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Overall, speeds of free-flow traffic on freeways averaged 70.4 mph and were approximately 14 mph higher than on major arterials, which at 56.4 mph were in turn about 7 mph higher than the mean speed of 49.7 mph on minor arterials and collector roads. Most traffic exceeded the speed limits. Sixty-eight percent of traffic on limited access roads, about 56 percent of traffic on arterials, and about 58 percent of traffic on collectors exceeded the speed limit. About 16- to 19 percent of traffic exceeded the speed limit by 10 mph or more on freeways, arterials, and collector roads.
While speeds of most vehicle size classes remained constant since 2009, the longest truck class (80-100 ft.) showed a 2 mph increase on limited access highways.</td></tr>
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Executive Summary

The purpose of this project was to measure driving speeds for all types of motor vehicles on freeways, arterial highways, and collector roads across the United States and to produce national estimates of travel speeds for various types of roads and vehicles. This study, performed in the spring and summer of 2015, was the third wave of a similar study performed in 2007 and again in 2009.

The speed survey employed a three-stage sample design. The first stage consisted of a geographic cluster sample of primary sampling units (PSUs), which were a county, or group of two or three counties. PSUs were chosen to represent a range of combinations of regions of the United States, level of urbanization, and type of topography (flat, hilly, mountainous).

The second stage was a sample of short road segments drawn from all segments in each PSU, and was considerably larger than the actual quantity desired. After field visits to document the characteristics at each site, the third stage selected a subsample of eligible sites for speed data collection. Site documenters were equipped with GPS-enabled tablets programmed with site location and curvature measurement routines. Preliminary determination of rare (sites with curvature) and common (straight) site types was performed using Geographic Information Systems (GIS) technologies. All horizontally and vertically curved road segments, which were relatively rare compared to the more common straight and flat sections, were retained, while only a subsample of the more common situations were retained in the sample. The resulting sample included higher sampling rates for sites with "rare" characteristics and lower sampling rates for sites with "common" characteristics (e.g., local roads not near intersections and not on curves) than would have occurred with completely randomized selection. In all, 30 sites were selected in each of 24 PSUs for a total of approximately 720 sites for speed data collection.

Speed data was collected on limited access highways, major arterial roads, and minor arterial and collector roads[1] during the summer of 2015. Speeds on arterials/collectors were measured using small, self-contained, on-road sensors (MH Corbin Hi-Stars) that data collectors temporarily placed on the road surface for a single 24-hour period, in each lane, at each road site. Speeds on limited access highways were collected using trailer-mounted, side-fire radar devices

[1] Limited access highways include interstates and other freeways and expressways with directional travel lanes separated by some type of barrier and limited access and egress points at on- and –off-ramps or very limited at-grade intersections. Major arterial roads are high-speed roads that serve similar functions as limited access roads, but without controlled access to adjoining land and including at-grade intersections with other roads. Minor arterials are relatively short and connect larger arterials. Collector roads connect local roads to arterials (FHWA, 2013).

(Wavetronix SmartSensor HD). A census was taken of all vehicles traversing each site during a 24-hour deployment period.

The following are the principal findings and conclusions from the 2015 wave of the National Travel Speed Survey and comparisons between it and the 2009 wave. The NTSS only compares to the previous round because each implementation of the NTSS has been both an improvement over the previous round and also designed in response to changing NTSS study objectives. The improvements have been in the areas of speed measurement technology and sample design. The NTSS-II introduced the use of the Wavetronix, in particular on LAH road segments, whereas the NTSS-I made exclusive use of Hi-Stars. The NTSS-III also took advantage of a recently designed PSU sample (The NASS FOPV / CISS PSU sample), which put the study in PSUs based on recent population and vehicle registration counts, while also maintaining some overlap with the NTSS-II PSUs. The changing NTSS study objectives reflect a move away from a sampling design with an emphasis on speeds at crash sites (especially in NTSS-I and to a lesser extent NTSS-II) to a probability sample (NTSS-III) designed for efficient estimation of overall vehicle speeds and that could align itself with other NHTSA studies, particularly the CISS, in the event that the data from the two different studies could be analyzed jointly. As a result, each round of the NTSS contains both improvements and changes as well as a link or bridge to the immediate previous round to which it can be compared. With the NTSS comparing only to the previous round, it is also consistent with the same approach used in reporting the findings for NHTSA's National Occupant Protection Use Survey (NOPUS), National Survey of the Use of Booster Seats (NSUBS), and the Seat Belt Use by Commercial Motor Vehicle Drivers surveys (SBUCMVD), all of which are period surveys of vehicle occupant behaviors.

1. A total of 12,330,540 vehicle speeds were recorded in the 2015 survey wave. 6,915,956 were constrained vehicles (within 5 seconds of the preceding vehicle) while 5,414,584 were free-flow vehicles.

2. For all traffic flow conditions and vehicle types combined (free flow and constrained), there was no difference between 2009 and 2015 speeds measured on limited access highways (less than 1 mph change). While the mean speeds on major arterials and minor arterials/collectors both increased relative to 2009, they were not significantly different between the two measurement years. The 85th and 95th percentile speeds on major arterials and minor arterials/collectors were significantly higher in 2015 (+5-7 mph) relative to 2009 ($p < .05$).

3. The change between the 2009 and 2015 speeds for free-flow vehicles was similar to the change in the speeds for the overall flow condition. There was no significant change in the mean or 85th percentile speeds on limited access roads in 2015 (mean =70.5 mph; 85th percentile = 78.1 mph) relative to 2009 (mean = 69.1 mph; 85th percentile =78.0 mph). The mean speeds on major arterials and minor arterials and collectors increased by 3 mph in 2015 (major arterials mean = 56.4 mph; minor

arterials mean = 49.5 mph) relative to 2009 (Major arterials mean = 53.3 mph; minor arterials mean = 47.0 mph); however, this increase was not statistically significant. The 85th and 95th percentile speeds on major arterials and minor arterials/collectors were significantly higher in 2015 (+5-7 mph) relative to 2009 ($p < .05$).

4. The standard deviation of free-flow traffic speed, a measure of the spread in the distribution of speeds, ranged from about 9 mph on freeways to 13 mph on major arterials and minor arterials/collectors. Compared to 2009 (10 mph), the standard deviations in 2015 (13 mph) are wider on major arterials and collectors. The standard deviation for limited access roadways remained at 8 mph.

5. The increase in speeds for all traffic on major arterials and minor arterials/collectors represents a 3-4 percentage point increase from 2009 in the proportion of vehicles on those roads exceeding the speed limit by more than 5 mph (34% and 35% in 2015, respectively) and a 4 percentage point increase for vehicles exceeding the speed limit by more than 10 mph over the speed limit (16% and 17% in 2015, respectively). These increases in speeds were not significantly different across the two measurement cycles. For free-flow vehicles, the proportion of vehicles traveling more than 5 mph over the speed limit on major arterials and minor arterials/collectors was up 3-5 points (36% and 37% in 2015, respectively) This increase was not statistically different from 2009. The proportion of vehicles traveling more than 10 mph over the speed limit on major and minor arterials/collectors was up 4-5 points (18-19% in 2015). This increase was only significant for major arterial ($p < .05$), not for minor arterials and collectors.

6. Time of day had little influence on traffic speeds in 2015. Relative to 2009, 85th and 95th percentile speeds on major arterials and minor arterials/collectors increased significantly across time of day in 2015 ($p < .05$).

7. Light condition (daylight or darkness) had little effect on travel speeds within each road condition. Relative to 2009, 85th and 95th percentile speeds on major arterials and minor arterials/collectors increased significantly across light condition in 2015 ($p < .05$). Relative to 2009, significant increases in mean speeds occurred on Monday (+8 mph), Tuesday (+7 mph), Wednesday (+ 9 mph), and Saturday (+8 mph) ($p < .05$). Mean speeds on limited access roadways showed little difference across day of week (2 mph). Mean speeds on major arterials were between 55-59 mph, with an insignificant increase of 1-7 mph across day of week from 2009 measures. However, significant increases in the 85th and 95th percentile speeds on major arterials occurred on Tuesday (+ 6-7 mph), Wednesday (+ 8-9 mph), and Saturday (+9 mph) ($p \leq .01$). In 2015, mean speeds on minor arterials/collectors were in the range of 47-53 mph, increasing by 2-6 mph from the 2009 measures. On minor arterials/collector roads the largest increase in mean speed occurred on Friday (6 mph) in 2015;

however, this increase was not significantly different than 2009. The 95th percentile speeds on minor arterials/collectors showed a significant increase on Tuesday (+ 7 mph), Friday (+11 mph), and Sunday (+10 mph) ($p \leq .05$).

8. Relative to 2009, mean speeds on limited access roadways increased significantly on moderately curved roads by 3 mph (69 mph vs. 72 mph) ($p < .05$) in 2015, which is slightly higher than speeds on straight limited access roadways (70 mph) in 2015. In addition, speeds increased significantly by 4 mph on straight major arterials in 2015 relative to 2009 ($p<.05$). The increase in mean speeds on minor arterials were not significant relative to 2015. The 2015 speed trends appear relatively predictable for the major and minor arterial/collector roadways. That is, speeds were 7-16 mph and 1-10 mph higher on straight roads when compared to moderate or sharp counterparts for major arterials and minor arterial/collectors, respectively.

9. In 2015, speeds on urban roads were lower than in more suburban or rural locations for major arterials and collectors. Vehicles on major arterials and minor arterials/collectors in rural areas were 15-17 mph faster than on their counterparts in urban areas. Speeds on limited access roadways across the various urbanicities remained relatively unchanged.

10. While speeds on limited access roadways for most vehicle lengths have remained constant relative to the 2009 estimates, the longest vehicles (80-100 ft.) showed a slight, though not significant, increase in mean speeds (2 mph) in 2015. Relative to 2009, moderate increases in mean speeds were noted on major arterials for some passenger vehicles (4 mph), but medium and larger trucks showed no similar increase. Relative to 2009, 85th and 95th percentile speeds on minor arterials/collectors, showed significant increases in 2015 for all vehicle sizes ($p < .05$).

11. Consistent with 2009 findings, there was an interaction among curvature (both horizontal and vertical), road class, and vehicle size. In general, speeds decreased as curvature and gradient increase on major arterials. That is, on major arterials the fastest speeds were recorded on flat/straight roadways (57 mph). Speeds on major arterials decreased on moderately and sharply curved roads with increased vertical gradients. The impact of gradient (i.e., vertical curvature) on speeds is most pronounced on major arterials with moderate or sharp horizontal curvature (37 mph and 39 mph, respectively). On minor arterials/collectors, speeds were greatest on straight roads with steep gradients (57 mph) and slowest on roads with sharp curvature with no incline (36 mph).

12. Speeds on major arterials and minor arterials/collectors showed greater variation between 2009 and 2015, but the directions of the changes were inconsistent. Mean speeds on straight, flat major arterials significantly increased by 4 mph between the two measurement cycles ($p < .05$).

13. Relative to 2009, mean speeds on straight, steep minor arterials/collectors increased significantly by 13 mph ($p < .01$). A similar increase in mean speeds (+ 10 mph) was measured on moderately curved flat minor arterials/collectors. Conversely, on moderately curved and moderately steep minor arterials, the mean speeds decreased significantly (by 12 mph) between 2009 and 2015 ($p < .05$). In addition, the 85th and 95th percentile speeds on straight and flat, straight and steep, and moderately curved flat minor arterials significantly increased between 2009 and 2015 ($p <.05$).

14. Year-to-year differences on limited access roadways were relatively minimal with the exception of a slight increase in speed (2-3 mph) for the longest vehicles in both light conditions. Overall, speeds for all vehicle lengths except the longest increased, with vehicles on major arterials increasing by 3-6 mph under daylight conditions. Minor arterials showed a slight slowing trend for medium and longer vehicles at night, though the effect did not carry through to the day condition. The shortest vehicles were slightly faster on minor arterials and this was more pronounced during day conditions than night.

Overall, there was an increase in speeds measured between 2009 and 2015. The increase was especially noted on minor arterials/collectors and major arterials where the mean and 85th percentile speeds increased by 2-3 mph and 5-6 mph, respectively. Interestingly, there was a greater variation between speeds on these roadways as evidenced by the increase in the standard deviation from 10-13 mph over the two measurement periods. The increase in both measured speeds and the variation in speed on these roadways may contribute to the understanding of why 87 percent of speeding-related fatalities occurred on roads that were non-interstate highways, and that the proportion of fatalities on local, collector, and arterial roads was approximately 3 times higher than on interstate highways in 2014 (NHTSA, 2016).

Interestingly, the mean, 85th percentile speeds, and the standard deviation of the mean speed on limited access roadways remained relatively unchanged between 2009 and 2015. The relative stability of the speed measurements suggest that most drivers have reached the maximum travel speed at which they feel comfortable driving within limited access highway prevailing conditions.

The lack of change in estimated speeds on limited access roadways between the 2009 and 2015 measurement waves may be attributed to differences in traffic patterns over the two measurement periods. The economic conditions in 2008-2009 have been associated with lower vehicle miles travelled (VMT) (as measured by various sources including FHWA's Highway

Performance Monitoring System and the 2008-2009 National Household Travel Survey (USDOT, 2009)). Cumulative travel for 2009 changed by -.8 percent (FHWA, 2009). Thus, there may have been less congestion, resulting in higher speeds. Conversely, the economy began to improve in 2010 and gasoline prices were markedly reduced in the summer of 2015 relative to recent years. These factors, either individually or in combination may have contributed to the greater VMT, increasing congestion, and suppressing any increase in speed on the limited access roadways.

1. Introduction and Background

The problem of speed remains a significant threat to public safety and warrants priority attention in the United States. Since the repeal of the National Maximum Speed Limit (NMSL) in 1995, States are no longer required to collect or submit data on prevailing travel speeds to any Federal agency. As a consequence, it is far more difficult for agencies with a highway safety mission to track changes in travel speeds over time or to relate travel speed trends to crash trends. In order to address this need, the National Highway Traffic Safety Administration started the National Travel Speed Survey (NTSS) program in 2007 to provide reliable, nationally representative estimates of traffic speeds for both passenger and commercial vehicles on most road types throughout the United States.

Speeding is widespread and commonly accepted within the driving culture (AAA Foundation for Traffic Safety, 2016), and excessive speed is a contributing factor in a high proportion of severe crashes. In 2016 there were 10,111 people killed in speeding-related crashes (NHTSA, 2018). Speeding-related crashes accounted for approximately $52 billion in economic costs in 2010 (Blincoe et al., 2015). Speeding, defined as "driving too fast for conditions, or exceeding the posted speed limit," is reported as a factor in 27 percent of all fatal crashes in 2016 (NHTSA, 2018). While crash severity increases with the speed of the vehicle at impact, it is important to note that 86 percent of speeding-related fatalities occurred on roads that were non-interstate highways in 2016.

Despite decades of efforts in enforcement, traffic engineering, driver training, and public education, speeding is a behavior that remains resistant to change. Although traditional approaches and more recent innovations (e.g., automated enforcement, vehicle-based monitoring, and feedback) help mitigate the problem, much remains to be done in the area of speed management. To establish appropriate policy regarding traffic speeds in pursuit of reductions in speeding-related crashes, NHTSA requires accurate information on traffic speeds. An effective and efficient program to address speeding as a highway safety issue requires better definition and understanding of speeding and its management. While it is important to identify driver characteristics or traits that can be used to target offenders and situations where there is increased risk, a detailed exploration of traffic speeds along the nation's roadways, in concert with information on why these drivers speed, can be used to develop more targeted countermeasures that may result in higher compliance rates with speed limits. The National Traffic Speed Surveys (NTSS) allow NHTSA, the Federal Highway Administration, State, and local officials and other highway safety professionals and advocates to better define the speeding problem and determine the degree to which speeding occurs as well as when, where, and under what conditions. Having this information enables NHTSA to determine a significant part of the total safety picture, and supports the development and implementation of balanced programs to decrease crash risks from speeding.

Another reason for acquiring data on travel speeds is to provide a means to nationally monitor the efficiency of various roadway types in terms of traffic flow and congestion. Concurrent with the goal of increasing the capacity of existing road systems is the concern that high-speed travel raises fuel consumption rates, a problem of increasing importance.

2. Study Overview

With the intention of producing both nationally representative traffic speed estimates and an analysis of the role of speed in crashes, NHTSA conducted the first two data collections of the NTSS in 2007 and 2009. In order to examine the relationship between speed and crashes, the original design of the NTSS required a sampling plan that included sites from the National Motor Vehicle Crash Causation Survey (NMVCCS) data set. This design included an oversampling of crash-related sites, but was less than optimal for estimating national speeds. The sampling plan resulted in a diminished sample of non-crash sites, thus resulting in differential weights between crash and non-crash sites and increasing the variance for traffic speed estimates that were not specific to crash sites. NMVCCS data cited crash causes that included whether the crash was speeding-related with pre-crash speeds computed in some cases. However, because NMVCCS is no longer being collected, the potential advantage of using the sampling plan to correlate speed information with crash data no longer exists for these PSUs.

The third cycle of the survey (NTSS III) implemented a new sampling plan that produced a more representative sample of the nation's traffic speeds. Development of national speed estimates and trends required a comprehensive, but economical, sample plan and strong field methodology to satisfy the requirements for collecting speeds. A cluster design, similar to the one used for the annual NOPUS, which uses approximately 57 PSUs to estimate safety restraint use by passenger vehicle occupants on urban, suburban, and rural roads, was used. The sampling design used a stratified, three-stage sample of PSUs, road segments, and observation sites/periods. Using the NASS PSUs allows NHTSA to achieve its current objective of generating national estimates for traffic speeds. These estimates of speeds are valuable for examining differences and trends for roadway and vehicle types and a variety of other travel conditions. If desired, it will also enable subsequent analysts to examine the relation between speed and crash data.

The NTSS III (2015) sample design has a greater number of PSUs than the previous sample (24 vs. 20), and is more nationally representative of the population of site types and characteristics than the older, NMVCCS-based sample design used in NTSS I and NTSS II. Note, part of the NTSS III sample includes some of the same sample PSUs (NMVCCS PSUs) used in the two previous waves, while the remainder of the PSUs were drawn from current NASS PSUs. This design decision was implemented to ensure that sample error rates would be comparable among the earlier and most recent samples, while improving the representativeness of the survey sample.

Each PSU within the sample is a city, county, or group of two or three counties. PSUs represent a range of combinations of regions of the United States, level of urbanization, and type of topography (flat, hilly, mountainous). Within each PSU, a two-phase sample of road segments was selected. Site documentation/ selection took place in early winter/spring 2015 followed by speed data collection during the summer of 2015. Speeds were measured at 30 sites in each of the 24 PSUs. Site types included limited access highways, major and minor arterial roads, and collector roads. Speed measurement sites were selected in road segments with varying degrees of curvature and gradient.

Procedures adopted in the NTSS II (2009) to improve the efficiency, quality, and speed with which collection could be accomplished were replicated in 2015. Self-contained, on-road sensors (MH Corbin Hi-Stars) were temporarily placed on the road surface for a single 24-hour period in each lane at each arterial and collector road site. Trailer-mounted, side-fire radar sensors were used at the limited access highway sites. Wavetronix SmartSensor HD (model SS-125) devices were towed to each limited access site, deployed for 24 hours, and then moved to the next site. These devices were selected as an alternative to the Hi-Stars, in part, due to the fact that their deployment was typically performed with little or no disruption to highway traffic. In addition, they eliminated the need for complex, costly, and time-consuming efforts to install and pick up Hi-Stars from the busier, multi-lane, high speed roads.

Note, the sample in this survey was not designed to support estimation of speeds for any specific State, county, or community. Consequently, data collection locations are not named in this report. The data are intended to be used by NHTSA and others to examine broad, national trends in speeds on various road types, by various vehicle types, under a broad range of conditions.

3.0 Sample Design and Sample Selection

The NTSS III sample needed to accommodate and support a sampling design that would provide reliable nationally representative estimates of vehicle speeds, and allow a comparison between estimated vehicle speeds from 2015 (NTSS III) and 2009 (NTSS II). The NTSS III used a stratified, two-stage, nationally representative, probability sample. The 2015 sample design has a greater number of PSUs and is designed to have better statistical representation of the population of site types and characteristics than the older NTSS I and II sample designs. To do this, part of the NTSS III sample represents the same sample PSUs used in 2007 and 2009, while the remainder of the PSUs come from NASS PSUs. This split of the overall sample was implemented to ensure that sample error rates would be comparable among the earlier and most recent sample, while improving the representativeness of the study sample. At the first stage, a sample of PSUs was selected. At the second stage, a two-phase sample of road segments was selected. An observation site was specified and an observation period was scheduled for each sampled road segment, and a full enumeration of all passing vehicles and their characteristics (speed, length, etc.) for a given 24 hour observation period was conducted. The NTSS III differs from the previous NTSS I and II in that NMVCCS crash sites were neither acknowledged by the design, nor included with certainty in the NTSS III sample.

3.1 PSU Sample

The NTSS III sampled a total of 24 PSUs in two separate and independent PSU samples. These PSU samples were called the "A" and "B" PSU samples. The "A" PSU sample was a sample of 8 PSUs drawn as a probability subsample of the original 20 NTSS II PSUs. The "B" PSU sample was an independent sample of 16 PSUs, which were drawn previously for NHTSA's new NASS Follow-On Passenger Vehicle (FOPV) study (See Appendix A). The partial overlap with NTSS II was done with an eye to reducing the variance of estimates of change (See Appendix A).

The separate and independent "A" and "B" PSU samples can each provide unbiased estimates in their own right, but were combined through composite estimation to provide unbiased estimates with increased precision beyond what either PSU sample could accomplish alone.

3.2 Road Segment Sample

3.2.1 Improving Road Type Classification – The TIGER/TomTom Overlay

The coverage of roadways in the new sampling design was improved by selecting a new sample of site locations in each of the 24 PSUs using the Census Bureau's 2014 MAF/TIGER geodatabase as the basis for the sampling frame. Sampling frames, in general, are evaluated and used with three characteristics: coverage, accuracy of classification information pertinent to sampling (such as stratification), and accuracy of other information. In the case of the TIGER line files, experience with several recent observational road segment studies have led us to believe that TIGER's coverage is excellent, whereas the accuracy of information pertinent to sampling, especially road type classification (limited access highway (LAH), arterial (ART), local roads) is imperfect. In the case of the NTSS, which restricts the population of inference and target population to limited access highway, major arterial, minor arterial and collector roads, misclassification can introduce bias if not addressed. This is especially true, for example, if arterial roads are misclassified as local roads which were not included in the sampling frame. In order to address the potential misclassification and eliminate or reduce the potential for bias in the estimates, the TIGER road segment frame was overlaid with the improved Federal Classification Code information from a TomTom database for the year 2009, which offers improved road type classification information. The road type classification obtained from the overlay was used for assignment and allocation of road segments to road segment sampling strata prior to selection of the Phase I sample.

3.2.2 Phase I - Sample Documentation

There were two defined phases in this study. Phase I involved identifying and documenting sites that were adequate for inclusion in the speed data collection conducted in Phase II. Phase I visits were used to document and evaluate each site's suitability in terms of traffic volume, surface type, location, road curvature, gradient, super elevation, drainage, and ability to safely deploy and retrieve data collection equipment during Phase II.

