15 (S. Hurstbourne Pkwy)
60	Interstates and Other Expressways	Jefferson	I-264	Exit 9 (Taylor Blvd)
61	Interstates and Other Expressways	Jefferson	I-71	Exit 9 (I-265)
62	Interstates and Other Expressways	Jefferson	I-71	Exit 2 (Zorn Ave)
63	Interstates and Other Expressways	Jefferson	I-265	Exit 27 (Shelbyville Rd.)
64	Interstates and Other Expressways	Jefferson	KY-841	US 42 (T-intersection)
65	Other Principal Arterials	Jefferson	US-42 (Brownsboro Rd)	Haldeman Rd
66	Other Principal Arterials	Jefferson	KY-1747	KY 864 (Fegenbush Ln)
67	Other Principal Arterials	Jefferson	US-31W	Garrs Ln
68	Other Principal Arterials	Jefferson	US-42	US 60

APPENDIX B. SURVEY LOCATIONS

Site Number	Road Classification	County	Road Surveyed	Reference
69	Other Principal Arterials	Jefferson	KY-2054	KY 2054 (Algonquin Ave) @ KY 1931 (S. 7th St)
70	Minor Arterials	Jefferson	KY-1020 (3rd St)	Central Ave
71	Minor Arterials	Jefferson	KY-146	Factory Ln/Chamberlain Ln
72	Collectors	Jefferson	KY-329	US 42 (T-intersection)
73	Other Principal Arterials	Jessamine	US-27	KY 1980 (Brannon Crossing)
74	Other Principal Arterials	Jessamine	US-27	Elizabeth Dr.
75	Other Principal Arterials	Jessamine	US-27	Edgewood Dr.
76	Other Principal Arterials	Jessamine	US-68	KY 1980 (Brannon Crossing)
77	Minor Arterials	Jessamine	KY-169	US 27
78	Minor Arterials	Jessamine	KY-169	N. Central Ave (4 way stop)
79	Collectors	Jessamine	KY-29	KY 1268
80	Collectors	Jessamine	KY-1981	KY 169 (2 T intersection)
81	Interstates and Other Expressways	Kenton	I-75	Exit 166
82	Interstates and Other Expressways	Kenton	I-75	Exit 186
83	Interstates and Other Expressways	Kenton	I-275	Exit 79
84	Interstates and Other Expressways	Kenton	I-75	Exit 184 (exit B)
85	Other Principal Arterials	Kenton	KY-1120	Garrard St
86	Other Principal Arterials	Kenton	KY-17 (Madison Ave)	20th St
87	Minor Arterials	Kenton	KY-16	36th St
88	Collectors	Kenton	KY-1501	KY 17
89	Other Principal Arterials	Knott	KY-15	Horseshoe Bend Rd
90	Other Principal Arterials	Knott	KY-15	KY 160
91	Other Principal Arterials	Knott	KY-80	KY 160
92	Other Principal Arterials	Knott	KY-15 (Smithboro Rd)	KY 1088
93	Minor Arterials	Knott	KY-160	KY 80
94	Collectors	Knott	KY-1087 (Possum Trot Rd)	KY 80
95	Collectors	Knott	KY-1410 (Burgeys Creek Rd)	KY 160 (T-intersection)
96	Collectors	Knott	KY-1231	KY 15 (T-intersection)
97	Other Principal Arterials	Knox	US-25E	KY 11 (Morris St in Heidrick, KY)
98	Other Principal Arterials	Knox	US-25E	KY 312 (Master St)
99	Other Principal Arterials	Knox	KY-3041	US 25E
100	Other Principal Arterials	Knox	US-25E	KY 11 (Daniel Boone Dr)
101	Minor Arterials	Knox	KY-312	SHOPPING CENTER ENTRANCE
102	Collectors	Knox	KY-6	KY 11
103	Collectors	Knox	KY-223	US 25
104	Collectors	Knox	KY-3436 (Hart Rd)	KY 6
105	Interstates and Other Expressways	Laurel	I-75	Exit 49 (KY 909)
106	Interstates and Other Expressways	Laurel	I-75	Exit 29 (US 25/Corbin Bypass)
107	Interstates and Other Expressways	Laurel	HR-9006	KY 354/KY 30
108	Interstates and Other Expressways	Laurel	I-75	Exit 41 (KY 80)
109	Other Principal Arterials	Laurel	KY-192	KY 1006
110	Minor Arterials	Laurel	US-25	3rd St
111	Collectors	Laurel	KY-472 (Johnson Rd)	KY 80 (Hal Rodger Pkwy)
112	Collectors	Laurel	KY-490	KY 30 (School St)
113	Interstates and Other Expressways	Madison	I-75	Exit 76 (Berea/KY 21)
114	Interstates and Other Expressways	Madison	I-75	Exit 97 (US 25)
115	Interstates and Other Expressways	Madison	I-75	Exit 87 (Eastern Bypass)
116	Interstates and Other Expressways	Madison	I-75	Exit 90 (Richmond/US 25)
117	Other Principal Arterials	Madison	US-25	Keeneland Dr
118	Minor Arterials	Madison	KY-21	Dogwood Dr
119	Minor Arterials	Madison	KY-52	KY 374 (Moberly Rd)
120	Collectors	Madison	US-25	KY 627/KY 3055/White Hall Shrine Rd
121	Other Principal Arterials	Mason	US-68	US 62/KY 1236
122	Other Principal Arterials	Mason	KY-9 (AA Highway)	Walmart Entrance
123	Other Principal Arterials	Mason	US-62 (AA Highway)	KY 9 (Clyde T Barbour Blvd)
124	Other Principal Arterials	Mason	KY-9 (AA Highway)	US 62 (Lexington Rd)
125	Minor Arterials	Mason	KY-8 (3rd St)	Market St
126	Minor Arterials	Mason	KY-10 (Mason Lewis Rd)	Carmel St
127	Collectors	Mason	KY-1235 (Dover Minerva Rd)	KY 8 (Mary Ingles Hwy) (T-intersection)
128	Collectors	Mason	KY-1448 (KY-11)	KY 9 (AA Highway)
129	Interstates and Other Expressways	McCracken	I-24	Exit 4 (Hinkleville Rd)
130	Interstates and Other Expressways	McCracken	I-24	KY 994 overpass
131	Interstates and Other Expressways	McCracken	I-24	Exit 16 (US 68)
132	Other Principal Arterials	McCracken	US-45 (Joe Clifton Dr)	US 60
133	Other Principal Arterials	McCracken	US-60X (S. 4th St)	US 45X (Kentucky Ave)
134	Other Principal Arterials	McCracken	US-60	KY 994 (Old Mayfield Rd)
135	Minor Arterials	McCracken	KY-284 (Old Benton Rd)	KY 450 (Frontage Rd)
136	Collectors	McCracken	KY-339 (Clinton Rd)	US 45 (Lone Oak Rd)