In Phase I, a stratified, probability proportional to size (PPS) sample of 1,080 road segments was selected within and across the 24 sampled PSUs. The road segments were stratified explicitly by PSU, and implicitly within PSU by sorting on urbanicity, road type, and road name, prior to sample selection. The measure of size (MOS) was related to road segment length. A strictly proportional (i.e., by road type and length) sample within each PSU resulted, with 45 Phase I road segments sampled within each of the 24 PSUs.

A substantial oversample of sites was selected in each PSU for the documentation phase; with the intent of retaining all high curvature and high gradient sites and only a subsample of the remaining sites for Phase II data collection. The oversampling also provided a cushion when sites were classified as ineligible because it would be technically infeasible or unsafe to deploy the data collection equipment at the site.

3.2.3 Phase II - Sample Speed Data Collection

Between Phase I sampling and Phase II sampling, road segments were visited by trained field staff and evaluated with respect to eligibility for inclusion in Phase II (i.e., assessed as truly LAH or ART, workability, curvature, and gradient) data collection. Sites were excluded from the Phase II sample if it was determined that Phase II data collector's safety might be at risk when deploying/retrieving the equipment, there was a likelihood of equipment theft, or the equipment could not be effectively deployed at the site (e.g., gravel roads, no clear lane markings). For Phase II, a stratified, equal probability within stratum sample of 720 road segments was selected within and across the 24 sampled PSUs. The road segments were stratified explicitly by PSU and curvature (horizontal or vertical) status, and implicitly within PSU and curvature status by sorting on road type. A proportional (i.e., by road type and length) sample within each PSU resulted (i.e., exclusive of curvy/hilly road segments sampled with certainty in Phase II), with 30 Phase II road segments/sites sampled within each of the 24 PSUs.

3.3 Observation Sites, Observation Periods, and Passing Vehicles

An observation site and observation period was used for each sampled road segment, and a full enumeration of all passing vehicles and their characteristics (speed, length, etc.) for a given 24-hour observation period (acknowledging some missing data did occur) was conducted. A total of 14,910,710 vehicles speeds were observed, of which 12,330,540 were determined suitable for analysis.

Table 1. Counts of Sampled and Observed Segments Units

Unit	"A" Sample	"B" Sample	Overall
PSUs	8	16	24
Road segments – sampled – Phase I	360	720	1080
Road segments – sampled – Phase I – Ineligible	19	21	40
Road segments – sampled – Phase II	240	480	720
Road segments – responding – Phase II	226	451	677
Lanes – Phase II – within responding road segments - total	723	1,372	2,095
Lanes – Phase II – within responding road segments - responding	670	1,310	1,980
Vehicle speeds observed	5,247,497	7,083,043	12,330,540

Table 2. Road Segments and Vehicle Records for Each Sample

Unit	Road Type	“A”	“B”	Overall
Road segments	LAH	49	96	145
Road segments	ART – Major	50	95	145
Road segments	ART - Minor	127	260	387
Vehicle speeds	LAH	3,525,686	4,876,351	8,402,037
Vehicle speeds	ART - Major	643,977	847,131	1,491,108
Vehicle speeds	ART - Minor	1,077,834	1,359,561	2,437,395

4.0 Site Documentation and Data Collection

4.1 Phase I - Site Documentation

Phase I site documentation required visiting each candidate site to assess and document it in person; collect location, curvature, and gradient data; record urbanicity and roadway design data; and to refine and mark the location of the preferred data collection location. The following sections further detail those operations and the preparations require for this to occur.

4.1.1 Site Documentation Recruitment and Training

Site documenters for Phase I were recruited from a pool of experienced field data collectors with skills necessary for completing this task. All individuals needed to show proficiency in computer skills, reliability, some potential or past experience in management of data collection exercises in the field, and an ability to think on their feet. These skills were critical for successfully completing all of the Phase I tasks.

Eight site documenters were required to attend a 2-day classroom tutorial. Trainers were experienced NTSS staff members who were familiar with the site documentation equipment and software as well as the data collection procedures used during the two previous waves of the NTSS study. The classroom instruction included training on navigating to and surveying the sites, using the site documentation software to accurately record pertinent information for each site, proper field techniques, data transmission, and proper safety procedures for working on the side of the road. Once the classroom training was complete, site documenters practiced navigating to and surveying predefined sites along local roadways in order to gain some practical experience, prior to moving to the first of three assigned PSU’s. Additional individual training between an NTSS staff member and the site documenter took place at their first PSU.

An NTSS Trainer accompanied each site documenter to his/her first PSU. Trainers and site documenters visited several sites in the PSU and worked together to document the sites and confirm the ability of the site documenter to work independently. Once the trainers consistently noted that the site documenter's work was proficient, they were given full responsibility to work independently and to transmit the information electronically to the home office for the remaining sites in the assigned PSU's.

4.1.2 Instrumentation

Each site documenter was assigned an electronic tablet with a GPS receiver, a safety vest, and a hard hat. The latitude and longitude of each site was loaded into Street Atlas to provide the site documenter with turn by turn directions to each site. As the site documenter approached and drove through the site, a custom software application collected GPS information, including horizontal and vertical curvature, of the roadway segment (See Figure 1).

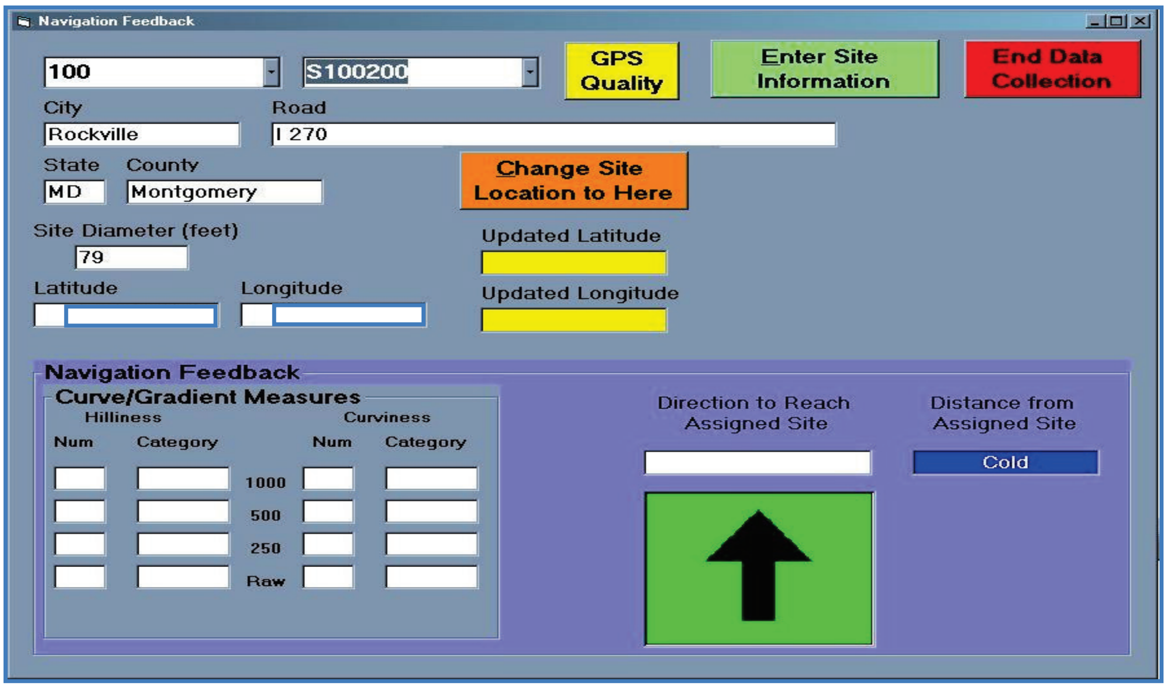

Figure 1. Site Navigation Interface

Documenters entered the candidate road segment at least ¼ mile in advance of the proposed site. The tablet with its GPS receiver collected curvature/elevation gradient data approximately every 100 feet, providing latitude, longitude, and altitude data while the documenter drove through the site. Audible feedback was provided by the tablet each time one of the samples was collected, when the site's quarter-mile radius had been reached on the approach and retreat, and when the site center was reached.

4.1.3 Site Characteristics Data Collection

After the “drive-through,” the documenter returned to the center of the site and completed a “walk-through.” This step included taking several digital photos of the site, marking the road edge with paint to allow the speed data collector (during Phase II) to locate the precise location at which the documenter expected the speed data collection equipment to be deployed, and providing written descriptions of the key aspects of the site for use in final selection of candidate sites. Figure 2 shows the documenting and marking activities at a site, and Figure 3 shows the screen used for documenting the “walk-through” information at a site.

Figure 2. Documenting Sites

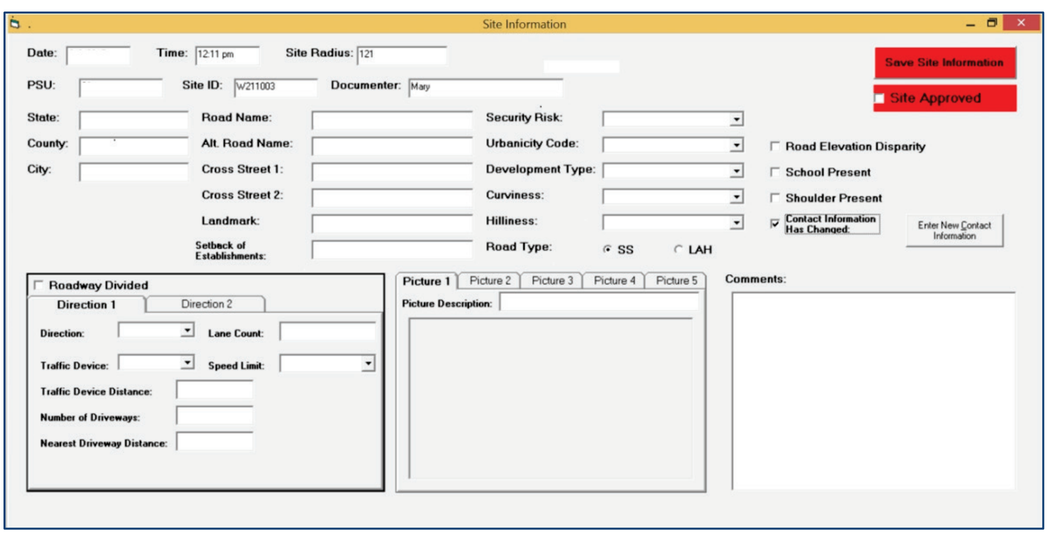

Figure 3. Site Documentation Interface

Site documenters were instructed to pay particular attention to a variety of roadway characteristics that might influence the likelihood of safely and successfully collecting accurate traffic speed data at a given location. These included, but were not limited to:

- Adequate separation from the site location from adjacent sources of traffic “friction” (i.e., traffic controls, intersections, driveways, uncharacteristic curves, congestion, etc.);
- Paved roadway surfaces and adequate shoulder space to accommodate the traffic classifiers with minimal chance of interference from overhead or underground sources of magnetic field disturbances;
- Roadway delineation and lane markings that would channel most vehicles directly over or past the speed traffic classifiers;
- Surroundings that would promote safe installation and removal of the traffic classifiers, as well as the likelihood that they would survive a 24-hour installation (i.e., avoiding theft, vandalism or destruction due to road or traffic conditions); and
- Landmarks that would help an unaccompanied speed data collector identify the site during navigation in Phase II.

At the end of each day, documenters uploaded data files and digital photos taken at each site. The photos were electronically linked to the descriptive data so that all of the information would be available for the final review and site selection at the home office. All data was processed and reviewed within 24 hours of receipt by the home office.

4.1.4 Final Site Selection

As the data was received from the field, they were reviewed and given a final viability rating. This review included an appraisal of the completeness and consistency (e.g., was the “drive-through” performed properly, were the street names and all other requested characteristics provided, did the description match the photos, did the curvature data match the photos, etc.). If the data received for a site were complete and did not indicate the presence of a safety hazards or features that would adversely affect data quality, the site was accepted for inclusion in the site frame for Phase II sampling. Note that all sites with some degree of curvature were intentionally sampled for Phase II, since sites with curvature or gradient were less common than those with simple, straight trajectories.

4.2 Phase II - Speed Data Collection Protocol

Overall, the data collection for the 2015 effort replicated the procedures used in 2009. MH Corbin Hi-Stars were deployed at all surface street sites, and Wavetronix SmartSensors were deployed on the limited access highways. This was intended to minimize the complexities involved with coordinating with local officials, traffic control and installation time for deployment and retrieval of equipment, and to improve the safety of field personnel.

4.2.1 Speed Data Collection Recruitment and Training

Twelve data collectors, eight field supervisors, and several backup personnel were recruited from the same pool of field staff used to recruit site documenters for Phase I. All field staff were required to show the same degree of proficiency with computers, reliability and responsibility, and past experience in field data collection. Field supervisors were also required to have experience with driving (and backing) pickup trucks and trailers. Each field supervisor was responsible for collecting data at all the limited access sites as well as overseeing data collection on the arterials and collector roads in their assigned PSUs.

Overall, training involved an overview of the study's purpose and its importance to highway safety; instruction on the programming, installation, and use of the data collection equipment; recharging and preparing all equipment for use in the field; methods for coordination with local authorities; use of a custom software application for documenting data collection efforts and verification of the site information; procedures for transmitting data back to the home office; troubleshooting procedures for equipment; and safety techniques for working in and alongside the road. Because field supervisors were responsible for managing and assisting data collectors with questions about site locations and the use of the Hi-Stars, they attended 4 days of training to obtain the required expertise in both types of data collection equipment, data transmission, site control, scheduling adjustments, and data collection quality control tasks.

Wavetronix training specifically involved instructing the field supervisors on how to drive and back up a pickup and trailer, deal with challenging parking or retrieval situations, deploy the Wavetronix unit, calibrate the Wavetronix sensor to ensure maximum performance, and other activities related to the retrieval and transmission of data. For each deployment of the Wavetronix devices, trailers had to be unhitched, programmed, and left for 24 hours of data collection. Supervisors had to be able and willing to perform this and all the other tasks associated with the use and care of the trailers.

Twelve data collectors and two backups attended a 2-day training session. The supervisors' final two days of training coincided with the field data collectors' training, which concentrated on the use of Hi-Star data collection devices and all the supporting procedures involved in the collection and transmission of the data back to the office.

Classroom lectures were followed by field practice, where each of the field data collectors was required to program, deploy, and retrieve the data collection equipment assigned to them (Wavetronix or Hi-Stars). These practice sessions included oversight by the project staff so that each data collector received individual attention.

4.2.2 Instrumentation

Data collectors and field supervisors were equipped with tablets, laptops, and GPS receivers to help them navigate to the selected sites, verifying that data was collected at the appropriate locations.

4.2.2.1 MH Corbin Hi-Stars

Each data collector was given all the equipment necessary to program and deploy 8-12 MH Corbin Hi-Stars. This included Hi-Star chargers, programming cables, duct and mastic tape, protective deployment bags, and a variety of other tools and supplies.

MH Corbin Hi-Stars are small, self-contained devices that are placed on the roadway to both measure and store individual vehicle data for all vehicles that pass over them. These devices use magnetometers to measure the disturbance in the surrounding ambient magnetic field caused by the vehicles passing over them. They interpret and save the time, speed, and length of each vehicle for later analysis. They are programmed to start and end data collection at specified dates and times, and can be temporarily attached with mastic tape to road surfaces in the middle of each lane to be measured. After the data collection period is complete, they are retrieved from the roadway and the data are read from the devices and stored in a database for analysis and/or transmission.

Hi-Stars were identified as the best alternative for collecting speed data on surface street sites prior to the 2007 deployment. At a minimum, the equipment needed to be able to collect data on each individual vehicle in each lane in the traffic stream for at least 24 hours. To perform the required analyses, data needed to include individual vehicle speeds, vehicle type (cars, trucks, etc. based on length, wheelbase or number of axles), time of day, date, and separation time or distance between vehicles. In addition, the equipment needed to be quickly deployed and retrieved from the roadway in order to avoid major interruption of traffic flow and to maximize the safety of the field staff by minimizing time spent in the road.

There were 97 Hi-Star NC-200 units and 23 NC 300 units used for this study (see Figure 4). All units were brought up to a common and compatible version of firmware prior to the 2015 collection effort. All of the equipment was returned to the manufacturer for testing and calibration prior to deployment to verify functionality of all the units prior to sending them into the field. Device programming and retrieval software was updated and pre-tested to confirm the best procedures for data collection.

Figure 4. MH Corbin Hi-Star (Model NC-200)

4.2.2.2 Wavetronix SmartSensor HD (model SS-125)

Because of the safety risks and deployment challenges of collecting limited access highway data with the MH Corbin Hi-Stars, self-contained trailers carrying Wavetronix SmartSensor HD side-fire radar devices were selected to collect data on the limited access roadways in 2009 and 2015. The SmartSensor HD measures and records the time, speed, and length of every vehicle that passes through its field of view, simultaneously in both directions in each of up to 10 lanes and out to a range of 200 feet, thus eliminating the need to instrument each lane separately. The goal of using the Wavetronix was to maintain the level of accuracy in the data while eliminating some of the coordination, safety, and efficiency issues associated with deploying and retrieving Hi-Stars on limited access highways.

The Wavetronix sensors were part of a trailer-mounted system rented from a national vendor. Each trailer's components were powered by solar-charged batteries. The Wavetronix sensor was mounted on an electronic actuator that allowed adjustment of its pitch at the top of a telescoping mast that was elevated to at least 16 feet above the ground while the trailer was parked perpendicular to the road. Inside the secure battery/control box at the base of the mast was an interface box that enabled PC connection to and recording of the data from the Wavetronix. Figure 5 shows the Wavetronix trailer.

Figure 5. Wavetronix Trailer

Both data collectors and field supervisors used a custom bookkeeping application to store the information related to the deployment and retrieval of the data collection equipment. This information was included in the reports reviewed by home office staff on a daily basis. This standard reporting protocol helped to quickly identify trends in data collection, or field staff problems, and support decisions with clear and concise information.

4.2.3 Site Coordination

Coordinating with area police and other officials began months before the actual field period. All of the necessary approvals, request for work permits, and coordination were completed to ensure adequate lead time for jurisdictions where approvals could be especially challenging. Area police and other officials were approached and asked to assist with traffic control during deployment and retrieval of the data collection devices (Hi-Stars or Wavetronix) in each PSU.

Immediately following training, field staff contacted the identified representative from each jurisdiction to confirm the schedule for data collection in their areas. Any problems or special considerations for coordination were immediately directed to the home office for resolution.

Installation and removal of Hi-Star devices on surface streets normally required less than 1 minute on each lane. During a typical visit to a site, data collectors secured a Hi-Star to each lane in the selected roadway using strips of mastic tape. The assistance of the police or local DOT responsible for the road was needed to control traffic for several minutes at each location for deployment and then 24 hours later for removal of these devices. For surface street sites, briefly stopping traffic in each lane permitted data collectors to quickly affix the Hi-Stars to the roadway and then easily remove them 24 hours later.

Installation and removal of the Wavetronix device at sites on limited access roadways did not require stopping traffic. The Wavetronix trailers were simply pulled onto the shoulder with little or no disruption to traffic. As a courtesy, all field supervisors contacted the local authorities responsible for the road segments on the selected roadways and provided them with schedules and exact locations for each deployment.

4.2.4 Data Collection

All of the selected data collection sites were geocoded, and PSU-level maps were developed for each of the data collectors and field supervisors that identified the location of each site and its geographic proximity to other sites within a PSU. Since different devices were used to collect speed data, the data collection and transmission operations were somewhat different for each method. The sections that follow outline the methods used for each approach.

4.2.4.1 Surface Streets

After coordinating a deployment and retrieval time with local authorities, data collectors programmed each Hi-Star with information uniquely identifying the data collection site, and the date and time the Hi-Star was to be deployed. This information included state, city, county, roadway name, lane number and direction, posted speed limit, and start and end date and time (see Figure 6).

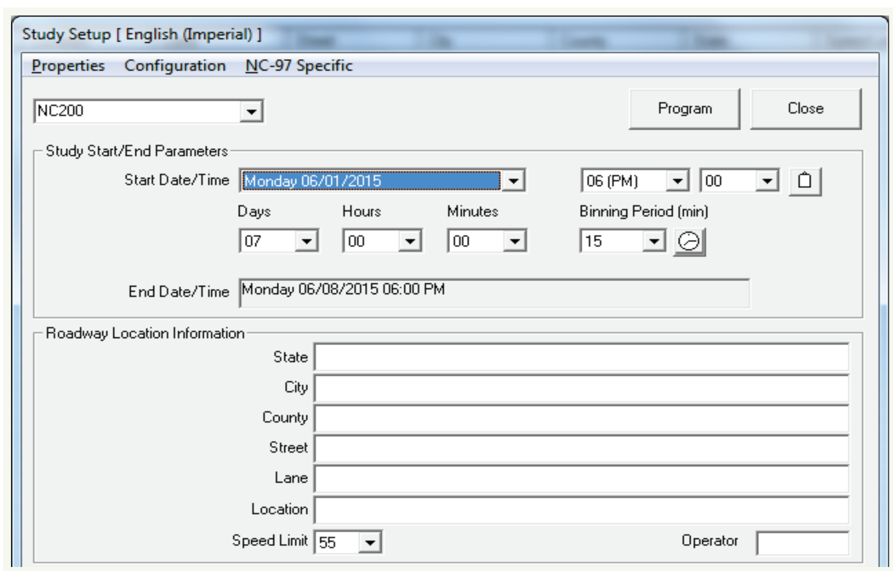

Figure 6. Hi-Star Programming Interface

After programming the Hi-Stars, each device was packaged to promote quick and proper installation/removal. This protocol was designed to minimize the data collectors' exposure to passing traffic and protected the devices from the elements during the deployment. Each unit was labeled with lane and direction information so that the data collector could easily identify which Hi-Star needed to be deployed in any given lane at a glance. Figure 7 shows two packaged Hi-Stars and one deployed unit. Data collectors worked with authorities capable of providing traffic control during the installation and removal of the Hi-Stars in each lane. With their assistance, data collectors were usually able to install the Hi-Stars in a matter of a few seconds per lane.

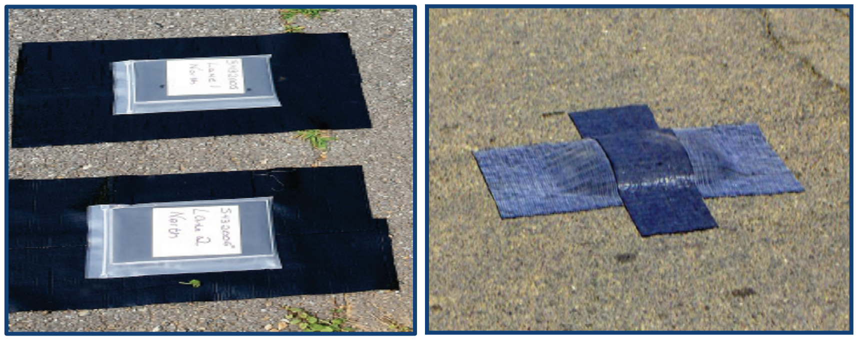

Figure 7. Packaged and Deployed Hi-Star

Data collection was scheduled with local authorities for every day of the week. If the coordinated time was missed by the traffic control authorities, rescheduling was required. Depending on the number of lanes being measured at a given site, a missed deployment appointment (e.g., due to a police emergency, etc.) often meant several hours of delay. This delay was a function of the need to coordinate a new time with the authorities as well as the need to re-program and re-package the Hi-Stars before deployment.

Similar coordination and traffic control was required again after 24 hours of data collection to remove the Hi-Stars. After retrieval of the Hi-Stars, the data collectors downloaded the information to their tablets and transmitted the data to the home office. Hi-Stars were recharged every night in preparation for data collection the next day.

Custom software was developed to allow field supervisors and office staff to track the status of deployments and retrievals as well as to determine if the data was being collected in a timely and complete fashion (see Figure 8 and Figure 9). For the data collectors, this provided a way to verify the information collected during Phase I and a means to track the status of their own data collection efforts. Electronically tracking the status of each site ensured immediate reassignment of collection duties or re-deployment in cases where data issues were recognized.

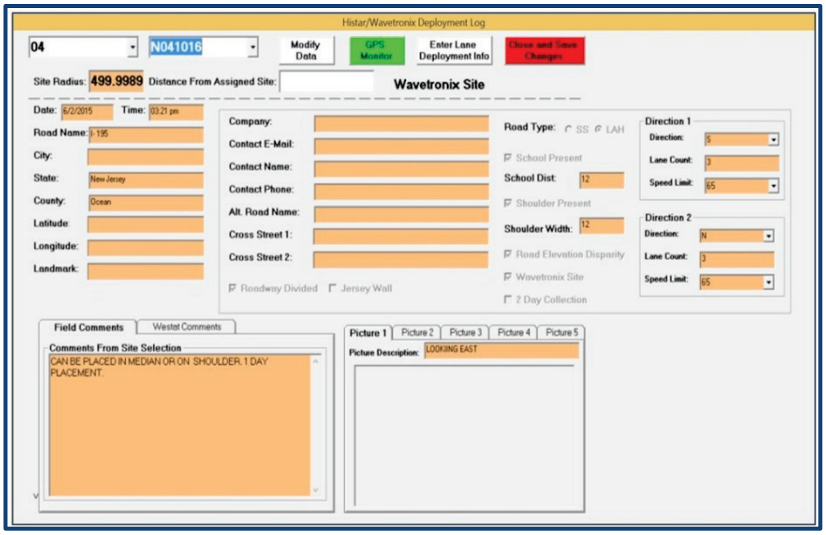

Figure 8. Site Verification and Data Collection Documentation Interface

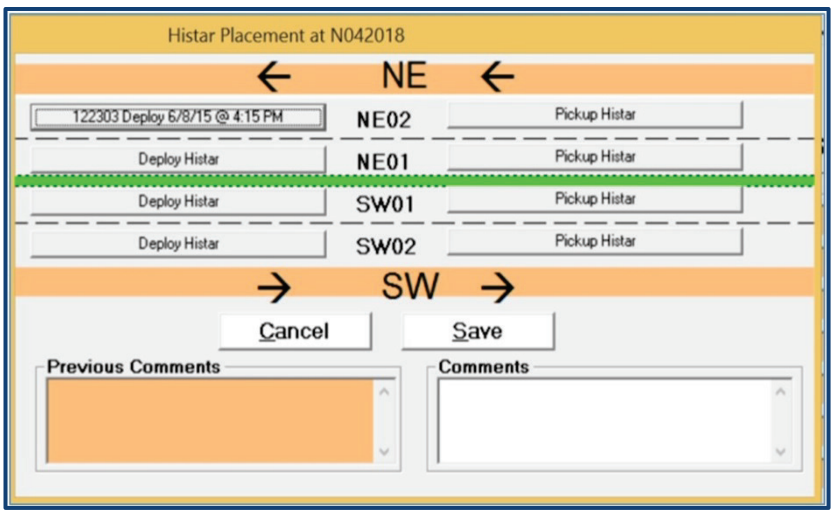

Figure 9. Hi-Star Deployment Schedule Tracking Interface

4.2.4.2 Limited Access Highways

Field supervisors also coordinated with local authorities to schedule Wavetronix deployments on limited access roadways. Even though the trailer-mounted Wavetronix devices were deployed on or outside the road shoulder, it was important to inform police and/or DOT personnel that these devices were going to be used within the highway right of way. Field staff would often visit upcoming deployment sites and provide authorities with a plan for when speed data would be collected at given locations days in advance of those deployments.

Upon arrival at a given data collection site, supervisors would pull out of the through lanes and position themselves as far out of the travel lanes as feasible for the collection. The Wavetronix sensors were capable of monitoring up to 10 lanes of traffic over a range of 200 feet from the trailer location. Supervisors made every effort to position the trailers with at least 15-20 feet of elevation above the road surface, depending on the roadside geometry, landscape, and obstructions. The trailers were parked in locations that provided for vertical extension of the sensor mast and a perpendicular perspective of the road for the Wavetronix sensors. All Field Supervisors were advised to deploy units behind the protection of a barrier or guardrail, if possible, to provide maximum safety for motorists and the data collection equipment. After selection of a suitable parking spot (which had typically been identified during Phase I), the trailer was unhooked from the tow vehicle in that spot and the unit was stabilized, set-up, and calibrated. At times the need for a feasible parking spot required the data collectors to deploy the Wavetronix unit at an alternative location. However, all field staff were trained to select an alternate site, if necessary, that was similar in roadway geometry to the original location and to not move more than ¼ mile from the original designated site location. Figure 10 shows a typical configuration of one of the trailers during data collection.

Figure 10. Wavetronix Trailer During Data Collection Setup

Lane calibration was performed automatically by the sensor. Calibration involved allowing a number of vehicles to pass while their speed, length, and distance from the sensor were measured and interpreted. Figure 11 shows the display provided by the software as aiming and lane calibration took place. The software was designed to estimate lane configuration and then allow operators to confirm, adjust, and name each lane.

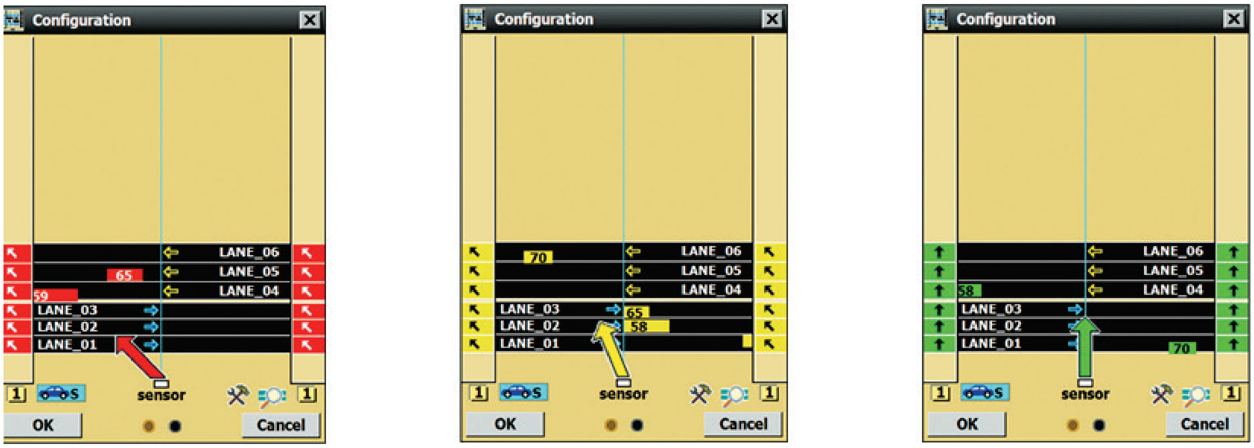

Figure 11. Automatic Lane Calibration Display

Supervisors needed to pay special attention to barriers and guardrails located in the center median. Occasionally, the presence of the barriers or guardrails causes undesirable reflections of the radar during data collection, requiring the supervisor to identify an alternate location not too far from the original site. Once those aspects of the calibration and data quality were verified, the sensor's data collection mode was activated, initiating capture of the date, time, speed, vehicle length, lane, and sensor-to-vehicle distance until data collection was deactivated. After 24 hours, Supervisors returned to the trailer and manually terminated the data capture mode, retrieved the PC that had been collecting data, and collapsed the system to allow for transport to the next site.

In most cases, the Wavetronix unit allowed data collection to take place for all lanes and both travel directions over one 24-hour period. However, at some locations the road geometry and/or adjacent landscape features were such that the unit was not able to get a clear view of all lanes in both directions. At those sites, data collection was completed over a 48-hour period. That is, 24 hours of data was collected for one direction of travel, then the unit was moved to the other side of the road, and 24 hours of data was collected for the opposite direction.

4.2.5 Data Transmission

Field staff transmitted the electronic data files for each site back to the home office using a secure FTP server connection each night after a collection. For Hi-Stars, this process was typically accomplished from hotels or other establishments offering high-speed internet access. After ensuring that the data had been received, data on the server were removed so that only databases located within the Westat firewall held the transmitted information. Raw data residing on the data collector's tablet were protected by usernames and passwords, which controlled not only access to the FTP server, but also access to the tablet user accounts. The same facilities were used to upload data from both the Hi-Star and Wavetronix deployments.

4.2.6 Data Quality Assurance

As data was transmitted from the field, raw data files were imported into databases for daily verification and cleaning. Back in the home office, a variety of manual and automated queries performed on the data allowed for quick assessment of the data's completeness as well as for determination of problems in the collection process. Every lane within a site was reviewed for the following descriptive statistics:

- Duration of data collection,
- Sample size,
- Mean and median speed,
- Standard deviation of speed,
- Maximum and minimum speeds,
- Percentile speeds (75th, 85th, and 95th),
- Overall speed distribution,
- The presence of "phantom" vehicles.

Phantom vehicles were usually identified as vehicles with speeds of 0 mph or above 100 mph, as well as those vehicles with lengths of 0 feet or greater than 100 feet. When anomalies, such as high percentages of vehicles with 0 mph speeds or speeds greater than 100 mph, were identified within the raw data for any lane, field staff were instructed to redeploy the units for a second round of data collection. Anomalies, such as those described above, were typically the result of Hi-Stars being dislodged during data collection or vehicles side swiping the unit. Sites were also revisited when specific anomalies were identified in any of the descriptive statistics (e.g., the mean speed of one lane was drastically different from the mean speeds of the other lane(s); sample sizes between lanes were drastically different; or there was an obvious failure of several of the Hi-Star units to collect data for the 24 hours). After the daily integrity checks were performed and data quality was verified for a given site, the field staff were directed to move on to other sites or PSUs.

For data collected with the Wavetronix sensors, some similar anomalies were detected and filtered. In particular, there were some cases in which large numbers of vehicles with missing speeds were logged. These cases were typical for situations where the site conditions were not ideal for deploying the trailer, including low shoulders that made adequate sensor height above the roadway difficult to achieve, narrow areas with minimal setback outside the travel lanes for parking the trailer, or where some surface (e.g., a guardrail or barrier) reflected "phantom" vehicle radar signatures back to the Wavetronix instead of just the vehicles themselves.

Once data collection was complete in all PSUs, the raw data went through a rigorous cleaning process and were merged with all of the descriptive information gathered during the site documentation phase (Phase I). For all speed data, each lane within a site was cleaned separately. Each lane was reviewed for excessively high speeds (greater than 100 mph) and speeds of 0 mph (or missing values), as well as a negative vehicle length or a length greater than 100 ft. If a vehicle met one of these criteria, it was considered a phantom vehicle and removed from the data set. In turn, the headway and gap measures were recalculated to reflect the new time differential between the remaining consecutive vehicles. At this point, vehicles were also classified as free-flow vehicles, those with 5 seconds or greater difference between two consecutive vehicles, or not free-flow. Once the individual records were cleaned for each lane within a site, the number of hours for which data was collected was calculated for each lane. Note that to be considered a good lane data set, the time between the first recorded vehicle and the last recorded vehicle in the lane had to be at least 16 hours. It was possible for no vehicles to be recorded during some individual hours, in which case the lane's data was still considered good, even if up to 8 consecutive hours had no vehicle records (we assumed that this was likely due to no traffic on the road during that period, rather than malfunctioning data collection equipment). Further, at least one vehicle had to be recorded in each of 12 hours (not necessarily consecutive) for the lane data set to be considered good. Whenever both of those conditions were met, we accepted the data and made no weighting adjustment. However, if there were fewer than 16 hours between the first and last vehicle recorded or fewer than 12 hours with at least one vehicle observation in each hour, we deemed that likely due to malfunctioning equipment and treated the lane as "non-response." In addition, lanes with an adequate number of hours, but with high percentages of vehicles with 0 mph or missing speeds or high percentages of vehicles with excessively high speeds, were also flagged as "non-response" lanes. Lanes identified as "non-response" were excluded from further data analyses.

Sites were categorized as "good" if usable data was collected from most of the lanes on the roadway as discussed in the previous paragraph. There were 720 sites in the 2015 sample. Data were collected at 677 sites. Data were not collected at 43 sites because some were identified as ineligible during Phase II, construction at the site during the data collection period, theft, or lack of cooperation from the local authorities.

One correction was applied to the data from the Hi-Stars. A linear correction was applied based on calibration trials run on the Hi-Star units prior to deployment. That calibration exercise involved a number of passes over each unit while they were installed on a local test track. Parallel measures were taken with a Wavetronix sensor, and GPS loggers riding in passing vehicles. That calibration exercise revealed nearly perfect correlation between GPS, and Wavetronix devices, but a model-correctable error offset for the Hi-Stars. As such, a linear correction factor was established and applied to the Hi-Star data on a per-device basis as part of the data processing for the 2015 data set.

5. Data Weighting and Sampling Expansion

5.1 Weighting, Estimation and Variance Estimation

The steps in the weighting process for the NTSS III are outlined below. The process and weighting steps are very similar to those used in the NTSS I and II. The steps include calculating:

A. Inverse of the probability of selecting a PSU.
B. Inverse of the probability of selection of a site for Phase I.
C. Adjustment for site length (distance-based measure).
D. Non-response adjustment for Phase I (there was no Phase I non-response in NTSS III).
E. Inverse of the probability of selection of a site for Phase II.
F. Non-response adjustment for Phase II.
G. Adjustment for non-observed lanes in Phase II.
H. Balancing for unequal distribution of assignments by day of week.
I. Trimming of large weights.

Phase I refers to the initial sample of road segments, which were reviewed for study eligibility, suitability, and classification with respect to curvature and gradient. Phase II refers to the subsample of eligible Phase I road segments, where all hilly/curvy road segments were selected with certainty and an equal probability sample of other road segments was selected.

As in the NTSS I and II, two sets of weights were produced. The first weight is for a "count-based" measure, and the second set is for a "distance-based" measure. The "count-based" measure is appropriate for estimating, for example, the mean speed of vehicles at a given instant in time or point along the road. It is not concerned with the distance that vehicles are traveling, and thus the length of an observation site does not figure into the weight.

The "distance-based" measure is appropriate for estimating the mean speed of vehicles according to the distance traveled by each vehicle. The length of an observation site must be included as a factor in the weighting. This measure is appropriate for describing total travel miles in relation to speed and is a more comprehensive representation of exposure to speed in everyday driving. Tables presented in this report are based on this distance-based measure.

The process is the same for the two weights, except for step C in the weighting (Section 5.2 below).

Note also that all weighting steps were applied separately to the two independent PSU samples: the NTSS II PSUs subsample (also called the "A" sample) and the NASS FOPV / CISS PSUs sample (also called the "B" sample). After the final weights were computed for each sample separately, the two samples were combined and a compositing factor was applied to the final weight of each sample. The composting factor was based on the relative size of the samples. This compositing factor was 0.33 for the NTSS II PSUs subsample and 0.67 for the NASS FOPV / CISS PSUs sample. See Section 1.3 of Appendix A.

5.2 *Primary Sampling Unit Weight*

Table 3 shows the base weights of the 8 out of the 20 NTSS II PSUs that were subsampled for the NTSS III "A" sample.

Table 3. Base Weights of the Eight NTSS II PSUs Subsampled for the NTSS III "A" Sample

PSU ID	NTSS II PSU base weight	Inverse of PSU subsampling rate	NTSS III PSU base weight
4	13.000	2.500	32.500
5	22.100	2.500	55.250
12	25.200	2.500	63.000
43	36.700	2.500	91.750
48	155.900	2.500	389.750
75	32.300	2.500	80.750
76	105.300	2.500	263.250
82	17.670	2.500	44.175

Table 4 shows the base weights of the 16 scenario 5 NASS FOPV PSUs and their PSU sampling strata that constitute the NTSS III "B" sample.

Table 4. Base Weights of the 16 NASS FOPV PSUs – NTSS III "B" Sample

PSU stratum	PSU ID	PSU base weight
1-01	24	90.484
1-01	28	64.017
2-01	22	64.648
2-01	26	27.837
3-01	29	25.372
3-01	32	105.329
4-01	30	333.741
4-01	33	74.199
5-01	35	341.656
5-01	36	19.075
6-01	23	78.763
6-01	34	394.079
7-01	21	6.564
7-01	27	87.514
8-01	25	38.939
8-01	31	50.605

5.3 Site Weights, Phase I

For the NTSS III, in Phase I, all road segments were selected with probability proportional to their length, given a fixed target of road segments (45) per PSU. Let $S_{1,i,j}$ is the inverse of the probability of selection of the *j*th site in the *i*th PSU and P_i be the base weight of PSU is shown in Table 3 and Table 4.

The weight at this point in the process is $W_{1,i,j} = P_i * S_{1,i,j}$

5.4 Adjustment for Site Length

As discussed above, we have calculated two weights; each can be used for a separate set of tables. The first weight is a "count-based" measure that can be used to describe the average static vehicle density in relation to speed. The second weight, used in the set of tables in this report, is a "distance-based" measure that can be used to describe total travel miles in relation to speed. For the "count-based" measure, no additional adjustment is needed. For the "distance-based" measure, the weight is multiplied by the length of the site.

The "distance-based" weight is $W'_{1,i,j} = W_{1,i,j} * l_j$, where l_j is the length of the *j*th site.

5.5 Phase I Non-Response Adjustment

There was no Phase I non-response in the NTSS III, unlike the NTSS II. All the sites selected in Phase I were successfully visited, evaluated for study eligibility and suitability, curvature and gradient, and identified as respondent. Thus, no non-response adjustment was needed for the NTSS III.

5.6 Site Weights, Phase II

A subsample of eligible sites that are non-Curved/Gradient (CG) from Phase I was selected for actual data collection in Phase II, while all CG sites were retained with certainty. $S_{2,i,j}$ is the inverse of the conditional probability of selection of the *j*th site in the *i*th PSU for Phase II. The non-CG sites were selected with equal probability within PSU, such that 30 Phase II road segments total were selected within each PSU.

The weight including this weight factor is $W_{2,i,j} = W_{1,i,j} * S_{2,i,j}$ for the count-based measure and $W'_{2,i,j} = W'_{1,i,j} * S_{2,i,j}$ for the distance-based measure.

5.7 Non-Response Adjustment for Non-Observed Sites, Phase II

A non-response adjustment was applied to compensate for non-responding sites in the Phase II sample. The non-response adjustment cells were formed within each PSU as was done in NTSS II by the number of lanes in the site. The response rate among the eligible sites was about 95 percent in each of the two samples (“A”, “B”). The non-response adjustment factor for a given cell h is N_h = [$\sum W_{2,i,j}$ for respondents + $\sum W_{2,i,j}$ for non-respondents] / [$\sum W_{2,i,j}$ for respondents].

The weight, including this stage of non-response adjustment, is $W_{3,i,j} = W_{2,i,j} * N_h$ for the count-based measure and $W'_{3,i,j} = W'_{2,i,j} * N'_h$ for the distance-based measure.

Note that, as in the previous NTSS I and II, in some instances a site that might otherwise have been considered responding had an insufficient number of lanes with good data. In such instances, the site was considered a non-respondent, and the above adjustment was applied.

5.8 *Adjustment for Non-Observed Lanes*

A non-response adjustment was made for non-responding lanes at sites that were considered as responding sites. A lane was non-responding according to the definition of response and non-response described in Appendix A. We give an example of when a *site* was non-responding and a non-response adjustment was made as described above and when a *lane* was non-responding and a non-response adjustment was made as described in this section. Suppose there are four lanes at a site. If three lanes were classified as non-responding, the site would be regarded as non-responding and the site non-response adjustment described in the preceding section would be applied. If, however, only one of the four lanes was classified as non-responding, the site would be regarded as responding, and there would be a non-response adjustment for only the bad lane. Overall, lane response rates were 92.7 percent and 95.5 percent for the sites in the NTSS II PSUs subsample (“A”) and in the NASS FOPV / CISS PSUs sample (“B”), respectively.

A very simple lane non-response adjustment was made, in which data for the good lanes from a given site were given larger weights to account for the lanes lacking good data. For a given site, let R be the number of lanes for which there was good data, and let T be the total number of lanes at the site. The non-response adjustment factor is then T/R.

The weight including this adjustment factor is $W_{4,i,j} = W_{3,i,j} * \frac{T}{R}$ for the count-based measure and $W'_{4,i,j} = W'_{3,i,j} * \frac{T}{R}$ for the distance-based measure.

5.9 *Balancing by Day of Week*

Ideally, the same number of sites would be observed each day of the week. For a variety of reasons, this might not always be the case. To adjust for unequal number of observations between weekdays and the weekend, two factors were formed: D_1 = 5/7*(weighted number total sites observed)/ (weighted number weekday sites observed) and D_2 = 2/7*(weighted number total sites observed)/ (weighted number weekend sites observed). The factor D_1 was applied to sites observed on weekdays and D_2 was applied to sites observed on weekends. Weekend observations were defined as sites for which the initiation of data collection at a given site occurred between 3 p.m. on a Friday and 3 p.m. on a Sunday, with weekday observations consisting of all other sites.

The weight, including this adjustment factor, is $W_{5,i,j} = W_{4,i,j} * D_g$ for the count-based measure and $W'_{5,i,j} = W'_{4,i,j} * D_g$.

5.10 *Trimming Large Weights*

Very large weights lead to high sampling errors. Thus, we used weight trimming to reduce the largest weights. Looking at all vehicle weights in curve/gradient (i.e., CG) sites, those weights that were more than 4.5 times the median weight for vehicles in this group as a whole were reduced to 4.5 times the median weight. Similarly, looking at all vehicle weights in non-CG sites, those weights that were more than 4.5 times the median weight for the group as a whole were similarly reduced. However, we also avoided letting more than 5 percent of all vehicles have their weights trimmed. Thus, in some cases, weights that exceeded the threshold of 4.5 times the median were not trimmed and, in those situations, weights were only trimmed back to the level of the largest non-trimmed weight. Trimming was done separately for the count-based weights and for the distance-based weights.