APPENDIX B. SURVEY LOCATIONS

Site Number	Road Classification	County	Road Surveyed	Reference
137	Interstates and Other Expressways	Mercer	BG-9002	Bondville Rd overpass
138	Other Principal Arterials	Mercer	US-127	US 127 Bypass
139	Other Principal Arterials	Mercer	US-127	Cardinal Dr
140	Other Principal Arterials	Mercer	US-127	US 68 (Mooreland Ave)
141	Other Principal Arterials	Mercer	US-68	Main St
142	Minor Arterials	Mercer	US-68	US 127 Bypass
143	Collectors	Mercer	KY-33	KY 152 (E Main St)
144	Collectors	Mercer	KY-390	At RR Crossing
145	Other Principal Arterials	Pike	US-119	KY 1426
146	Other Principal Arterials	Pike	US-23	KY 1426
147	Other Principal Arterials	Pike	US-23 (N. Mayo Tr)	US-119 (Buckley Creek Rd)
148	Other Principal Arterials	Pike	US-23	KY 2061 (Cowpen Rd)
149	Minor Arterials	Pike	KY-632	KY 194
150	Collectors	Pike	KY-308	US-119
151	Collectors	Pike	KY-194	US-119
152	Collectors	Pike	KY-1384	Porter Rd
153	Interstates and Other Expressways	Warren	I-65	Exit 26 (KY 234)
154	Interstates and Other Expressways	Warren	WN-9007	Exit 7 (US 23)
155	Interstates and Other Expressways	Warren	I-65	Exit 22 (US 231)
156	Interstates and Other Expressways	Warren	I-65	Exit 38 (KY101)
157	Other Principal Arterials	Warren	US-231	Smallhouse Rd
158	Minor Arterials	Warren	KY-185	Double Springs
159	Minor Arterials	Warren	US-231X	Normal Street
160	Collectors	Warren	US-31W	KY 242