Table 5 below shows the percentages of weights that were trimmed for the two samples ("A", "B") by CG status. The process of trimming slightly reduces the sum of total weights. Weights for all vehicles were slightly increased, separately within each of the four cells, defined by the CG status and weekday/weekend assignment of the sites to restore the sum of vehicle level weights prior to trimming. Let T be the weight trimming factor, where $T = 1$ for most vehicles and a value less than 1.0 for those vehicle weights requiring trimming and similarly T' be the weight trimming factor for the distance weight. Let F_k be the trimmed weight redistribution factor applied to the weight redistribution cell k and similarly F'_k be the redistribution factor for the distance weight. Then, the final weights are:

$$W_{6,i,j} = W_{5,i,j} * T * F_k \text{ and } W'_{6,i,j} = W'_{5,i,j} * T' * F'_k .$$

Table 5. Percent of Weights That Were Trimmed (vehicle level)

Type of weight	**NTSS II PSUs**		**NASS FOPV / CISS PSUs**	
	Curvy/ high gradient %	**Non-curvy/ low gradient %**	**Curvy/ high gradient %**	**Non-curvy/ low gradient %**
Count-based	4.5	4.6	4.6	2.7
Distance-based	4.4	4.2	0	2.2

5.11 *Characteristics of Weights*

Table 6 shows the statistics for the distribution of the weights for the two samples ("A", "B") separately and for the combined samples. The distribution of the weights computed in each weighting step described in this weighting section is shown separately.

Table 6. Statistics for the Distribution of the Count and Distance Weights for the Two Samples Separately and the Combined Samples

Weight	Number of sites	Sum	Mean	Median	CV (%)	Max	Min
NTSS II PSUs subsample							
Count weights							
Base weight (Phase 2) [1/]	360	18,362,379	51,007	19,279	166	798,088	3,125
Base weight (Phase 2)	226	11,501,080	50,890	20,055	148	441,155	3,646
Adjusted for site non-response	226	12,182,783	53,906	20,055	150	474,967	3,646
Adjusted for lane non-response	226	13,342,330	59,037	23,066	156	659,234	3,646
Adjusted by day of week	226	13,342,330	59,037	23,328	158	620,562	3,528
Trimmed final weight	226	12,504,509	55,330	27,831	104	218,193	4,125
Distance weights							
Base weight (Phase 2) [1/]	360	1,112,591,725	3,090,533	1,258,229	102	10,323,144	476,318
Base weight (Phase 2)	226	745,142,334	3,297,090	1,258,229	103	10,323,144	555,704
Adjusted for site non-response	226	782,994,051	3,464,575	1,258,229	105	12,476,297	555,704
Adjusted for lane non-response	226	853,773,953	3,777,761	1,476,022	109	22,621,132	555,704
Adjusted by day of week	226	853,773,953	3,777,761	1,511,780	110	20,599,464	506,040
Trimmed final weight	226	851,858,062	3,769,283	1,624,799	101	11,946,275	532,858
NASS FOPV / CISS PSUs							
Count weights							
Base weight (Phase 2) [1/]	720	19,161,394	26,613	19,465	110	234,436	1,996
Base weight (Phase 2)	451	12,443,594	27,591	20,024	112	234,436	1,996
Adjusted for site non-response	451	12,995,778	28,815	20,389	115	256,957	1,996
Adjusted for lane non-response	451	13,495,190	29,923	21,912	112	256,957	1,996
Adjusted by day of week	451	13,495,190	29,923	20,982	113	348,703	1,806
Trimmed final weight	451	12,941,313	28,695	22,755	81	128,327	1,977
Distance weights							
Base weight (Phase 2) [1/]	720	1,266,749,106	1,759,374	1,442,595	61	4,033,836	302,912
Base weight (Phase 2)	451	840,033,033	1,862,601	1,546,802	61	4,033,836	302,912
Adjusted for site non-response	451	887,885,481	1,968,704	1,605,493	63	4,737,855	302,912
Adjusted for lane non-response	451	926,275,242	2,053,825	1,605,493	65	6,042,967	302,912
Adjusted by day of week	451	926,275,242	2,053,825	1,602,908	67	7,672,139	279,197
Trimmed final weight	451	924,018,041	2,048,820	1,604,308	65	5,410,191	279,197
Combined samples							
Final count weight	677	12,797,168	18,903	13,758	89	85,979	1,325
Final distance weight	677	900,205,248	1,329,698	890,869	78	3,942,271	175,843

Notes: 1/ All sites selected in Phase 2, including responding, nonresponding and ineligible sites.

6. Results

This section presents tabulations of weighted speed estimates and standard error values. Table naming indicates the levels of road classification, light condition, time of day, day of week, horizontal or vertical roadway curvature, vehicle length, urbanicity, number of lanes, etc. that each tabulation represents. In each case, tables are presented in pairs, with mean, median, 85th percentile, and 95th percentile values in one table followed by a table with the standard deviations (SD) for the presented data. For each table, roadways are classified according to the functional classification code (FCC) definitions in the Geographic Data Technology (GDT) database.

Each primary table presented in this section provides the 2015 population estimate and its standard error. The standard error of the estimate is presented in parentheses next to the estimate. This standard error of the estimate represents the bounds of the 95 percent confidence interval for the presented weighted estimate (i.e., the weighted estimate for that cross-tabulation). The next column represents the value of the change relative to the 2009 estimate and standard error. That is, if the estimate for 2015 is higher, the change value will be a positive number. Conversely, if the estimate for 2015 is lower, the change value will be a negative number. **If the estimate of change from 2009 to 2015 was significant ($p \leq .05$), the cell is highlighted yellow.**

The *standard deviations* are presented as a companion table for each of the primary tables. These standard deviations provide a measure of the spread of the unweighted data above or below the unweighted mean value. Note that we have not presented the unweighted means in this report.

Overall, the data generally followed expected trends for the FCC class breakouts. That is, FCC-1 (limited access highways) typically showed a higher overall speed than FCC-2 (major arterials). In turn, FCC-2 road segments generally had higher speeds than most FCC-3 (minor arterials/collector) road segments.

The following sections point out the results by road class for the various other independent variables and combinations. Each breakout of the data discussed in the sections to follow expands on the differences among the independent variable categories from the 2015 period as the primary focus of the discussion since it is these relative measures, not just the longitudinal differences, that are of interest and concern in shaping speed management policy.

It is important to note that although the NTSS-III report presents estimates and standard errors from some 12.5 million vehicles observed, there is nonetheless some sampling error on the NTSS-III estimates and the differences between NTSS-III and NTSS-II. While the large number of vehicles observed works to reduce the between-vehicle component of variance to essentially zero, the between-PSU and between-road segment components remain as the main contributors to the overall variance, the latter often being the larger of the two components given the association between road type and vehicle speed. The PSU and road segment sample sizes, as well as the PSU and road segment stratification, work to reduce these variances, which largely explain and are reflected in the NTSS-III standard errors presented in the report. The standard errors of differences between NTSS-III and NTSS-II are also influenced, however, by the standard errors of the NTSS-II estimates themselves.

6.1 Road Class

Overall speeds are presented for all traffic in Table **7** and for free-flow traffic in Table 8. In this report, the term free flow is defined on an individual vehicle basis, not on the flow regime of the roadway. Thus, a free-flow vehicle is defined as a vehicle with headway greater than 5 seconds. Drivers of these vehicles have fewer constraints due to the proximity of other vehicles to choose their speeds than drivers in more highly constrained vehicles. In general, the speed estimates for both flow conditions (free-flow and non-free-flow) are quite comparable, with both typically falling within 1 to 1.5 mph of each other for each road class. Traffic speeds on limited access roads average about 14 mph faster than on major arterials, which in turn are about 7 mph faster than on minor arterials and collector roads.

Overall, mean speeds increased significantly between 2009 and 2015 for both the free-flow and all-traffic cases. While speed estimates on limited access highways in 2015 were unchanged from the 2009 estimates, the other FCC road classes showed substantial increases over the two data collection periods. Mean speed estimates for major arterials increased by approximately 3 mph, and mean speed estimates for minor arterials and collectors increased by 2-3 mph for overall traffic measures and free flow conditions, respectively. While the increase in mean speeds for major arterials and minor arterials for all traffic and free flow conditions were not significant, the 85th and 95th percentile speeds on these roadways increased significantly ($p < .05$) relative to 2009 for both conditions. This suggests a greater speed differences among the traffic stream on these lower classification roads.

Table 7. Overall Speeds by Road Class (All Traffic)

	FCC ROAD CLASS							
	1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
	Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
	2015	Change	2015	Change	2015	Change	2015	Change
	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
Mean	69.0 (1.0)	-0.1 (1.5)	54.9 (1.6)	3.0 (2.0)	48.8 (2.0)	2.3 (2.1)	62.9 (1.3)	5.7 (1.7)
Median	69.8 (1.0)	-0.1 (2.2)	55.9 (2.2)	3.9 (2.6)	47.8 (2.6)	2.2 (2.7)	65.7 (1.1)	7.7 (2.1)
Quantile (0.85)	77.3 (0.6)	-0.2 (1.2)	68.3 (1.2)	5.8 (1.7)	62.1 (2.3)	5.1 (2.5)	75.8 (0.7)	2.3 (2.1)
Quantile (0.95)	81.3 (0.6)	0.4 (1.0)	75.2 (0.8)	6.3 (1.5)	71.2 (2.7)	6.5 (2.7)	80.4 (0.6)	1.4 (1.7)

Table 8 shows the overall speed distributions by the three FCC classes for vehicles designated as free flow. In 2015, the 85th percentile values of these speeds range from about 8-14 mph above the mean, while the 95th percentiles are from about 12-22 mph above the mean. The differences between the mean speed and 85th and 95th percentile speeds estimate for major arterials and minor arterials in 2015 did not differ much from those of 2009. In 2009 the 85th percentile values of these speeds range from about 7-11 mph above the mean, while the 95th percentiles are from about 12-22 mph above the mean.

Table 8. Overall Speeds by Road Class (Free-Flow)

	FCC ROAD CLASS							
	1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
	Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
	2015	Change	2015	Change	2015	Change	2015	Change
	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
Mean	70.4 (0.6)	-0.1 (1.2)	56.4 (1.3)	3.1 (1.6)	49.7 (2.0)	2.7 (2.0)	62.6 (1.1)	6.3 (1.6)
Median	70.8 (0.6)	-0.0 (1.1)	57.3 (1.6)	4.0 (2.0)	49.0 (2.7)	2.9 (2.7)	65.3 (1.0)	9.3 (1.9)
Quantile (0.85)	78.1 (0.5)	0.1 (1.7)	69.3 (1.1)	5.6 (1.4)	63.2 (2.3)	5.4 (2.5)	76.0 (0.6)	3.0 (1.7)
Quantile (0.95)	82.2 (0.6)	0.4 (1.0)	76.2 (0.9)	6.1 (1.3)	72.1 (2.6)	6.6 (2.6)	80.8 (0.5)	1.8 (1.5)

Figure 12 shows the overall speeds for free-flow traffic for the 2015 data collection period. The arrows below each box plot show the change relative to the 2009 values for the same data, while an oval symbol indicates that there was no change between the 2009 and 2015 data for that particular measure. The overall values for limited access highway data was unchanged from 2009. In contrast, the major arterials and minor arterial/collector categories showed 3-4 mph increases in mean, though these increases were not significant. Relative to 2009, the median speeds on major arterials increased significantly by 4 mph in 2015 ($p < .05$). On both major arterials and minor arterial/collectors, the 85th and 95th percentile speeds increased significantly by 5-7 mph from year to year ($p < .05$).

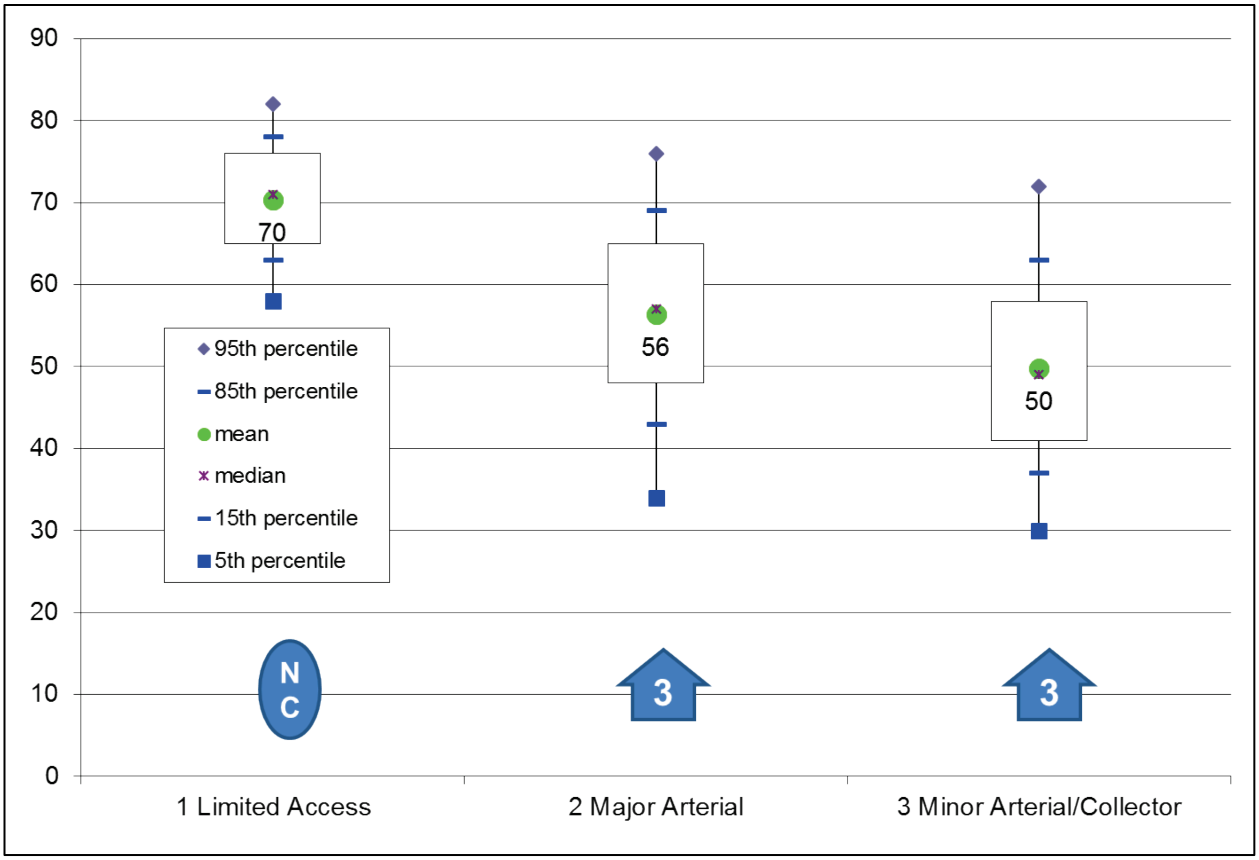

Figure 12. Overall Speeds by Road Class, 2015 (Free-Flow) (Arrows show change from 2009)

Standard deviations for the three FCC classes under all traffic and free-flow driving conditions are presented in Table 9. As in 2009, the 2015 standard deviations of both free-flow and all-traffic conditions show only a small difference in the values for free-flow over all-traffic datasets. Despite the higher mean speeds on the limited access roadways, the standard deviations for these roads were not largely different than for arterials or collectors in 2015. At about 9 mph on limited access roadways, the standard deviation was about 13 percent of the mean, while for arterials and collectors, it was about 13 mph, or 24-26 percent of the mean. In 2009, at about 8 mph on limited access roadways, the standard deviation was about 12 percent of the mean, while for arterials and collectors, it was in approximately 10 mph, or 19-22 percent of the mean.

Table 9. Standard Deviations for the Values Reported in Table 7 and Table 8

	FCC ROAD CLASS							
	1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
	Speed SD		Speed SD		Speed SD		Speed SD	
Flow Condition	**2015**	**Change**	**2015**	**Change**	**2015**	**Change**	**2015**	**Change**
Free-Flow	9.25	0.18	13.42	2.90	12.98	2.68	13.70	-0.64
All Traffic	8.11	-0.00	13.04	2.71	13.12	2.66	13.92	-0.29

6.2 Proportion Exceeding the Posted Speed Limit

The proportions of speeding vehicles in 2015 are shown in Table 10 (All Traffic) and Table 11 (Free-Flow). The proportions were very similar for free-flow and overall conditions.

Table 10 shows the proportion of all vehicles exceeding the speed limit by various speeds on each road class. Since the speed estimates remained relatively unchanged for the limited access highway class from 2009 to 2015, the percent change here shows only a small decrease in the percent of drivers exceeding the posted speed limit (-2 percent). While the proportion of all vehicles exceeding the speed limit by various speeds on major arterials and collectors increased in 2015, the increases were not significant relative to the various speed measures in 2009. That is, the increases in the percentage of vehicles exceeding the speed limit by any speed, speeds greater than 5 mph, and speeds greater than 10 mph between 2009 and 2015 were not significant.

Table 10. Proportion of Traffic Exceeding Speed Limit by Road Class (All Traffic)

	FCC ROAD CLASS							
	1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
	Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
	2015	**Change**	**2015**	**Change**	**2015**	**Change**	**2015**	**Change**
% Exceeding Speed Limit by Any Amount	68.8%	-1.8%	56.1%	1.4%	58.4%	1.1%	64.8%	2.3%
% Exceeding Speed Limit by > 5 mph	43.0%	-1.5%	33.9%	4.2%	34.7%	3.3%	40.0%	3.3%
% Exceeding Speed Limit by > 10 mph	19.1%	-0.1%	16.4%	4.3%	17.1%	3.3%	18.3%	2.5%

Table 11 shows the proportion of free-flow vehicles exceeding the speed limit on each road class. Overall, 66 percent of free-flow vehicles exceeded the speed limit on all roadways. This was a 3 percent increase when compared to 2009 (63 percent), though the increase was not a significant change from 2009. Forty one percent of free-flow vehicles exceeded the speed limit by more than 5 mph. In addition, 19 percent of drivers in all the road classes were observed exceeding the posted speed limits by more than 10 mph. This was a 3 percent increase from 2009, though not significant. It is important to note that on major arterials, 18 percent of drivers were exceeding the posted speed limit by more than 10 mph. This was a significant increase from the proportion of drivers exceeding the posted speed limit 2009 (+ 5 percent; $p < .05$). Figure 13 provides a graphical depiction of the values listed in Table 11.

Table 11. Proportion of Traffic Exceeding Speed Limit by Road Class (Free-Flow)

	FCC ROAD CLASS							
	1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
	Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
	2015	Change	2015	Change	2015	Change	2015	Change
% Exceeding Speed Limit by Any Amount	70.1%	-1.6%	58.7%	2.8%	60.3%	1.2%	65.5%	2.9%
% Exceeding Speed Limit by > 5 mph	44.9%	-0.6%	36.2%	5.2%	36.7%	3.4%	41.2%	4.3%
% Exceeding Speed Limit by > 10 mph	20.3%	0.2%	18.1%	4.9%	18.6%	3.6%	19.4%	3.1%

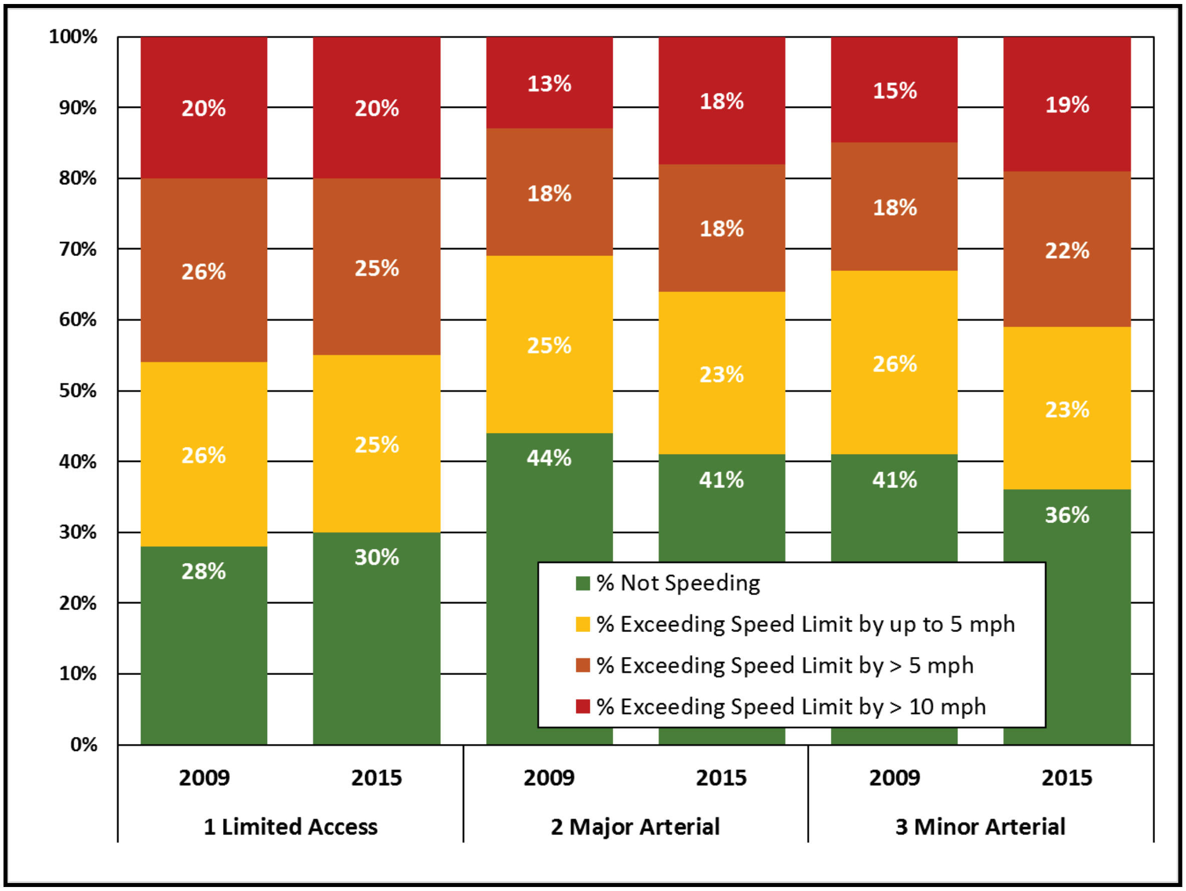

Figure 13. Proportion of Traffic Exceeding the Speed Limit by Road Class (Free-Flow)

Table 3 through Table 11 show only small differences in the values for free-flow and all-traffic conditions. Since the goal of this portion of the data collection effort was to determine the speeds chosen by drivers on given roadway classes as a function of various other independent factors, it is prudent to concentrate on the portion of the data that represents drivers' speed when not constrained by other drivers in proximity. For that reason, the remainder of the data tabulations and discussion of relationships of those factors will concentrate on the free-flow dataset.

6.3 Time of Day

There was very little variation in speeds by time of day across all road types, as shown in Table 12. Consistent with the 2009 data there are minimal shifts as a result of the time-of-day across all road types. In addition, the year-to-year variations are in line with the overall trends, where measured speeds were greatest on limited access roadways as compared to the other road types. While speeds were greatest on limited access roadways, the speed measures for the various times of day did not differ significantly across the two measurement years (2009 vs. 2015). Conversely, speeds on major arterials increased significantly across all times of day relative to 2009 ($p \leq .05$). In turn, relative to 2009, the 85th and 95th percentile speeds on minor arterials/collectors increased significantly in 2015 ($p < .05$) across all times of day. Figure 14 provides a graphic view of speeds by time of day.

Table 12. Speed by Road Type and Time of Day (Free-Flow)

		FCC ROAD CLASS							
		1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
		Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
		2015	Change	2015	Change	2015	Change	2015	Change
TIMEDAY		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
1 Late night 6 hrs. (000-0559)	Mean	68.5 (0.9)	-0.1 (1.3)	57.1 (1.7)	3.7 (1.7)	50.3 (1.7)	1.6 (1.8)	64.0 (1.0)	4.6 (1.5)
	Median	68.6 (0.8)	0.6 (1.4)	58.1 (1.9)	4.9 (2.1)	49.4 (2.1)	1.4 (2.4)	66.0 (0.8)	5.0 (1.7)
	Quantile (0.85)	76.3 (0.5)	0.0 (1.3)	70.0 (1.5)	6.2 (1.5)	63.7 (2.0)	4.1 (2.2)	75.1 (0.6)	2.1 (1.7)
	Quantile (0.95)	80.5 (0.4)	0.1 (1.0)	77.1 (1.3)	6.4 (1.2)	72.9 (2.4)	6.0 (2.4)	79.9 (0.5)	1.9 (2.8)
2 Morning peak 3 hrs. (0600-0859)	Mean	70.6 (0.6)	-0.3 (1.1)	57.6 (1.3)	3.2 (1.8)	50.8 (2.0)	2.6 (2.0)	62.9 (1.2)	5.9 (1.6)
	Median	71.3 (0.6)	0.4 (2.6)	58.4 (1.6)	3.8 (2.1)	50.3 (2.5)	2.9 (2.6)	65.5 (1.0)	8.8 (1.9)
	Quantile (0.85)	78.4 (0.4)	0.1 (0.8)	70.3 (1.2)	5.4 (1.5)	64.2 (2.1)	5.0 (2.4)	76.3 (0.5)	3.3 (1.6)
	Quantile (0.95)	82.5 (0.4)	0.1 (0.9)	77.1 (1.1)	5.7 (1.2)	72.8 (2.4)	5.9 (2.5)	81.0 (0.5)	2.0 (1.3)
3 Mid-day 7 hrs. (0900-1559)	Mean	70.9 (0.6)	-0.1 (1.1)	56.0 (1.3)	2.9 (1.7)	49.7 (2.1)	2.8 (2.1)	62.4 (1.1)	6.4 (1.7)
	Median	71.3 (0.5)	-0.6 (2.1)	57.1 (1.6)	3.7 (2.0)	49.0 (2.7)	3.0 (2.7)	65.1 (1.0)	9.8 (1.9)
	Quantile (0.85)	78.3 (0.5)	-0.4 (1.5)	68.8 (1.0)	5.3 (1.5)	63.3 (2.6)	5.6 (2.5)	76.1 (0.5)	3.1 (1.8)
	Quantile (0.95)	82.4 (0.6)	0.4 (1.1)	75.9 (1.1)	6.0 (1.4)	72.2 (2.9)	7.0 (2.8)	80.9 (0.6)	1.9 (1.6)
4 Evening peak 3 hrs. (1600-1859)	Mean	70.9 (0.7)	-0.2 (1.3)	57.0 (1.3)	3.4 (1.7)	50.0 (2.0)	3.0 (2.1)	62.4 (1.2)	6.8 (1.7)
	Median	71.7 (0.6)	-0.3 (1.4)	58.0 (1.6)	4.1 (2.0)	49.3 (2.7)	3.3 (2.7)	65.1 (1.1)	10.5 (1.8)
	Quantile (0.85)	78.9 (0.6)	-0.0 (0.7)	69.8 (1.1)	5.7 (1.4)	63.5 (2.3)	5.6 (2.4)	76.5 (0.6)	3.5 (1.8)
	Quantile (0.95)	83.0 (0.6)	0.5 (1.1)	76.8 (1.0)	6.3 (1.5)	72.3 (2.3)	6.7 (2.2)	81.4 (0.6)	2.4 (1.3)
5 Early night 5 hrs. (1900-2359)	Mean	69.9 (0.7)	-0.0 (1.3)	55.5 (1.4)	3.2 (1.6)	48.5 (2.0)	2.5 (2.0)	62.5 (1.3)	6.3 (1.7)
	Median	70.2 (0.7)	0.3 (2.1)	56.2 (1.7)	4.1 (2.0)	47.4 (2.5)	2.4 (2.6)	65.3 (1.0)	9.3 (2.1)
	Quantile (0.85)	77.5 (0.6)	-0.1 (1.1)	68.3 (1.1)	5.8 (1.5)	61.9 (2.3)	5.5 (2.4)	75.6 (0.6)	2.6 (1.8)
	Quantile (0.95)	81.7 (0.6)	0.5 (1.0)	75.1 (0.7)	6.0 (1.4)	70.7 (2.4)	6.8 (2.3)	80.4 (0.6)	2.4 (3.2)
Total	Mean	70.4 (0.6)	-0.1 (1.2)	56.4 (1.3)	3.1 (1.6)	49.7 (2.0)	2.7 (2.0)	62.6 (1.1)	6.3 (1.6)
	Median	70.8 (0.6)	-0.0 (1.1)	57.3 (1.6)	4.0 (2.0)	49.0 (2.7)	2.9 (2.7)	65.3 (1.0)	9.3 (1.9)
	Quantile (0.85)	78.1 (0.5)	0.1 (1.7)	69.3 (1.1)	5.6 (1.4)	63.2 (2.3)	5.4 (2.5)	76.0 (0.6)	3.0 (1.7)
	Quantile (0.95)	82.2 (0.6)	0.4 (1.0)	76.2 (0.9)	6.1 (1.3)	72.1 (2.6)	6.6 (2.6)	80.8 (0.5)	1.8 (1.5)

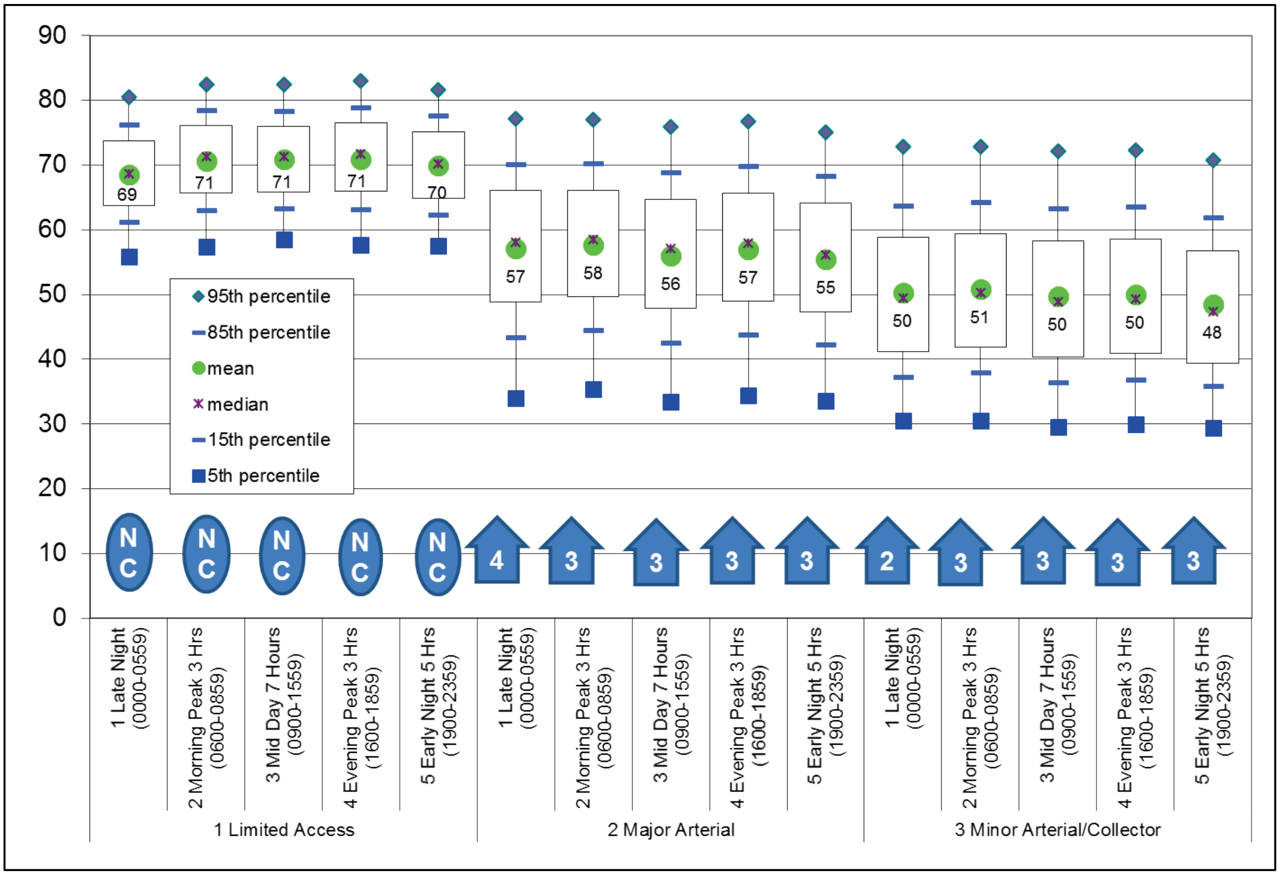

Figure 14. Speed by Road Type and Time of Day, 2015 (Free-Flow) (Arrows show change from 2009)

Table 13 shows the standard deviations for the speed values across the time of day. Standard deviation variations show little difference due to time of day within all road types. The overall standard deviation for the limited access roadways was relatively unchanged from 2009 to 2015. However, the standard deviation for both major arterials and collectors increased by approximately 3 mph reflecting the greater variability in speeds on these road classes relative to 2009 speeds estimates.

Table 13. Standard Deviations for the Values Reported in Table 12

	FCC ROAD CLASS							
	1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
	Speed SD		Speed SD		Speed SD		Speed SD	
TIMEDAY	**2015**	**Change**	**2015**	**Change**	**2015**	**Change**	**2015**	**Change**
1 Late night 6 hrs. (000-0559)	7.99	0.25	13.13	2.95	13.12	2.59	12.12	-0.87
2 Morning peak 3 hrs. (0600-0859)	8.56	0.49	12.85	2.38	13.06	2.53	13.86	-0.05
3 Mid-day 7 hrs. (0900-1559)	7.74	-0.12	13.09	2.74	13.19	2.71	14.18	-0.15
4 Evening peak 3 hrs. (1600-1859)	8.82	-0.40	13.14	2.73	13.16	2.61	14.46	-0.03
5 Early night 5 hrs. (1900-2359)	7.78	0.07	12.80	2.76	12.86	2.78	13.72	-0.52
Total	8.11	-0.00	13.04	2.71	13.12	2.66	13.92	-0.29

6.4 Light Condition

Table 14 and Table 15 present daytime versus nighttime speeds and standard deviations. Evening civil twilight, the time when there is still enough light for objects to be distinguished and artificial illumination is not necessary, occurred between 8:40 p.m. and 9 p.m. during the 2009 and 2015 field periods. Therefore, daytime was defined as 6 a.m. – 9 p.m. Again, the differences are extremely small (i.e., 1-2 mph) between light conditions within each road type in 2015. This pattern is identical to that observed in 2009, where the changes were also between 1-2 mph. While speeds under both light on limited access roadways remained relative unchanged compared to 2009, speeds on major arterials and minor arterials increased significantly. This was true for the mean speeds on major arterials under night conditions with an increase of 3 mph as well, though the 85th and 95th percentile speeds on both roadways increased significantly ($p \leq .05$).

The standard deviations for limited access highways have remained relatively unchanged from 2009 to 2015. However, the standard deviations on major arterials and collector roads have increased by 3 mph. We believe the increase in the standard deviations reflects the observed speeds themselves (see Tables 7 and 9), as is evidenced by the relatively large increases in the 85th and 95th percentile speeds compared to 2009 (Table 7) and the overall standard deviations (Table 9). Figure 15 provides a graphic view of the statistics from Table 14.

Table 14. Speed by Road Type and Light Condition (during June 2015) (Day=6 a.m.-9 p.m. Night=9 p.m.-6 a.m.) (Free-Flow)

		FCC ROAD CLASS							
		1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
		Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
		2015	Change	2015	Change	2015	Change	2015	Change
LIGHT CONDTION		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
1 Day (0600-2059)	Mean	70.8 (0.6)	-0.1 (1.1)	56.5 (1.3)	3.1 (1.7)	49.9 (2.0)	2.9 (2.1)	62.5 (1.2)	6.5 (1.7)
	Median	71.4 (0.6)	-0.5 (2.0)	57.4 (1.6)	3.9 (2.0)	49.2 (2.7)	3.0 (2.7)	65.2 (1.0)	9.9 (1.9)
	Quantile (0.85)	78.4 (0.5)	-0.3 (1.3)	69.3 (1.0)	5.5 (1.3)	63.4 (2.4)	5.5 (2.5)	76.2 (0.6)	3.2 (1.7)
	Quantile (0.95)	82.5 (0.6)	0.4 (1.0)	76.3 (0.9)	6.0 (1.4)	72.2 (2.6)	6.6 (2.5)	81.0 (0.6)	2.0 (1.4)
2 Night (2100-0559)	Mean	68.8 (0.8)	-0.1 (1.3)	55.8 (1.5)	3.2 (1.6)	48.9 (1.8)	1.9 (2.0)	63.2 (1.1)	5.2 (1.6)
	Median	69.0 (0.8)	0.1 (1.5)	56.5 (1.9)	4.2 (2.0)	47.9 (2.5)	1.7 (2.6)	65.6 (0.9)	6.6 (2.2)
	Quantile (0.85)	76.5 (0.5)	0.0 (1.1)	68.8 (1.2)	5.8 (1.4)	62.3 (2.0)	4.6 (2.3)	75.1 (0.6)	2.1 (1.5)
	Quantile (0.95)	80.7 (0.5)	0.3 (1.0)	75.8 (1.1)	5.9 (1.3)	71.2 (2.3)	6.1 (2.3)	79.8 (0.5)	1.8 (1.3)
Total	Mean	70.4 (0.6)	-0.1 (1.2)	56.4 (1.3)	3.1 (1.6)	49.7 (2.0)	2.7 (2.0)	62.6 (1.1)	6.3 (1.6)
	Median	70.8 (0.6)	-0.0 (1.1)	57.3 (1.6)	4.0 (2.0)	49.0 (2.7)	2.9 (2.7)	65.3 (1.0)	9.3 (1.9)
	Quantile (0.85)	78.1 (0.5)	0.1 (1.7)	69.3 (1.1)	5.6 (1.4)	63.2 (2.3)	5.4 (2.5)	76.0 (0.6)	3.0 (1.7)
	Quantile (0.95)	82.2 (0.6)	0.4 (1.0)	76.2 (0.9)	6.1 (1.3)	72.1 (2.6)	6.6 (2.6)	80.8 (0.5)	1.8 (1.5)

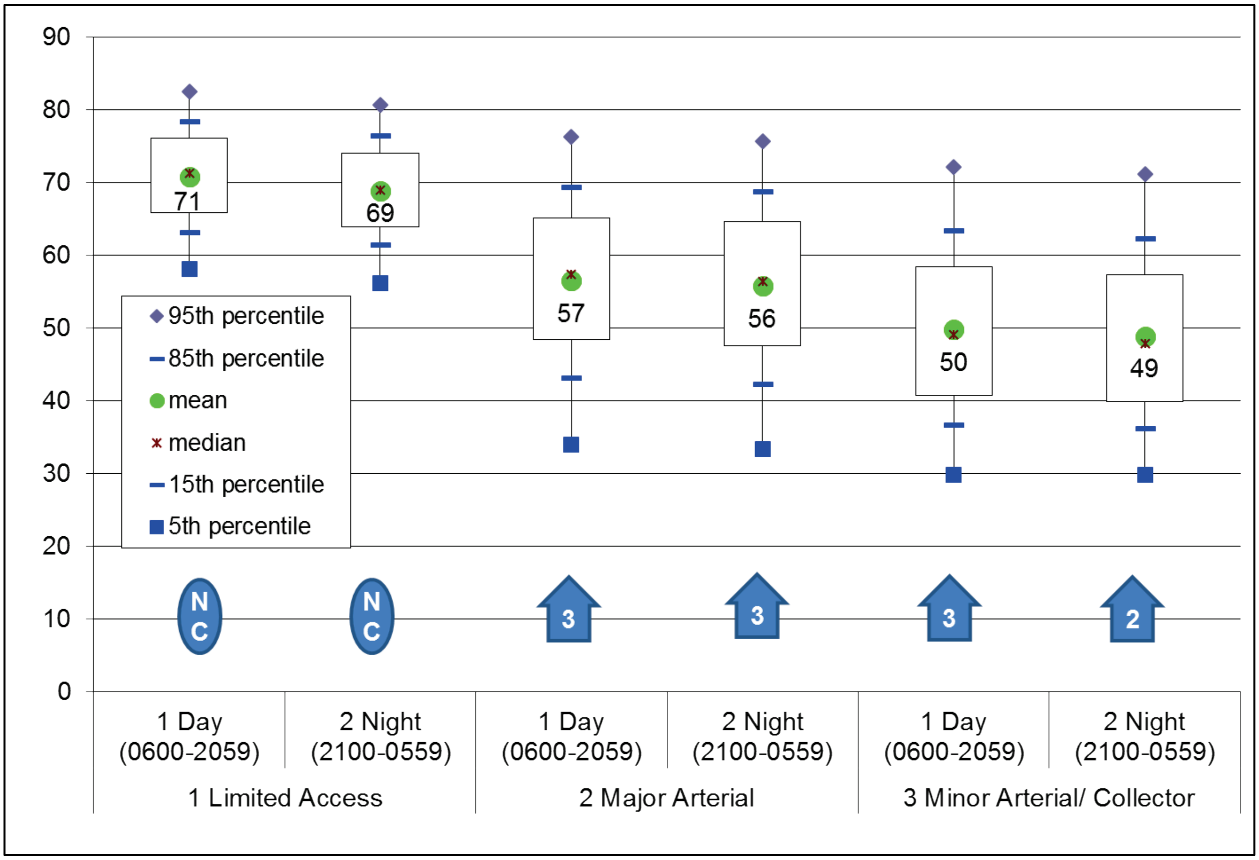

Figure 15. Speed by Road Type and Light Condition, 2015 (Free-Flow) (Arrows show change from 2009)

Table 15. Standard Deviations for the Values Reported in Table 14.

	FCC ROAD CLASS							
	1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
	Speed SD		Speed SD		Speed SD		Speed SD	
LIGHT CONDITION	2015	Change	2015	Change	2015	Change	2015	Change
1 Day (0600-2059)	8.11	-0.06	13.04	2.66	13.15	2.66	14.16	-0.15
2 Night (2100-0559)	7.94	0.23	13.00	2.95	12.92	2.61	12.83	-0.77
Total	8.11	-0.00	13.04	2.71	13.12	2.66	13.92	-0.29

6.5 Day of Week

Variations attributable to the day of the week are presented in Table 16 and Table 17. Relative to 2009, significant increases in mean speeds occurred on Monday (+8 mph), Tuesday (+7 mph), Wednesday (+ 9 mph), and Saturday (+8 mph) ($p < .05$). Speeds on limited access roadways showed little difference across day of week (2 mph). Mean speeds on major arterials were between 55-59 mph, with an increase of 1-7 mph across day of week from 2009 measures. Note, these increases in mean speed were not significantly different from similar measures in 2009. However, there were highly significant increases in the 85th and 95th percentile speeds on major arterials occurred on Tuesday (+ 6-7 mph), and Wednesday (+ 8-9 mph) ($p < .01$). The 95th percentile speed increased significantly on Saturday (+9 mph) ($p \leq .01$). In 2015, mean speeds on minor arterials and collectors were in the range of 47-53 mph, increasing by 2-6 mph from the 2009 measures. On minor arterials and collector roads the largest increase in mean speed occurred on Friday (6 mph) in 2015; however, this increase was not significantly different than 2009. The 95th percentile speeds on minor arterials/collectors showed a significant increase on Tuesday (+ 7 mph), Friday (+11 mph), and Sunday (+10 mph) ($p \leq .05$). Figure 16 provides a graphic view of the statistics from Table 16.