Appendix C:

Summary of Data

APPENDIX C. SUMMARY OF DATA

	ALL FRONT SEAT OCCUPANTS				CATEGORY					
					DRIVERS		FRONT SEAT PASSENGERS		UNDER FOUR (FRONT AND REAR)	
Location Number	Sample	Percent Usage	Relative Error*	Confidence Interval*	Sample	Percent Usage	Sample	Percent Usage	Sample	Percent Usage
1	425	91.8	2.8	2.6	334	91.3	91	93.4	0	---
2	611	83.5	3.5	2.9	458	83.6	153	83.0	8	100.0
3	993	84.4	2.7	2.3	784	84.8	209	82.8	4	100.0
4	780	85.4	2.9	2.5	579	85.3	201	85.6	1	100.0
5	722	75.8	4.1	3.1	661	75.3	61	80.3	0	---
6	622	75.1	4.5	3.4	478	75.9	144	72.2	5	80.0
7	407	70.3	6.3	4.4	312	74.0	95	57.9	0	---
8	210	64.8	10.0	6.5	162	66.7	48	58.3	1	100.0
9	754	79.8	3.6	2.9	590	78.6	164	84.1	5	100.0
10	491	83.3	4.0	3.3	429	84.4	62	75.8	2	100.0
11	345	73.3	6.4	4.7	291	74.9	54	64.8	2	100.0
12	502	73.5	5.3	3.9	414	73.9	88	71.6	7	100.0
13	435	74.0	5.6	4.1	374	75.7	61	63.9	8	100.0
14	318	82.4	5.1	4.2	262	81.7	56	85.7	2	100.0
15	112	75.9	10.4	7.9	84	77.4	28	71.4	1	100.0
16	367	76.8	5.6	4.3	276	76.8	91	76.9	1	100.0
17	516	88.0	3.2	2.8	412	88.1	104	87.5	3	100.0
18	358	87.2	4.0	3.5	273	87.5	85	85.9	2	100.0
19	419	89.0	3.4	3.0	336	88.7	83	90.4	2	100.0
20	702	84.5	3.2	2.7	617	84.8	85	82.4	11	100.0
21	309	80.3	5.5	4.4	268	80.6	41	78.0	1	100.0
22	441	83.0	4.2	3.5	369	83.2	72	81.9	1	100.0
23	238	84.5	5.4	4.6	192	85.4	46	80.4	5	100.0
24	426	81.0	4.6	3.7	363	81.8	63	76.2	5	100.0
25	548	80.7	4.1	3.3	446	80.9	102	79.4	0	---
26	458	87.3	3.5	3.0	356	87.6	102	86.3	0	---
27	459	84.3	3.9	3.3	346	85.0	113	82.3	2	100.0
28	637	89.0	2.7	2.4	542	88.9	95	89.5	0	---
29	227	87.7	4.9	4.3	202	89.1	25	76.0	3	100.0
30	319	87.8	4.1	3.6	262	87.8	57	87.7	0	---
31	526	91.4	2.6	2.4	454	91.9	72	88.9	0	---
32	428	88.6	3.4	3.0	361	89.5	67	83.6	0	---
33	513	84.8	3.7	3.1	421	85.3	92	82.6	1	100.0
34	575	84.5	3.5	3.0	502	86.1	73	74.0	1	100.0
35	499	85.2	3.7	3.1	442	84.8	57	87.7	0	---
36	535	86.2	3.4	2.9	463	84.9	72	94.4	0	---
37	467	87.2	3.5	3.0	409	87.8	58	82.8	0	---
38	358	85.2	4.3	3.7	293	84.3	65	89.2	1	100.0
39	313	83.4	4.9	4.1	276	82.6	37	89.2	0	---
40	336	80.1	5.3	4.3	274	82.1	62	71.0	0	---
41	568	84.0	3.6	3.0	462	84.2	106	83.0	3	100.0
42	490	88.4	3.2	2.8	366	88.3	124	88.7	2	100.0
43	728	89.0	2.6	2.3	491	90.0	237	86.9	1	100.0
44	572	82.7	3.7	3.1	437	82.6	135	83.0	3	100.0
45	776	82.9	3.2	2.7	614	82.6	162	84.0	3	100.0
46	372	81.7	4.8	3.9	296	80.7	76	85.5	12	100.0
47	468	85.7	3.7	3.2	387	85.0	81	88.9	0	---
48	125	72.8	10.7	7.8	98	72.4	27	74.1	1	100.0
49	169	76.9	8.3	6.4	135	75.6	34	82.4	0	---
50	263	82.5	5.6	4.6	204	81.9	59	84.7	0	---
51	870	82.4	3.1	2.5	675	84.0	195	76.9	7	100.0
52	370	83.0	4.6	3.8	318	84.6	52	73.1	2	100.0
53	513	78.2	4.6	3.6	424	79.0	89	74.2	7	100.0
54	331	75.8	6.1	4.6	246	76.4	85	74.1	3	100.0