Table 16. Speed by Road Type and Day of Week (Free-Flow)

		FCC ROAD CLASS							
		1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
		Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
		2015	Change	2015	Change	2015	Change	2015	Change
DAYWEEK		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
Mon	Mean	70.1 (0.8)	2.5 (1.7)	57.2 (2.0)	4.9 (6.1)	48.6 (2.2)	2.0 (3.5)	60.8 (1.1)	8.3 (2.3)
	Median	70.4 (0.9)	3.5 (1.8)	57.4 (2.2)	5.1 (7.6)	46.8 (2.5)	1.7 (3.6)	63.1 (1.0)	11.2 (3.6)
	Quantile (0.85)	78.0 (0.7)	3.0 (1.3)	68.4 (2.1)	3.3 (6.1)	62.0 (3.4)	3.8 (5.4)	75.2 (0.9)	8.0 (2.3)
	Quantile (0.95)	82.1 (0.7)	2.6 (1.1)	75.4 (2.0)	3.9 (5.6)	72.2 (4.4)	6.3 (6.7)	80.4 (0.8)	6.2 (2.1)
Tue	Mean	69.1 (0.7)	-1.1 (2.3)	56.5 (2.3)	1.1 (3.9)	49.5 (1.6)	2.6 (2.7)	61.2 (0.9)	7.1 (2.3)
	Median	70.1 (0.6)	-0.5 (2.0)	57.1 (2.8)	1.8 (4.4)	49.4 (2.1)	2.8 (3.1)	63.7 (1.0)	10.4 (2.6)
	Quantile (0.85)	77.3 (0.4)	0.0 (1.2)	70.1 (1.2)	6.2 (2.0)	61.6 (1.4)	4.9 (2.7)	75.1 (0.5)	6.1 (4.4)
	Quantile (0.95)	81.3 (0.4)	0.4 (1.2)	77.1 (1.1)	7.3 (1.8)	69.9 (1.4)	6.6 (3.2)	79.9 (0.4)	3.9 (2.7)
Wed	Mean	70.5 (0.6)	2.9 (1.7)	56.2 (1.5)	3.7 (2.8)	49.5 (2.2)	2.5 (4.4)	63.2 (1.5)	9.4 (2.0)
	Median	71.0 (0.5)	3.4 (1.5)	57.9 (2.3)	5.2 (2.9)	49.5 (3.0)	4.1 (4.2)	66.0 (1.4)	12.7 (2.0)
	Quantile (0.85)	78.1 (0.5)	2.9 (1.8)	70.8 (1.5)	8.4 (2.9)	61.9 (1.8)	2.9 (7.5)	76.3 (0.7)	7.3 (2.7)
	Quantile (0.95)	82.2 (0.6)	2.7 (2.0)	77.9 (1.3)	9.0 (3.0)	69.5 (1.5)	3.1 (8.1)	81.0 (0.6)	6.0 (2.6)
Thu	Mean	70.3 (0.4)	0.5 (1.9)	59.4 (2.2)	6.7 (6.4)	51.9 (3.1)	2.6 (3.1)	62.9 (1.6)	5.1 (2.9)
	Median	70.6 (0.5)	0.8 (2.6)	61.3 (1.8)	7.3 (5.6)	51.6 (4.5)	3.2 (4.6)	65.5 (1.0)	6.5 (3.6)
	Quantile (0.85)	77.8 (0.5)	-0.1 (1.5)	70.6 (0.9)	5.7 (5.1)	66.5 (3.0)	4.3 (3.3)	75.7 (0.5)	1.7 (2.8)
	Quantile (0.95)	81.8 (0.5)	-0.1 (1.4)	76.5 (0.6)	4.9 (5.0)	74.7 (2.6)	4.7 (3.5)	80.5 (0.4)	1.5 (2.6)
Fri	Mean	70.9 (0.7)	-0.5 (1.7)	56.9 (1.5)	2.9 (4.1)	52.6 (3.3)	6.4 (4.4)	63.5 (1.3)	3.4 (2.5)
	Median	71.3 (0.7)	0.1 (2.0)	57.4 (2.1)	3.7 (4.8)	52.5 (4.5)	7.1 (5.6)	66.1 (1.1)	3.1 (3.1)
	Quantile (0.85)	78.3 (0.6)	-0.2 (1.7)	68.9 (1.3)	4.4 (4.3)	66.8 (3.6)	10.1 (5.2)	76.2 (0.6)	0.2 (1.6)
	Quantile (0.95)	82.3 (0.7)	-0.2 (1.7)	75.7 (1.3)	5.2 (3.5)	74.7 (3.7)	11.3 (5.5)	80.9 (0.6)	-0.1 (1.8)
Sat	Mean	71.1 (1.0)	-1.2 (2.8)	54.3 (1.8)	2.6 (5.0)	47.5 (1.7)	0.3 (2.1)	63.4 (1.8)	7.7 (3.5)
	Median	71.4 (0.9)	-1.4 (2.8)	55.0 (1.5)	3.0 (5.1)	46.5 (2.1)	-0.8 (2.5)	66.3 (1.6)	12.4 (3.3)
	Quantile (0.85)	78.6 (0.8)	-0.4 (1.4)	66.5 (1.5)	6.1 (3.7)	60.0 (2.1)	3.2 (2.5)	76.7 (1.0)	3.4 (6.1)
	Quantile (0.95)	82.9 (0.9)	0.4 (1.4)	74.5 (1.8)	8.7 (3.2)	68.1 (1.5)	4.9 (2.6)	81.5 (0.9)	2.5 (2.6)

		FCC ROAD CLASS							
		1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
		Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
		2015	Change	2015	Change	2015	Change	2015	Change
DAYWEEK		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
Sun	Mean	70.6 (0.9)	-1.0 (1.8)	54.5 (2.1)	-0.8 (2.2)	47.4 (1.7)	2.5 (2.3)	63.8 (1.9)	4.7 (4.2)
	Median	71.0 (1.0)	-1.6 (2.1)	55.1 (2.5)	1.1 (3.3)	46.0 (1.8)	1.2 (2.4)	66.6 (1.8)	7.0 (8.1)
	Quantile (0.85)	78.4 (0.9)	-0.5 (1.0)	67.8 (2.0)	2.6 (3.1)	60.1 (2.6)	6.4 (3.4)	76.8 (1.0)	1.0 (3.8)
	Quantile (0.95)	82.6 (1.0)	0.4 (1.4)	75.4 (1.6)	3.6 (2.9)	69.5 (3.5)	10.1 (4.5)	81.5 (1.0)	1.5 (2.0)
Total	Mean	70.4 (0.6)	-0.1 (1.2)	56.4 (1.3)	3.1 (1.6)	49.7 (2.0)	2.7 (2.0)	62.6 (1.1)	6.3 (1.6)
	Median	70.8 (0.6)	-0.0 (1.1)	57.3 (1.6)	4.0 (2.0)	49.0 (2.7)	2.9 (2.7)	65.3 (1.0)	9.3 (1.9)
	Quantile (0.85)	78.1 (0.5)	0.1 (1.7)	69.3 (1.1)	5.6 (1.4)	63.2 (2.3)	5.4 (2.5)	76.0 (0.6)	3.0 (1.7)
	Quantile (0.95)	82.2 (0.6)	0.4 (1.0)	76.2 (0.9)	6.1 (1.3)	72.1 (2.6)	6.6 (2.6)	80.8 (0.5)	1.8 (1.5)

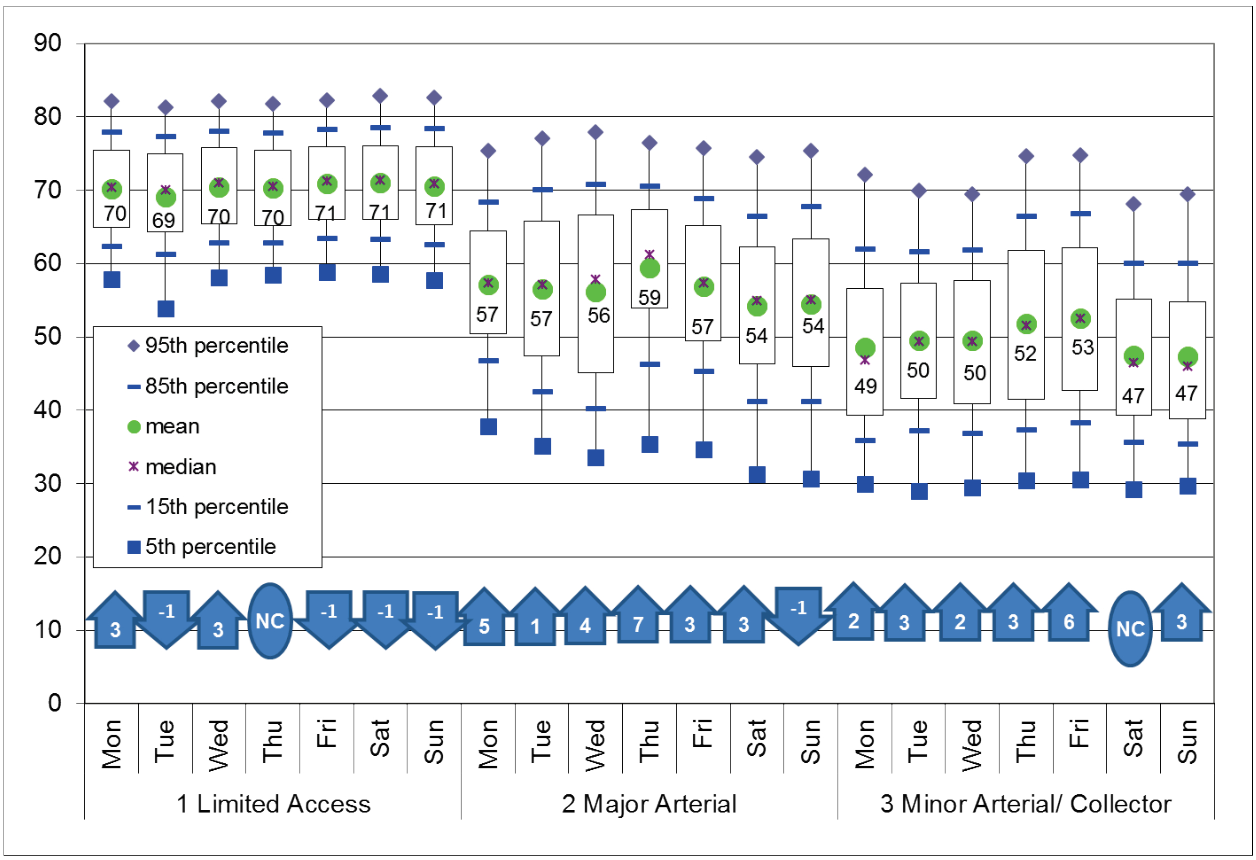

Figure 16. Speed by Road Type and Day of Week, 2015 (Free-Flow)
(Arrows show change from 2009)

Table 17. Standard Deviations for the Values Reported in Table 16

	FCC ROAD CLASS							
	1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
	Speed SD		Speed SD		Speed SD		Speed SD	
DAYWEEK	2015	Change	2015	Change	2015	Change	2015	Change
Mon	8.08	0.10	11.80	0.08	13.17	2.42	14.26	1.12
Tue	9.01	0.42	13.25	4.43	12.46	2.74	13.96	1.10
Wed	8.30	-0.68	14.33	4.12	12.52	1.71	13.97	0.77
Thu	7.56	-0.82	12.64	0.12	13.99	2.16	13.60	-0.91
Fri	7.75	0.37	12.45	2.43	13.70	3.61	13.37	-1.42
Sat	7.80	0.31	12.88	4.07	12.14	2.46	14.01	0.00
Sun	7.95	0.13	13.27	3.99	12.42	3.55	13.83	-0.76
Total	8.11	-0.00	13.04	2.71	13.12	2.66	13.92	-0.29

6.6 Horizontal Curvature

Table 18 and Table 19 highlight the influence of horizontal curvature on speed for the road classes. Relative to 2009, speeds on limited access roadways increased on significantly on moderately curved roads by 3 mph (69 mph vs. 72 mph) ($p < .05$), which is slightly higher than speeds on straight limited access roadways (70 mph) in 2015. In addition, speeds also increased significantly by 2-4 mph on straight major arterials ($p < .05$). there was an increase on minor arterials/collectors relative to 2009, as well, but it was not statistically significant.

The 2015 speed trends appear relatively predictable for the major and minor arterial roadways. That is, speeds were 7-16 mph and 1-10 mph higher on straight roads when compared to moderate or sharp curve counterparts for major arterials and minor arterials/collectors, respectively. For moderately curved roadways, mean speeds on major arterials decreased by 9 mph, but speeds on minor arterials increased by 7 mph when compared to 2009 estimates, neither of which were statistically significant. Note, that the estimated speeds for sharply curved major arterials are unreliable due to the small sample size. Therefore, estimates have not been provided. **Note in Table 18 and others in this report, missing point estimates (which appear as "." in the report), and missing standard errors (which appear as "(.)") occur when there are no such observations in either the NTSS-III or NTSS-II data or when there is insufficient data from enough PSUs and road segments to calculate a variance for the estimate, respectively.** These occasional limitations are design and data driven, and are fixed for a given year and sample realization. Figure 17 provides a graphic view of the statistics from Table 18.

Table 18. Speed by Road Type and Horizontal Curvature Class (Free-Flow)

		FCC ROAD CLASS							
		1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
		Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
		2015	Change	2015	Change	2015	Change	2015	Change
HOR_CURVERD CLASS		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
1 Straight	Mean	70.4 (0.6)	-0.3 (1.2)	56.7 (1.3)	3.7 (1.6)	49.9 (1.9)	2.2 (2.0)	63.1 (1.1)	6.4 (1.7)
	Median	70.8 (0.6)	-0.1 (1.9)	57.5 (1.6)	4.5 (2.0)	49.2 (2.5)	2.3 (2.6)	65.7 (0.9)	9.6 (2.1)
	Quantile (0.85)	78.1 (0.5)	-0.6 (1.6)	69.4 (1.0)	5.8 (1.4)	63.4 (2.2)	5.0 (2.4)	76.2 (0.6)	3.2 (1.8)
	Quantile (0.95)	82.2 (0.6)	0.2 (1.0)	76.3 (0.9)	6.2 (1.3)	72.2 (2.4)	6.1 (2.4)	80.9 (0.5)	1.9 (1.4)
2 Moderate	Mean	72.2 (0.6)	3.3 (4.1)	49.4 (4.6)	-9.0 (6.0)	48.9 (3.1)	6.9 (3.8)	51.4 (2.7)	-1.5 (4.4)
	Median	72.7 (0.3)	3.3 (4.7)	50.2 (8.2)	-8.5 (10.0)	48.1 (3.6)	8.3 (4.3)	50.2 (3.6)	-3.4 (6.1)
	Quantile (0.85)	77.5 (0.9)	0.6 (3.6)	62.8 (2.8)	-2.9 (3.9)	62.2 (4.4)	8.2 (5.5)	68.1 (3.7)	-2.9 (7.1)
	Quantile (0.95)	80.6 (1.2)	0.3 (3.3)	70.5 (3.4)	-0.3 (4.9)	71.8 (5.0)	11.4 (6.3)	76.2 (1.7)	-0.8 (5.4)
3 Sharp	Mean	. (.)	. (.)	40.5 (2.0)	-17.7 (.)	39.9 (6.2)	-1.2 (6.5)	40.2 (3.0)	-14.1 (5.9)
	Median	. (.)	. (.)	39.6 (2.3)	-18.7 (.)	35.8 (7.3)	-3.3 (7.5)	38.1 (2.5)	-19.4 (12.1)
	Quantile (0.85)	. (.)	. (.)	46.9 (2.1)	-18.3 (.)	56.3 (10.1)	3.6 (11.3)	51.8 (6.7)	-20.2 (7.5)
	Quantile (0.95)	. (.)	. (.)	53.9 (1.5)	-15.9 (.)	64.3 (7.0)	4.8 (8.2)	62.1 (6.0)	-14.9 (6.7)
Total	Mean	70.4 (0.6)	-0.1 (1.2)	56.4 (1.3)	3.1 (1.6)	49.7 (2.0)	2.7 (2.0)	62.6 (1.1)	6.3 (1.6)
	Median	70.8 (0.6)	-0.0 (1.1)	57.3 (1.6)	4.0 (2.0)	49.0 (2.7)	2.9 (2.7)	65.3 (1.0)	9.3 (1.9)
	Quantile (0.85)	78.1 (0.5)	0.1 (1.7)	69.3 (1.1)	5.6 (1.4)	63.2 (2.3)	5.4 (2.5)	76.0 (0.6)	3.0 (1.7)
	Quantile (0.95)	82.2 (0.6)	0.4 (1.0)	76.2 (0.9)	6.1 (1.3)	72.1 (2.6)	6.6 (2.6)	80.8 (0.5)	1.8 (1.5)

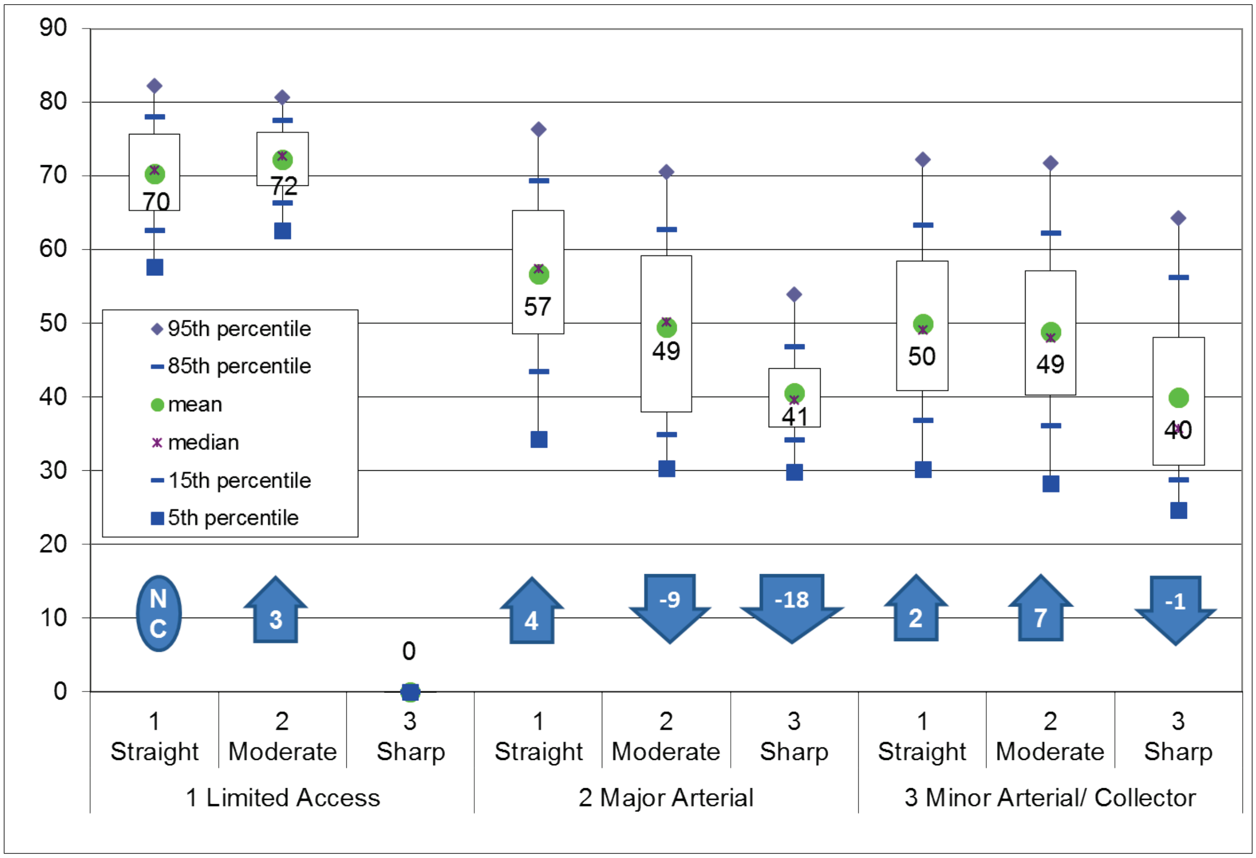

Figure 17. Speed by Road Type and Horizontal Curvature Class, 2015 (Free-Flow) (Arrows show Change from 2009)

Table 19. Standard Deviations for the Values Reported in Table 18

	FCC ROAD CLASS							
	1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
	Speed SD		Speed SD		Speed SD		Speed SD	
HOR_CURVERD CLASS	**2015**	**Change**	**2015**	**Change**	**2015**	**Change**	**2015**	**Change**
1 Straight	8.13	0.01	12.95	2.58	13.09	2.77	13.66	-0.37
2 Moderate	5.72	-2.87	13.39	5.55	13.12	2.98	14.48	-0.89
3 Sharp	.	.	7.80	0.57	13.09	3.67	11.22	-4.42
Total	8.11	-0.00	13.04	2.71	13.12	2.66	13.92	-0.29

6.7 Vertical Curvature

Table 20 and Table 21 show the influence of increased gradient on the speeds for the road classes. When comparing the speeds measured in 2009 and 2015, the relative differences in the estimated speeds for moderately and steeply curved limited access roadways are unreliable due to the small sample sizes. Therefore, estimates have not been provided and comparisons cannot be made between the two measurement years.

In 2015, speeds on major arterials decreased as gradient increased. Relative to 2009, 85th and 95th percentile speeds increased significantly by 6 mph on flat major arterials ($p < .01$). Conversely, the quantiles decreased by 16 and 17 mph on steep major arterials, but the decrease as not statistically significant The estimated speeds for moderately inclined major arterials in 2009 were unreliable due to the small sample size, thus a comparison cannot be made between the two measurement years. The 2015 speed trends appear relatively unpredictable for minor arterial roadways. That is, when comparing speeds on flat and steep roadways, speeds on steep minor arterials were greater (52 mph) than those on flat minor arterials (50 mph). Conversely, mean speeds on moderately inclined minor arterials were less (45 mph) than speeds on flat minor arterials (50 mph). Considering the estimates and standard errors behind these estimates in 2009 and 2015, these differences are not significant. The comparison of tables also indicate considerably more variability in the 2009 estimates than in the 2015 estimates, when looking at the standard errors of the 2009 and 2015 point estimates. Note the 85th and 95th percentile speeds for both flat and steep minor arterials were significantly different from measures taken in 2009 ($p < .05$). Figure 18 provides a graphic view of the statistics from Table 20.

Table 20. Speed by Road Type and Vertical Curvature Class (Free-Flow)

		FCC ROAD CLASS							
		1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
		Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
		2015	Change	2015	Change	2015	Change	2015	Change
VER_CURVERD CLASS		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
1 Flat	Mean	70.4 (0.6)	-0.2 (1.2)	56.6 (1.4)	3.4 (1.7)	49.8 (2.0)	2.7 (2.0)	62.8 (1.2)	6.1 (1.7)
	Median	70.8 (0.6)	-0.1 (1.4)	57.5 (1.7)	4.1 (2.1)	49.1 (2.7)	2.7 (2.6)	65.4 (1.0)	9.0 (2.1)
	Quantile (0.85)	78.1 (0.5)	0.1 (2.1)	69.4 (1.0)	5.6 (1.4)	63.3 (2.4)	5.5 (2.4)	76.1 (0.5)	3.1 (1.9)
	Quantile (0.95)	82.2 (0.6)	0.3 (1.0)	76.3 (1.0)	6.2 (1.5)	72.2 (2.6)	6.6 (2.4)	80.9 (0.5)	1.9 (1.3)
2 Moderate	Mean	70.9 (.)	4.2 (.)	50.4 (7.5)	-2.2 (.)	45.0 (3.0)	-2.0 (4.7)	51.2 (4.8)	0.5 (5.4)
	Median	70.8 (.)	5.1 (.)	50.9 (8.6)	-1.3 (.)	44.4 (3.8)	-0.4 (5.6)	51.0 (6.8)	1.1 (6.3)
	Quantile (0.85)	76.6 (.)	4.8 (.)	62.1 (9.9)	4.3 (.)	58.3 (3.7)	-1.3 (5.4)	66.7 (5.0)	1.7 (6.8)
	Quantile (0.95)	80.6 (.)	4.9 (.)	69.3 (11.0)	6.7 (.)	66.0 (2.0)	-0.5 (4.7)	74.5 (4.5)	3.6 (6.1)
3 Steep	Mean	. (.)	. (.)	44.1 (2.6)	-11.5 (12.9)	52.5 (6.2)	12.8 (7.9)	52.0 (5.8)	7.4 (8.4)
	Median	. (.)	. (.)	43.2 (2.8)	-13.8 (14.1)	54.5 (9.7)	15.0 (12.8)	53.5 (8.4)	10.9 (11.2)
	Quantile (0.85)	. (.)	. (.)	50.6 (1.9)	-16.9 (14.4)	64.2 (3.3)	16.6 (5.4)	63.7 (3.5)	5.3 (11.2)
	Quantile (0.95)	. (.)	. (.)	57.7 (2.2)	-15.5 (13.5)	71.3 (3.3)	18.7 (5.6)	70.9 (3.1)	3.8 (12.7)
Total	Mean	70.4 (0.6)	-0.1 (1.2)	56.4 (1.3)	3.1 (1.6)	49.7 (2.0)	2.7 (2.0)	62.6 (1.1)	6.3 (1.6)
	Median	70.8 (0.6)	-0.0 (1.1)	57.3 (1.6)	4.0 (2.0)	49.0 (2.7)	2.9 (2.7)	65.3 (1.0)	9.3 (1.9)
	Quantile (0.85)	78.1 (0.5)	0.1 (1.7)	69.3 (1.1)	5.6 (1.4)	63.2 (2.3)	5.4 (2.5)	76.0 (0.6)	3.0 (1.7)
	Quantile (0.95)	82.2 (0.6)	0.4 (1.0)	76.2 (0.9)	6.1 (1.3)	72.1 (2.6)	6.6 (2.6)	80.8 (0.5)	1.8 (1.5)

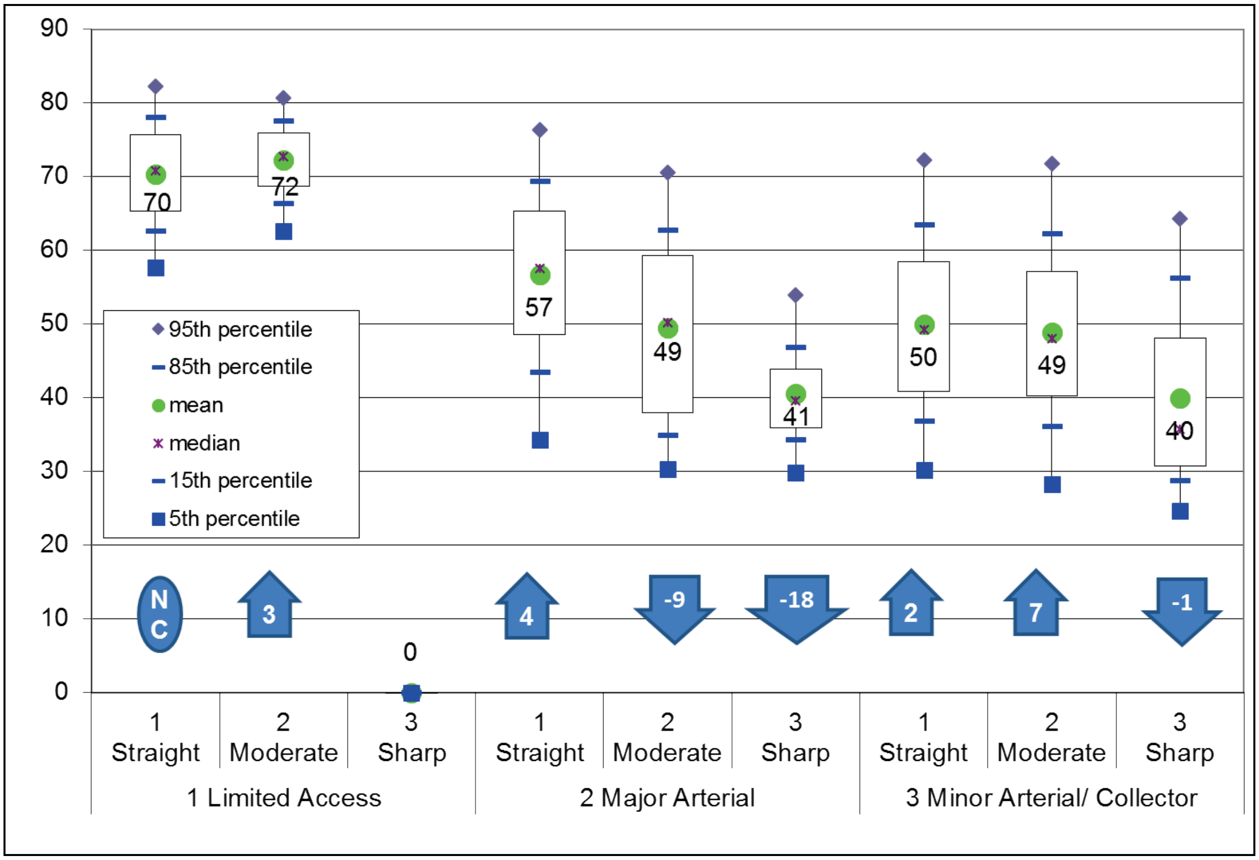

Figure 18. Speed by Road Type and Vertical Curvature Class, 2015 (Free-Flow) (Arrows show Change from 2009)

Table 21. Standard Deviations for Values Reported in Table 20

	FCC ROAD CLASS							
	1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
	Speed SD		Speed SD		Speed SD		Speed SD	
VER_CURVERD CLASS	2015	Change	2015	Change	2015	Change	2015	Change
1 Flat	8.12	-0.02	13.03	2.68	13.11	2.68	13.85	-0.35
2 Moderate	5.95	0.49	11.67	5.88	13.07	2.05	13.96	1.64
3 Steep	.	.	8.67	-3.09	12.64	5.10	12.59	0.93
Total	8.11	-0.00	13.04	2.71	13.12	2.66	13.92	-0.29

6.8 Urbanicity

The effect of urbanicity (the degree to which a geographical unit is urban) on various roadway classes is shown in Table 22 and Table 23. Overall, in 2015 speeds in urban areas were lower than in more suburban or rural locations for all road types. Vehicles on major arterials, and minor arterials/collectors in rural areas were 15-17 mph faster than on their counterparts in urban areas. Speeds on limited access roadways across the various urbanicities remained relatively unchanged. Note, a year to year comparison of estimated speeds for urban and rural limited access roadways are unreliable due to the small sample sizes in 2009. Comparing estimated mean speeds in 2009 to 2015 shows a decrease of 1-4 mph on major arterials in urban/suburban and urban areas, respectively, though not significantly. However, in suburban and rural areas, means speeds increased on major arterials by 4-5 mph since 2009, though again not significantly. The 85th and 95th percentile speeds on suburban and rural major arterials increased significantly by 4-9mph ($p < .05$).

A similar trend was noted when comparing estimated mean speeds on minor arterials/collectors. That is, mean speeds decreased significantly in urban/suburban ($p < .05$) (6 mph), but increased (insignificantly) in rural areas (4 mph). The 85th and 95th percentile speeds on urban/suburban minor arterials and collectors decreased significantly by 6 mph ($p < .05$), but the 95th percentile speeds increased significantly by 6 mph on rural minor arterials and collectors ($p < .05$) Figure 19 provides a graphic view of the statistics from Table 22.

Table 22. Speed by Road Type by Urbanicity (Urban, Urban/Suburban, Suburban, Rural) (Free-Flow)

		FCC ROAD CLASS							
		1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
		Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
		2015	Change	2015	Change	2015	Change	2015	Change
URBANICITY		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
1 Urban	Mean	70.7 (2.0)	9.2 (.)	43.8 (2.6)	-3.5 (4.9)	38.7 (0.7)	-1.1 (2.9)	56.8 (7.5)	12.5 (8.8)
	Median	71.2 (2.2)	8.0 (.)	43.0 (3.7)	-3.9 (5.3)	38.0 (0.7)	-1.7 (2.8)	60.9 (16.0)	18.6 (16.9)
	Quantile (0.85)	78.6 (1.1)	8.0 (.)	52.5 (7.5)	-1.2 (9.8)	46.6 (1.3)	-0.7 (3.8)	75.9 (3.5)	18.7 (10.6)
	Quantile (0.95)	83.0 (0.9)	8.0 (.)	63.2 (9.3)	4.3 (12.5)	53.2 (2.5)	0.5 (4.6)	80.9 (2.3)	13.9 (13.0)
2 Urban-Suburban	Mean	69.0 (1.8)	-2.6 (1.7)	53.7 (1.2)	-1.0 (1.5)	42.6 (1.2)	-5.3 (2.1)	64.0 (5.1)	6.2 (4.9)
	Median	69.5 (1.7)	-2.5 (1.5)	53.2 (0.7)	-1.1 (1.7)	42.5 (1.4)	-4.7 (2.4)	66.6 (5.7)	9.2 (4.8)
	Quantile (0.85)	77.2 (1.4)	-1.6 (1.0)	63.4 (2.4)	-0.4 (2.4)	51.9 (1.4)	-6.4 (2.6)	76.3 (2.8)	2.3 (3.0)
	Quantile (0.95)	81.3 (1.3)	-0.7 (1.0)	76.3 (7.0)	6.2 (6.5)	59.4 (2.1)	-6.4 (3.1)	80.7 (2.0)	1.7 (2.1)
3 Suburban	Mean	69.0 (0.9)	1.6 (1.1)	52.9 (1.7)	5.4 (3.6)	44.6 (1.5)	0.1 (2.2)	59.9 (1.9)	6.7 (2.4)
	Median	69.4 (1.0)	2.6 (1.2)	52.3 (2.2)	5.1 (3.8)	43.8 (1.8)	0.2 (2.5)	63.3 (2.1)	11.2 (3.2)
	Quantile (0.85)	76.9 (0.7)	2.0 (1.1)	67.6 (1.7)	8.8 (4.0)	55.2 (2.0)	1.0 (3.1)	74.8 (1.0)	4.8 (2.7)
	Quantile (0.95)	81.0 (0.6)	1.6 (1.0)	75.1 (1.1)	9.0 (4.4)	63.4 (1.8)	2.4 (3.2)	79.6 (0.7)	3.6 (1.3)
4 Rural	Mean	72.0 (0.6)	-0.9 (.)	59.2 (1.2)	4.4 (3.0)	55.9 (1.9)	4.0 (5.0)	65.0 (0.8)	6.5 (6.4)
	Median	72.3 (0.5)	-0.7 (.)	60.0 (1.3)	4.2 (2.3)	56.1 (1.9)	3.9 (7.2)	66.7 (0.9)	7.7 (7.4)
	Quantile (0.85)	79.1 (0.7)	-1.3 (.)	70.3 (1.0)	4.4 (1.8)	67.9 (2.4)	4.0 (4.4)	76.9 (0.7)	2.9 (9.0)
	Quantile (0.95)	83.3 (0.8)	-1.0 (.)	77.0 (1.3)	4.8 (2.2)	75.8 (2.6)	5.5 (2.3)	81.7 (0.8)	1.8 (8.2)

		FCC ROAD CLASS							
		1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
		Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
		2015	Change	2015	Change	2015	Change	2015	Change
URBANICITY		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
Total	Mean	70.4 (0.6)	-0.1 (1.2)	56.4 (1.3)	3.1 (1.6)	49.7 (2.0)	2.7 (2.0)	62.6 (1.1)	6.3 (1.6)
	Median	70.8 (0.6)	-0.0 (1.1)	57.3 (1.6)	4.0 (2.0)	49.0 (2.7)	2.9 (2.7)	65.3 (1.0)	9.3 (1.9)
	Quantile (0.85)	78.1 (0.5)	0.1 (1.7)	69.3 (1.1)	5.6 (1.4)	63.2 (2.3)	5.4 (2.5)	76.0 (0.6)	3.0 (1.7)
	Quantile (0.95)	82.2 (0.6)	0.4 (1.0)	76.2 (0.9)	6.1 (1.3)	72.1 (2.6)	6.6 (2.6)	80.8 (0.5)	1.8 (1.5)

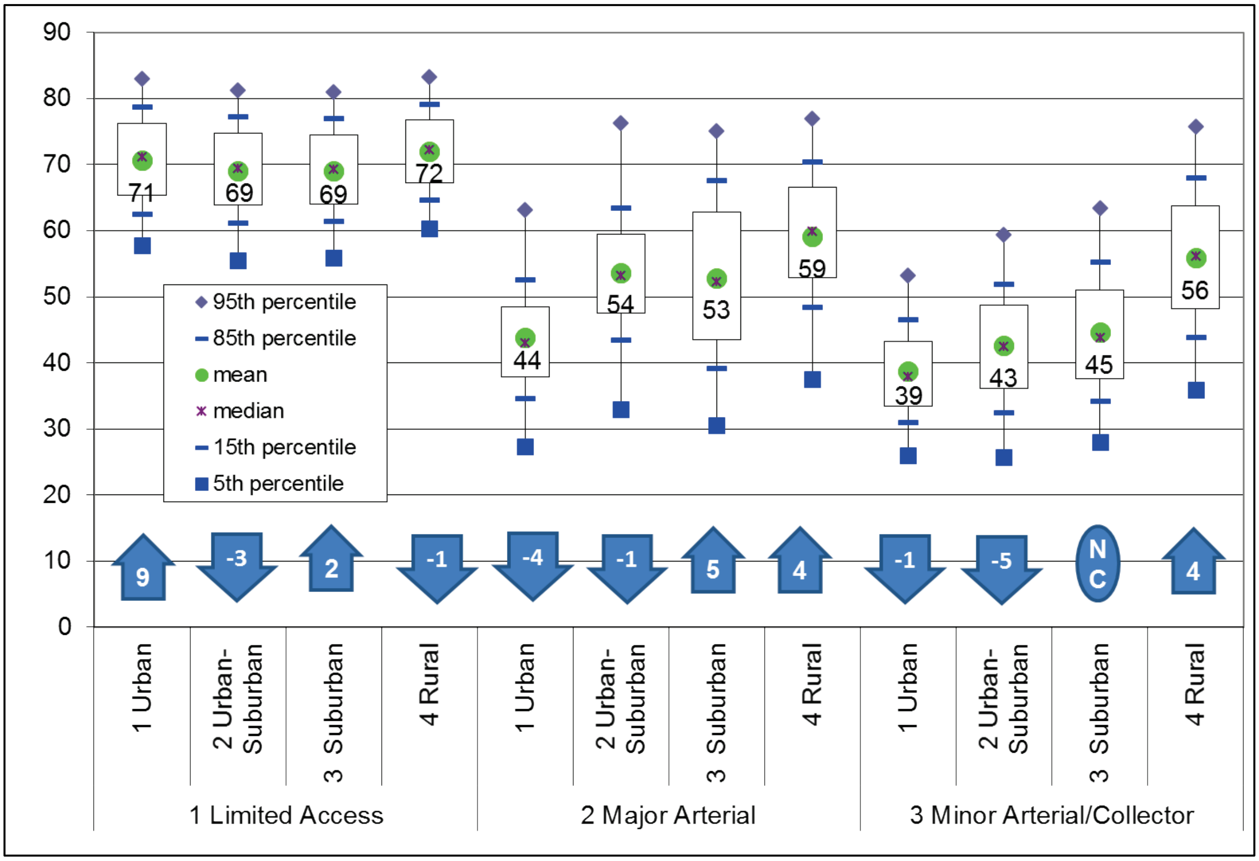

Figure 19. Speed by Road Type by Urbanicity, 2015 (Free-Flow)
(Arrows show Change from 2009)

Table 23. Standard Deviations for the Values Reported in Table 22

	FCC ROAD CLASS							
	1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
	Speed SD		Speed SD		Speed SD		Speed SD	
URBANICITY	2015	Change	2015	Change	2015	Change	2015	Change
1 Urban	8.55	-4.32	10.83	4.11	8.97	1.37	17.63	6.00
2 Urban-Suburban	8.51	1.04	12.59	3.51	10.64	0.26	13.28	-0.71
3 Suburban	8.35	0.22	13.70	2.53	11.17	1.87	14.85	0.74
4 Rural	7.40	-0.39	11.88	0.79	12.32	0.91	12.36	-1.25
Total	8.11	-0.00	13.04	2.71	13.12	2.66	13.92	-0.29

6.9 Vehicle Length

Table 24 and Table 25 indicate the influence of vehicle length on speed for the various road classes. Vehicles in length classes 1 and 2 are passenger vehicles and light trucks; categories 3 and 4 are generally medium trucks, and classes 5 and 6 are heavy trucks/combinations vehicles. Speeds on limited access roadways for most vehicle lengths have remained constant relative to the 2009 estimates; the longest vehicles (80-100 ft.) seem to show the greatest increase in mean speeds (2 mph). Relative to 2009, moderate, but significant increases in mean speeds were noted on major arterials within the passenger vehicles (4 mph) ($p \leq .01$). In addition, significant increases in the 85th and 95th percentile speeds were observed for passenger vehicles, medium trucks, and some larger trucks ($p < .01$) on major arterials. The largest vehicles showed a slight slowing trend (-1 mph) on major arterials, but this change was not significantly different from 2009.

On minor arterials and collectors, mean speeds of passenger vehicles and medium trucks increased by 2-3 mph and 1-2 mph in 2015, respectively. Conversely, larger truck speeds decreased by 2 mph on minor arterials. While changes in mean speeds over the two measure years were not significant, the 85th and 95th percentile speeds for all vehicle sizes increased significantly in 2015 on minor arterials ($p < .05$). Also of note, the standard deviations of data being reported in this table have increased for the arterials since 2009, while limited access highway values have remained relatively unchanged, reflecting the relatively large increases in the 85th and 95th percentile speeds on arterials as shown in Table 7. Figure 20 provides a graphic view of the statistics from Table 24.

Table 24. Speed by Road Type by Vehicle Length Class (<20, 20-29, 30-39, 40-49, 50-79, 80-100) (Free-Flow)

		FCC ROAD CLASS							
		1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
		Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
		2015	Change	2015	Change	2015	Change	2015	Change
VEH_LENGTH		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
1 (<20 ft)	Mean	71.4 (0.7)	0.1 (1.4)	55.2 (1.2)	4.2 (1.4)	48.3 (2.1)	3.3 (2.1)	62.6 (1.2)	7.7 (1.8)
	Median	72.0 (0.7)	0.1 (1.6)	56.1 (1.5)	4.7 (1.7)	47.4 (2.6)	3.2 (2.7)	65.8 (1.2)	12.4 (1.9)
	Quantile (0.85)	78.8 (0.5)	-0.1 (1.4)	67.8 (1.1)	7.1 (1.0)	61.3 (2.5)	6.1 (2.6)	76.6 (0.6)	3.6 (2.1)
	Quantile (0.95)	82.8 (0.6)	0.3 (1.2)	74.3 (1.0)	7.8 (0.9)	69.4 (3.0)	7.3 (3.0)	81.1 (0.6)	2.1 (1.3)
2 (20-<30 ft)	Mean	71.0 (0.8)	-0.8 (1.2)	60.1 (1.6)	3.4 (2.1)	53.1 (2.1)	2.4 (2.3)	62.5 (1.4)	4.4 (1.7)
	Median	71.8 (0.8)	-0.9 (1.3)	61.0 (1.9)	4.1 (2.5)	52.6 (2.8)	2.5 (2.9)	64.6 (1.3)	6.9 (1.9)
	Quantile (0.85)	78.7 (0.7)	-0.2 (0.7)	72.6 (0.9)	5.5 (1.5)	67.0 (2.3)	5.0 (2.5)	76.2 (0.6)	2.5 (1.8)
	Quantile (0.95)	82.9 (0.7)	0.7 (0.9)	80.1 (1.0)	6.9 (1.3)	75.9 (2.0)	6.5 (2.1)	81.5 (0.7)	2.5 (0.7)
3 (30-<40 ft)	Mean	67.1 (0.7)	-0.5 (1.2)	56.6 (1.1)	0.3 (1.4)	53.0 (1.2)	1.6 (1.5)	60.7 (0.8)	3.0 (1.2)
	Median	67.3 (0.6)	-0.4 (1.0)	58.0 (1.0)	1.7 (1.5)	52.7 (1.5)	1.9 (2.0)	62.9 (0.7)	4.9 (1.4)
	Quantile (0.85)	75.3 (0.5)	-0.6 (0.6)	69.7 (1.0)	2.1 (1.6)	68.0 (1.2)	5.1 (1.5)	73.6 (0.6)	2.4 (1.5)
	Quantile (0.95)	79.7 (0.6)	-0.2 (0.9)	78.6 (1.4)	3.6 (2.0)	79.9 (1.3)	8.6 (2.0)	79.6 (0.6)	2.3 (1.7)
4 (40-<50 ft)	Mean	67.1 (0.7)	0.4 (1.1)	55.8 (1.1)	-0.4 (1.2)	52.8 (1.4)	0.9 (1.7)	61.4 (0.8)	2.4 (1.3)
	Median	67.4 (0.6)	0.7 (1.0)	57.3 (1.0)	0.6 (1.4)	52.8 (1.7)	0.7 (2.5)	63.7 (0.8)	3.7 (1.3)
	Quantile (0.85)	75.1 (0.5)	0.6 (0.9)	69.4 (1.1)	3.3 (1.4)	67.5 (1.4)	5.3 (1.5)	73.7 (0.6)	2.7 (1.4)
	Quantile (0.95)	79.3 (0.5)	1.0 (0.8)	77.8 (1.1)	5.2 (1.5)	77.6 (1.7)	8.5 (1.9)	79.0 (0.5)	3.0 (1.7)
5 (50-<80 ft)	Mean	65.6 (0.5)	0.3 (1.4)	56.2 (1.1)	0.4 (2.1)	53.2 (1.3)	0.3 (2.4)	64.0 (0.7)	0.7 (1.4)
	Median	65.6 (0.4)	0.6 (1.9)	57.7 (1.0)	0.9 (2.1)	53.1 (1.8)	-1.1 (2.8)	65.0 (0.5)	1.0 (1.6)
	Quantile (0.85)	71.5 (0.4)	-0.1 (1.5)	69.1 (1.4)	3.3 (1.8)	68.4 (1.3)	4.8 (1.7)	71.3 (0.5)	0.3 (2.5)
	Quantile (0.95)	74.9 (0.6)	-0.3 (1.3)	78.1 (1.6)	5.9 (1.8)	78.7 (1.2)	9.3 (1.2)	75.2 (0.6)	0.2 (1.1)
6 (80-<100 ft)	Mean	68.6 (0.7)	2.5 (1.8)	57.3 (1.0)	-1.2 (3.5)	53.3 (1.5)	-1.7 (2.9)	66.7 (0.9)	1.8 (1.8)
	Median	69.1 (0.6)	3.1 (1.7)	59.5 (0.8)	-0.0 (2.3)	53.6 (4.0)	-2.8 (4.5)	68.2 (0.9)	2.3 (1.7)
	Quantile (0.85)	74.7 (0.4)	1.9 (2.1)	68.6 (1.1)	2.0 (2.8)	66.1 (1.5)	2.2 (2.1)	74.4 (0.4)	1.4 (2.7)
	Quantile (0.95)	77.6 (0.6)	0.9 (1.9)	74.9 (2.8)	3.4 (6.1)	77.9 (2.6)	8.0 (3.3)	77.5 (0.6)	1.2 (2.0)
Total	Mean	70.4 (0.6)	-0.1 (1.2)	56.4 (1.3)	3.1 (1.6)	49.7 (2.0)	2.7 (2.0)	62.6 (1.1)	6.3 (1.6)
	Median	70.8 (0.6)	-0.0 (1.1)	57.3 (1.6)	4.0 (2.0)	49.0 (2.7)	2.9 (2.7)	65.3 (1.0)	9.3 (1.9)
	Quantile (0.85)	78.1 (0.5)	0.1 (1.7)	69.3 (1.1)	5.6 (1.4)	63.2 (2.3)	5.4 (2.5)	76.0 (0.6)	3.0 (1.7)
	Quantile (0.95)	82.2 (0.6)	0.4 (1.0)	76.2 (0.9)	6.1 (1.3)	72.1 (2.6)	6.6 (2.6)	80.8 (0.5)	1.8 (1.5)