APPENDIX C. SUMMARY OF DATA

	ALL FRONT SEAT OCCUPANTS				CATEGORY					
					DRIVERS		FRONT SEAT PASSENGERS		UNDER FOUR (FRONT AND REAR)	
Location Number	Sample	Percent Usage	Relative Error*	Confidence Interval*	Sample	Percent Usage	Sample	Percent Usage	Sample	Percent Usage
55	284	76.4	6.5	4.9	241	76.3	43	76.7	2	100.0
56	45	64.4	21.7	14.0	38	63.2	7	71.4	0	---
57	650	82.9	3.5	2.9	553	83.9	97	77.3	6	100.0
58	594	86.9	3.1	2.7	505	87.7	89	82.0	0	---
59	1311	76.8	3.0	2.3	1034	77.6	277	74.0	7	100.0
60	463	86.6	3.6	3.1	401	87.8	62	79.0	3	100.0
61	735	90.5	2.3	2.1	588	89.8	147	93.2	9	100.0
62	741	84.3	3.1	2.6	606	83.5	135	88.1	9	100.0
63	730	87.9	2.7	2.4	623	88.6	107	84.1	5	100.0
64	697	86.8	2.9	2.5	598	87.5	99	82.8	7	100.0
65	611	80.9	3.9	3.1	514	82.1	97	74.2	6	100.0
66	1789	71.3	2.9	2.1	1414	72.4	375	67.2	7	100.0
67	495	76.6	4.9	3.7	424	77.4	71	71.8	6	100.0
68	832	77.9	3.6	2.8	697	77.5	135	80.0	5	100.0
69	568	72.9	5.0	3.7	450	75.3	118	63.6	1	100.0
70	482	72.0	5.6	4.0	393	75.1	89	58.4	0	---
71	737	80.6	3.5	2.9	611	83.1	126	68.3	4	100.0
72	328	87.8	4.0	3.5	277	85.9	51	98.0	2	100.0
73	893	82.6	3.0	2.5	712	82.3	181	84.0	6	100.0
74	761	81.9	3.3	2.7	599	81.8	162	82.1	3	100.0
75	772	81.7	3.3	2.7	615	81.1	157	84.1	5	100.0
76	424	79.2	4.9	3.9	341	80.1	83	75.9	3	100.0
77	256	77.3	6.6	5.1	201	75.6	55	83.6	3	100.0
78	651	70.0	5.0	3.5	519	72.3	132	61.4	6	100.0
79	149	78.5	8.4	6.6	117	76.9	32	84.4	5	100.0
80	148	71.6	10.1	7.3	124	70.2	24	79.2	5	100.0
81	1476	87.1	2.0	1.7	1188	87.9	288	83.7	3	100.0
82	815	88.8	2.4	2.2	626	89.3	189	87.3	0	---
83	470	88.7	3.2	2.9	409	89.0	61	86.9	0	---
84	1052	84.6	2.6	2.2	892	84.1	160	87.5	12	100.0
85	275	72.0	7.4	5.3	207	72.5	68	70.6	3	100.0
86	767	71.7	4.4	3.2	589	75.2	178	60.1	7	100.0
87	142	78.2	8.7	6.8	106	81.1	36	69.4	3	100.0
88	306	80.7	5.5	4.4	241	80.1	65	83.1	4	100.0
89	338	69.2	7.1	4.9	254	71.7	84	61.9	2	100.0
90	182	69.8	9.6	6.7	133	66.2	49	79.6	0	---
91	401	72.3	6.1	4.4	322	72.7	79	70.9	1	0.0
92	306	74.2	6.6	4.9	244	73.8	62	75.8	2	100.0
93	353	64.9	7.7	5.0	289	65.1	64	64.1	7	100.0
94	250	65.2	9.1	5.9	198	65.2	52	65.4	0	---
95	90	60.0	16.9	10.1	66	60.6	24	58.3	1	100.0
96	40	55.0	28.0	15.4	33	57.6	7	42.9	0	---
97	469	74.2	5.3	4.0	356	72.8	113	78.8	0	---
98	707	68.7	5.0	3.4	513	67.4	194	72.2	7	42.9
99	368	63.9	7.7	4.9	261	63.2	107	65.4	1	100.0
100	420	72.9	5.8	4.3	339	74.9	81	64.2	0	---
101	488	68.4	6.0	4.1	367	71.1	121	60.3	2	100.0
102	243	53.9	11.6	6.3	174	55.2	69	50.7	4	100.0
103	79	57.0	19.2	10.9	57	61.4	22	45.5	0	---
104	107	70.1	12.4	8.7	70	71.4	37	67.6	1	100.0
105	654	89.1	2.7	2.4	434	89.6	220	88.2	2	100.0
106	330	85.5	4.5	3.8	248	86.3	82	82.9	3	100.0
107	386	73.1	6.1	4.4	297	72.1	89	76.4	1	100.0
108	528	80.3	4.2	3.4	362	81.8	166	77.1	2	100.0

APPENDIX C. SUMMARY OF DATA

	ALL FRONT SEAT OCCUPANTS				CATEGORY					
					DRIVERS		FRONT SEAT PASSENGERS		UNDER FOUR (FRONT AND REAR)	
Location Number	Sample	Percent Usage	Relative Error*	Confidence Interval*	Sample	Percent Usage	Sample	Percent Usage	Sample	Percent Usage
109	686	79.3	3.8	3.0	533	77.7	153	85.0	4	100.0
110	638	72.7	4.8	3.5	486	72.4	152	73.7	5	100.0
111	217	69.1	8.9	6.1	157	70.1	60	66.7	0	---
112	254	57.5	10.6	6.1	184	59.8	70	51.4	0	---
113	713	91.4	2.2	2.1	489	92.2	224	89.7	0	---
114	1321	86.6	2.1	1.8	960	88.3	361	82.0	0	---
115	931	85.4	2.7	2.3	645	84.8	286	86.7	0	---
116	909	89.7	2.2	2.0	632	89.7	277	89.5	0	---
117	2476	80.5	1.9	1.6	2016	82.2	460	72.6	46	100.0
118	1284	79.0	2.8	2.2	1016	78.5	268	80.6	34	94.1
119	864	79.9	3.3	2.7	628	83.1	236	71.2	4	100.0
120	322	73.3	6.6	4.8	270	74.1	52	69.2	0	---
121	295	78.6	5.9	4.7	224	79.0	71	77.5	2	100.0
122	466	77.5	4.9	3.8	346	79.8	120	70.8	1	100.0
123	552	76.8	4.6	3.5	385	76.4	167	77.8	1	100.0
124	605	76.4	4.4	3.4	473	76.3	132	76.5	4	100.0
125	228	73.2	7.8	5.7	173	75.1	55	67.3	2	100.0
126	185	68.6	9.7	6.7	142	70.4	43	62.8	0	---
127	75	70.7	14.6	10.3	56	66.1	19	84.2	3	100.0
128	296	74.0	6.8	5.0	222	74.8	74	71.6	0	---
129	720	85.8	3.0	2.5	546	86.1	174	85.1	7	100.0
130	852	86.6	2.6	2.3	581	86.4	271	87.1	1	100.0
131	718	87.2	2.8	2.4	463	86.4	255	88.6	0	---
132	421	81.0	4.6	3.7	333	79.6	88	86.4	4	100.0
133	392	80.1	4.9	4.0	338	80.8	54	75.9	1	100.0
134	357	79.8	5.2	4.2	316	80.4	41	75.6	0	---
135	148	75.0	9.3	7.0	123	78.0	25	60.0	0	---
136	166	82.5	7.0	5.8	138	84.8	28	71.4	0	---
137	440	85.5	3.9	3.3	312	85.9	128	84.4	3	100.0
138	518	77.2	4.7	3.6	415	77.6	103	75.7	5	100.0
139	540	77.2	4.6	3.5	428	77.6	112	75.9	12	100.0
140	476	73.1	5.4	4.0	376	72.1	100	77.0	11	100.0
141	231	68.8	8.7	6.0	187	67.9	44	72.7	8	100.0
142	354	72.0	6.5	4.7	288	72.6	66	69.7	1	100.0
143	204	67.6	9.5	6.4	160	68.8	44	63.6	4	100.0
144	144	68.8	11.0	7.6	105	72.4	39	59.0	3	100.0
145	492	77.2	4.8	3.7	399	77.4	93	76.3	6	100.0
146	417	72.4	5.9	4.3	351	73.2	66	68.2	2	100.0
147	1107	69.8	3.9	2.7	801	69.7	306	70.3	1	100.0
148	887	69.1	4.4	3.0	665	66.5	222	77.0	3	100.0
149	114	58.8	15.4	9.0	87	58.6	27	59.3	0	---
150	65	67.7	16.8	11.4	52	67.3	13	69.2	0	---
151	140	58.6	13.9	8.2	117	57.3	23	65.2	1	100.0
152	92	59.8	16.8	10.0	76	61.8	16	50.0	2	100.0
153	974	87.1	2.4	2.1	692	89.0	282	82.3	1	100.0
154	322	82.9	5.0	4.1	243	83.5	79	81.0	1	100.0
155	855	87.4	2.5	2.2	571	87.9	284	86.3	0	---
156	884	85.9	2.7	2.3	640	87.8	244	80.7	6	100.0
157	797	83.1	3.1	2.6	634	82.5	163	85.3	4	100.0
158	636	77.0	4.2	3.3	489	78.5	147	72.1	0	---
159	359	68.0	7.1	4.8	280	68.6	79	65.8	1	100.0
160	243	78.6	6.6	5.2	186	76.9	57	84.2	2	100.0

*Percent (using .95 probability)

Appendix D:

Mini-Survey Data

APPENDIX D. Mini-Survey Data

Site	County	VMT%	Intersection Description	Town	2007	2008	2009
5	Barren	3.46	I-65 at Exit 53	Cave City	81	82	88
11	Meade	6.00	US 31W at KY 1638	Muldraugh	72	76	85
27	Grayson	6.95	KY 259 at US 62	Leitchfield	64	70	79
37	Logan	3.07	US 68 at US 79	Russellville	67	70	79
44	Hopkins	2.13	Pennyrile Parkway at Exit 44	Madisonville	83	84	86
54	Henderson	3.52	Us 41A at 5th St.	Henderson	69	73	78
63	Calloway	3.35	KY 1637 at 16th	Murray	68	72	75
76	Shelby	8.31	I-64 at Exit 28	Simpsonville	83	82	85
80	Woodford	1.92	US 60 at US 62	Versailles	77	79	84
88	Oldham	4.01	KY 146 at KY 1817	La Grange	75	82	84
98	Franklin	1.41	KY 2820 at US 127	Frankfort	69	69	74
110	Kenton	17.65	I-75 at Exit 186	Crescent Springs	86	85	87
121	Jefferson	8.71	US 31W at KY 841	Louisville	70	71	77
144	Boone	7.65	US 42 at US 25	Walton	70	75	77
154	Boyd	2.48	I-64 at Exit 185	Ashland	81	80	81
166	Lincoln	6.56	US 27 at US 150	Stanford	70	70	74
174	Carter	5.94	US 60 at KY 7	Grayson	63	67	72
180	Floyd	3.13	KY 680 at KY 122	Drift	60	56	57
188	Rowan	0.41	I-64 at Exit 137	Morehead	79	81	85
194	Laurel	1.89	US 25E at US 25	Corbin	68	68	74
200	Pulaski	1.45	KY 80 at KY 2296	Somerset	72	75	75
					74.0	75.6	79.9

For more information or a complete publication list, contact us at:

KENTUCKY TRANSPORTATION CENTER

176 Raymond Building
University of Kentucky
Lexington, Kentucky 40506-0281

(859) 257-4513
(859) 257-1815 (FAX)
1-800-432-0719
www.ktc.uky.edu
ktc@engr.uky.edu