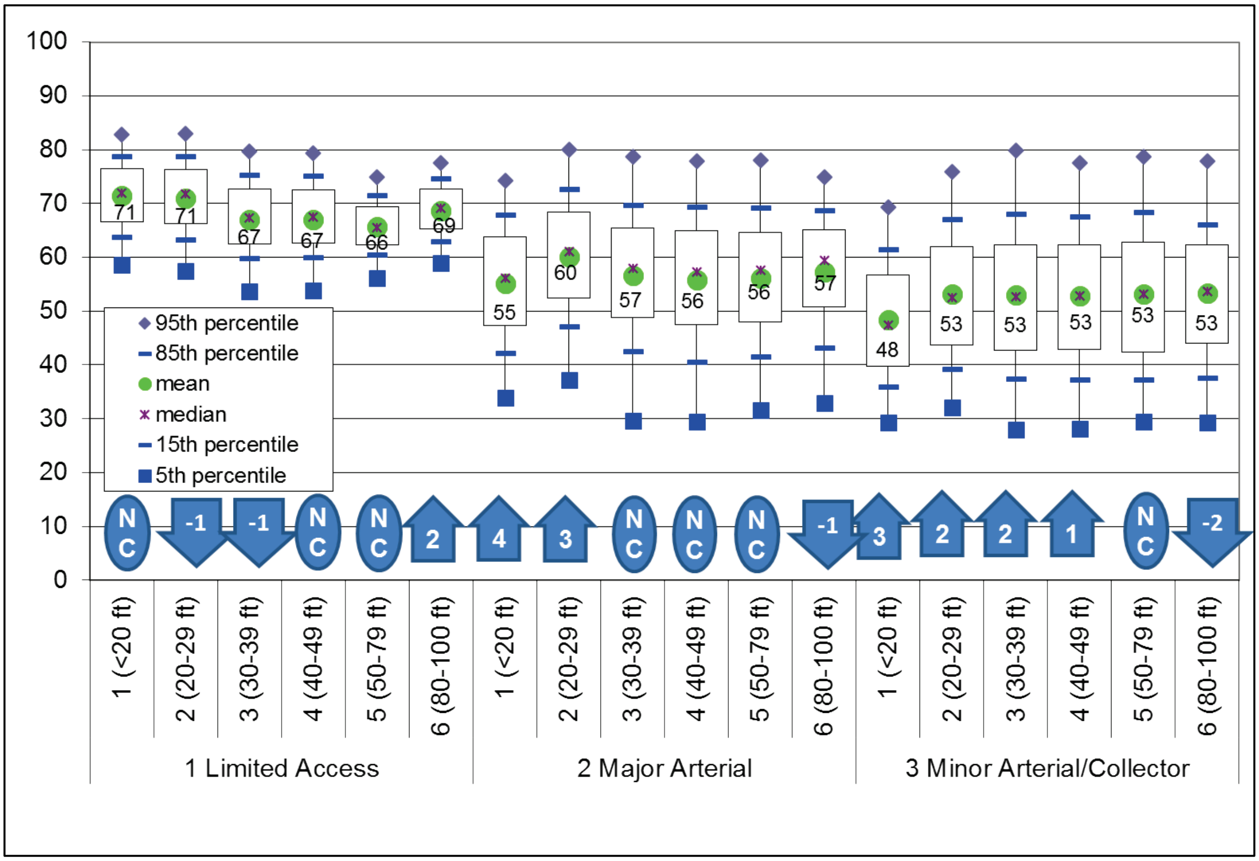

Figure 20. Speed by Road Type by Vehicle Length Class, 2015 (Free-Flow) (Arrows show change from 2009)

Table 25. Standard Deviations for Values Reported in Table 24

	FCC ROAD CLASS							
	1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
	Speed SD		Speed SD		Speed SD		Speed SD	
VEH_LENGTH	2015	Change	2015	Change	2015	Change	2015	Change
1 (<20 ft)	7.86	0.02	12.59	2.87	12.48	2.73	14.41	-0.42
2 (20-<30 ft)	8.71	0.80	13.14	2.95	13.54	2.86	13.96	0.73
3 (30-<40 ft)	9.02	0.01	14.38	3.39	15.41	4.27	13.93	1.42
4 (40-<50 ft)	8.89	0.03	14.41	4.10	15.01	4.48	13.47	1.68
5 (50-<80 ft)	6.30	-0.74	13.94	3.27	15.02	3.94	8.94	-0.06
6 (80-<100 ft)	6.90	-0.89	13.05	4.11	14.33	4.25	9.50	0.88
Total	8.11	-0.00	13.04	2.71	13.12	2.66	13.92	-0.29

6.10 *Horizontal and Vertical Curvature*

Table 26 and Table 27 show cross-tabulations of the impact of various horizontal and vertical curvature categories on speeds within a roadway classification. A number of cells in Table 26 have relatively low levels or no site representation for limited access roadways, limiting the statistical confidence in the estimated speed values. Therefore, estimates have not been provided. Generally, greater horizontal curvature and increased gradients are associated with lower speeds on major arterials. That is, on major arterials the fastest speeds were recorded on flat/straight roadways (57 mph). Speeds on major arterials decreased on moderately and sharply curved roads with increased vertical gradients. The impact of gradient (i.e., vertical curvature) on speeds is most pronounced on major arterials with moderate or sharp horizontal curvature (37 mph and 39 mph, respectively). On minor arterials and collectors, speeds were greatest on straight roads with steep gradients (57 mph), and slowest on roads with sharp curvature with no incline (36 mph).

For the cases in which sufficient data was available for year to year analysis, variation was relatively minimal and insignificant for the limited access highways. Speeds on major arterials and collectors showed greater variation between 2009 and 2015, but the direction of the changes were inconsistent. Mean speeds on straight flat major arterials significantly increased by 4 mph over the two measurement cycles ($p < .05$).

Relative to 2009, mean speeds on straight steep minor arterials appeared to increase significantly by 13 mph ($p < .01$). A similar increase in mean speeds (+ 9 mph) was measured on moderately curved flat minor arterials ($p <.05$). Conversely, on moderately curved and moderately steep minor arterials, the mean speeds decreased significantly by 12 mph between 2009 and 2015 ($p < .05$). In addition, the 85th and 95th percentile speeds on straight and flat, straight and steep, and moderately curved flat minor arterials significantly increased between 2009 and 2015 ($p < .05$).

Major and minor arterials also showed greater standard deviation shifts, but again, not in a consistent direction. The number of sites where there is a combination of these extremes is small, precluding more detailed analyses. Figure 21 provides a graphic view of the statistics from Table 26.

Table 26. Speed by Road Type, Horizontal Curvature Class, and Vertical Curvature Class

			FCC ROAD CLASS							
			1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
			Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
			2015	Change	2015	Change	2015	Change	2015	Change
HOR_ CURVERD CLASS	VER_ CURVERD CLASS		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
1 Straight	1 Flat	Mean	70.4 (0.6)	-0.3 (1.2)	56.8 (1.3)	3.8 (1.7)	49.9 (1.9)	2.1 (2.0)	63.2 (1.1)	6.2 (1.7)
		Median	70.8 (0.6)	-0.1 (1.9)	57.7 (1.7)	4.7 (2.1)	49.1 (2.5)	2.0 (2.6)	65.8 (1.0)	9.3 (2.0)
		Quantile (0.85)	78.1 (0.5)	-0.6 (1.6)	69.5 (1.0)	5.9 (1.4)	63.4 (2.2)	5.0 (2.3)	76.2 (0.5)	3.2 (2.5)
		Quantile (0.95)	82.2 (0.6)	0.2 (1.0)	76.4 (0.9)	6.3 (1.5)	72.2 (2.4)	6.1 (2.3)	80.9 (0.5)	1.9 (1.4)
	2 Moderate	Mean	70.9 (.)	. (.)	53.2 (7.1)	0.6 (.)	53.2 (4.8)	7.5 (7.7)	56.6 (3.3)	10.0 (7.5)
		Median	70.8 (.)	. (.)	53.5 (7.2)	1.3 (.)	53.8 (4.2)	10.4 (6.1)	56.2 (3.2)	11.2 (6.8)
		Quantile (0.85)	76.6 (.)	. (.)	63.7 (9.4)	5.9 (.)	62.5 (5.5)	3.7 (13.2)	70.0 (5.5)	11.4 (15.1)
		Quantile (0.95)	80.6 (.)	. (.)	71.0 (10.7)	8.4 (.)	67.7 (6.5)	1.2 (15.8)	76.1 (4.2)	10.5 (15.6)
	3 Steep	Mean	. (.)	. (.)	. (.)	. (.)	56.5 (1.0)	12.8 (2.9)	56.5 (1.0)	7.4 (4.8)
		Median	. (.)	. (.)	. (.)	. (.)	56.4 (0.6)	12.9 (2.7)	56.4 (0.6)	10.0 (2.9)
		Quantile (0.85)	. (.)	. (.)	. (.)	. (.)	65.6 (0.6)	15.6 (3.6)	65.6 (0.6)	3.4 (10.6)
		Quantile (0.95)	. (.)	. (.)	. (.)	. (.)	72.3 (0.8)	18.1 (3.9)	72.3 (0.8)	2.6 (11.9)
	Total	Mean	70.4 (0.6)	-0.3 (1.2)	56.7 (1.3)	3.7 (1.6)	49.9 (1.9)	2.2 (2.0)	63.1 (1.1)	6.4 (1.7)
		Median	70.8 (0.6)	-0.1 (1.9)	57.5 (1.6)	4.5 (2.0)	49.2 (2.5)	2.3 (2.6)	65.7 (0.9)	9.6 (2.1)
		Quantile (0.85)	78.1 (0.5)	-0.6 (1.6)	69.4 (1.0)	5.8 (1.4)	63.4 (2.2)	5.0 (2.4)	76.2 (0.6)	3.2 (1.8)
		Quantile (0.95)	82.2 (0.6)	0.2 (1.0)	76.3 (0.9)	6.2 (1.3)	72.2 (2.4)	6.1 (2.4)	80.9 (0.5)	1.9 (1.4)
2 Moderate	1 Flat	Mean	72.2 (0.6)	3.3 (4.1)	51.6 (4.7)	-7.0 (6.4)	49.6 (3.3)	9.0 (4.1)	52.5 (2.7)	-1.1 (4.7)
		Median	72.7 (0.3)	3.3 (4.7)	53.2 (5.8)	-5.5 (7.9)	48.9 (3.8)	9.8 (4.7)	51.4 (3.6)	-3.2 (6.9)
		Quantile (0.85)	77.5 (0.9)	0.6 (3.6)	63.8 (2.5)	-1.9 (3.7)	62.9 (4.4)	12.0 (5.6)	69.2 (3.6)	-2.8 (7.0)
		Quantile (0.95)	80.6 (1.2)	0.3 (3.3)	71.7 (3.4)	0.9 (4.9)	72.1 (5.2)	14.4 (6.7)	76.6 (1.7)	-1.4 (5.1)
	2 Moderate	Mean	. (.)	. (.)	37.4 (.)	. (.)	42.2 (2.7)	-12.0 (4.3)	41.4 (3.2)	-12.9 (4.6)
		Median	. (.)	. (.)	37.0 (.)	. (.)	42.3 (1.5)	-12.3 (3.4)	40.9 (2.5)	-13.7 (3.8)
		Quantile (0.85)	. (.)	. (.)	42.0 (.)	. (.)	53.4 (2.5)	-8.9 (4.7)	51.6 (3.0)	-10.7 (4.8)
		Quantile (0.95)	. (.)	. (.)	45.4 (.)	. (.)	63.2 (1.7)	-4.9 (5.6)	61.5 (2.9)	-6.7 (6.0)
	3 Steep	Mean	. (.)	. (.)	46.0 (.)	14.6 (.)	35.8 (.)	0.9 (.)	37.6 (6.2)	2.7 (6.7)
		Median	. (.)	. (.)	45.4 (.)	14.5 (.)	35.5 (.)	1.9 (.)	37.1 (6.0)	3.5 (6.5)
		Quantile (0.85)	. (.)	. (.)	50.7 (.)	14.6 (.)	40.7 (.)	0.5 (.)	44.6 (5.4)	4.4 (7.7)
		Quantile (0.95)	. (.)	. (.)	56.4 (.)	17.5 (.)	45.5 (.)	0.4 (.)	50.7 (5.7)	5.6 (9.3)
	Total	Mean	72.2 (0.6)	3.3 (4.1)	49.4 (4.6)	-9.0 (6.0)	48.9 (3.1)	6.9 (3.8)	51.4 (2.7)	-1.5 (4.4)
		Median	72.7 (0.3)	3.3 (4.7)	50.2 (8.2)	-8.5 (10.0)	48.1 (3.6)	8.3 (4.3)	50.2 (3.6)	-3.4 (6.1)
		Quantile (0.85)	77.5 (0.9)	0.6 (3.6)	62.8 (2.8)	-2.9 (3.9)	62.2 (4.4)	8.2 (5.5)	68.1 (3.7)	-2.9 (7.1)
		Quantile (0.95)	80.6 (1.2)	0.3 (3.3)	70.5 (3.4)	-0.3 (4.9)	71.8 (5.0)	11.4 (6.3)	76.2 (1.7)	-0.8 (5.4)

Table 26. Speed by Road Type, Horizontal Curvature Class, and Vertical Curvature Class (continued)

			FCC ROAD CLASS							
			1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
			Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
			2015	Change	2015	Change	2015	Change	2015	Change
HOR_ CURVERD CLASS	VER_ CURVERD CLASS		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
3 Sharp	1 Flat	Mean	. (.)	. (.)	43.1 (.)	-15.1 (.)	36.2 (6.1)	-4.8 (6.4)	37.8 (4.6)	-14.6 (6.8)
		Median	. (.)	. (.)	42.6 (.)	-15.6 (.)	33.4 (7.5)	-5.2 (7.7)	35.9 (6.0)	-16.3 (12.3)
		Quantile (0.85)	. (.)	. (.)	49.1 (.)	-16.1 (.)	46.6 (8.1)	-6.3 (9.9)	47.9 (4.1)	-24.1 (5.9)
		Quantile (0.95)	. (.)	. (.)	55.2 (.)	-14.6 (.)	57.0 (6.5)	-2.5 (8.7)	56.5 (4.0)	-20.5 (4.2)
	2 Moderate	Mean	. (.)	. (.)	39.4 (.)	. (.)	48.2 (12.3)	6.3 (13.2)	42.8 (5.5)	-16.2 (16.8)
		Median	. (.)	. (.)	38.6 (.)	. (.)	48.3 (14.6)	8.5 (15.7)	39.4 (6.7)	-24.5 (22.6)
		Quantile (0.85)	. (.)	. (.)	45.1 (.)	. (.)	62.8 (16.3)	12.8 (18.9)	57.0 (11.2)	-13.9 (20.8)
		Quantile (0.95)	. (.)	. (.)	52.7 (.)	. (.)	68.7 (17.9)	9.9 (20.5)	64.0 (9.9)	-11.0 (17.0)
	3 Steep	Mean	. (.)	. (.)	41.2 (.)	. (.)	. (.)	. (.)	41.2 (.)	4.1 (.)
		Median	. (.)	. (.)	40.1 (.)	. (.)	. (.)	. (.)	40.1 (.)	3.8 (.)
		Quantile (0.85)	. (.)	. (.)	47.9 (.)	. (.)	. (.)	. (.)	47.9 (.)	3.7 (.)
		Quantile (0.95)	. (.)	. (.)	60.5 (.)	. (.)	. (.)	. (.)	60.5 (.)	3.4 (.)
	Total	Mean	. (.)	. (.)	40.5 (2.0)	-17.7 (.)	39.9 (6.2)	-1.2 (6.5)	40.2 (3.0)	-14.1 (5.9)
		Median	. (.)	. (.)	39.6 (2.3)	-18.7 (.)	35.8 (7.3)	-3.3 (7.5)	38.1 (2.5)	-19.4 (12.1)
		Quantile (0.85)	. (.)	. (.)	46.9 (2.1)	-18.3 (.)	56.3 (10.1)	3.6 (11.3)	51.8 (6.7)	-20.2 (7.5)
		Quantile (0.95)	. (.)	. (.)	53.9 (1.5)	-15.9 (.)	64.3 (7.0)	4.8 (8.2)	62.1 (6.0)	-14.9 (6.7)
Total	1 Flat	Mean	70.4 (0.6)	-0.2 (1.2)	56.6 (1.4)	3.4 (1.7)	49.8 (2.0)	2.7 (2.0)	62.8 (1.2)	6.1 (1.7)
		Median	70.8 (0.6)	-0.1 (1.4)	57.5 (1.7)	4.1 (2.1)	49.1 (2.7)	2.7 (2.6)	65.4 (1.0)	9.0 (2.1)
		Quantile (0.85)	78.1 (0.5)	0.1 (2.1)	69.4 (1.0)	5.6 (1.4)	63.3 (2.4)	5.5 (2.4)	76.1 (0.5)	3.1 (1.9)
		Quantile (0.95)	82.2 (0.6)	0.3 (1.0)	76.3 (1.0)	6.2 (1.5)	72.2 (2.6)	6.6 (2.4)	80.9 (0.5)	1.9 (1.3)
	2 Moderate	Mean	70.9 (.)	4.2 (.)	50.4 (7.5)	-2.2 (.)	45.0 (3.0)	-2.0 (4.7)	51.2 (4.8)	0.5 (5.4)
		Median	70.8 (.)	5.1 (.)	50.9 (8.6)	-1.3 (.)	44.4 (3.8)	-0.4 (5.6)	51.0 (6.8)	1.1 (6.3)
		Quantile (0.85)	76.6 (.)	4.8 (.)	62.1 (9.9)	4.3 (.)	58.3 (3.7)	-1.3 (5.4)	66.7 (5.0)	1.7 (6.8)
		Quantile (0.95)	80.6 (.)	4.9 (.)	69.3 (11.0)	6.7 (.)	66.0 (2.0)	-0.5 (4.7)	74.5 (4.5)	3.6 (6.1)
	3 Steep	Mean	. (.)	. (.)	44.1 (2.6)	-11.5 (12.9)	52.5 (6.2)	12.8 (7.9)	52.0 (5.8)	7.4 (8.4)
		Median	. (.)	. (.)	43.2 (2.8)	-13.8 (14.1)	54.5 (9.7)	15.0 (12.8)	53.5 (8.4)	10.9 (11.2)
		Quantile (0.85)	. (.)	. (.)	50.6 (1.9)	-16.9 (14.4)	64.2 (3.3)	16.6 (5.4)	63.7 (3.5)	5.3 (11.2)
		Quantile (0.95)	. (.)	. (.)	57.7 (2.2)	-15.5 (13.5)	71.3 (3.3)	18.7 (5.6)	70.9 (3.1)	3.8 (12.7)
	Total	Mean	70.4 (0.6)	-0.1 (1.2)	56.4 (1.3)	3.1 (1.6)	49.7 (2.0)	2.7 (2.0)	62.6 (1.1)	6.3 (1.6)
		Median	70.8 (0.6)	-0.0 (1.1)	57.3 (1.6)	4.0 (2.0)	49.0 (2.7)	2.9 (2.7)	65.3 (1.0)	9.3 (1.9)
		Quantile (0.85)	78.1 (0.5)	0.1 (1.7)	69.3 (1.1)	5.6 (1.4)	63.2 (2.3)	5.4 (2.5)	76.0 (0.6)	3.0 (1.7)
		Quantile (0.95)	82.2 (0.6)	0.4 (1.0)	76.2 (0.9)	6.1 (1.3)	72.1 (2.6)	6.6 (2.6)	80.8 (0.5)	1.8 (1.5)

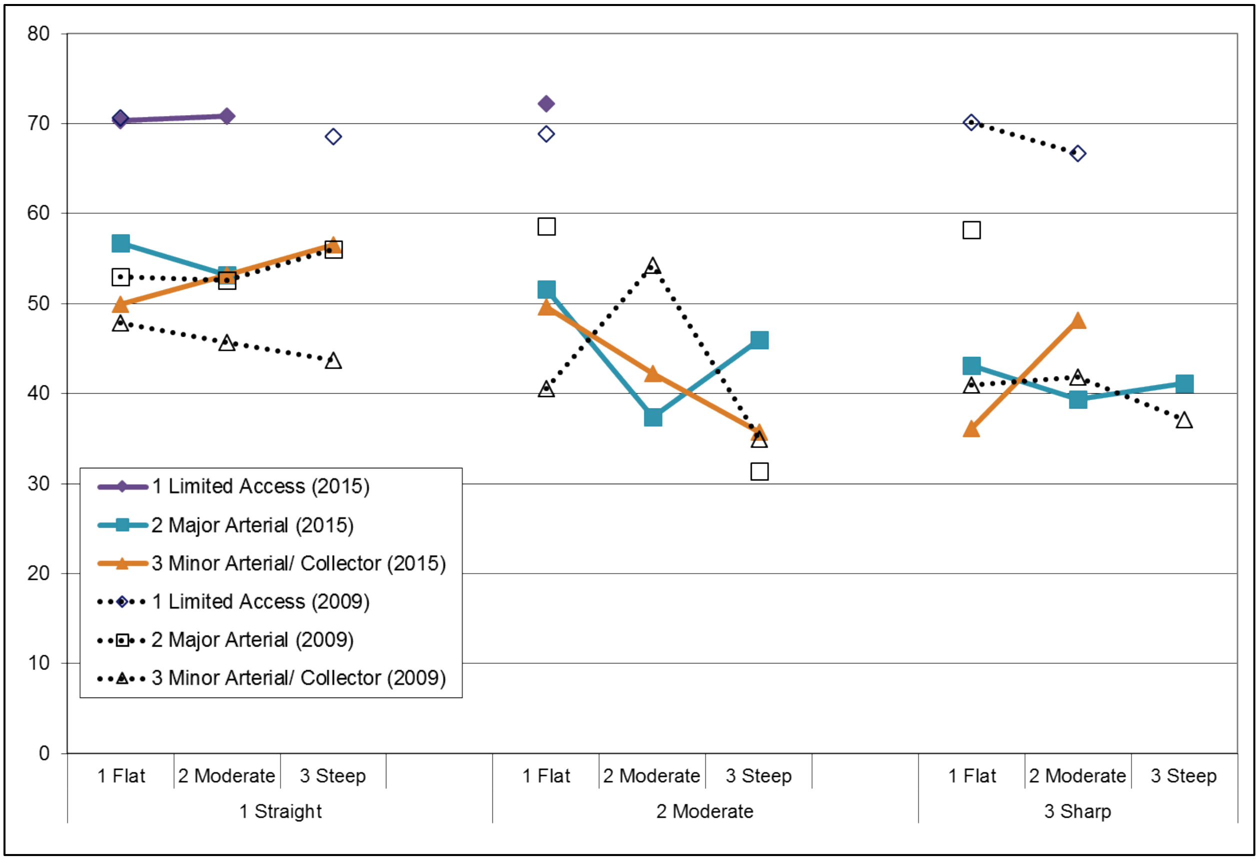

Figure 21. Speed by Road Type, Horizontal, and Vertical Curvature Class (Free-Flow)

Table 27. Standard Deviations for Values Reported in Table 26

		FCC ROAD CLASS							
		1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
		Speed SD		Speed SD		Speed SD		Speed SD	
HOR_ CURVERD CLASS	VER_ CURVERD CLASS	2015	Change	2015	Change	2015	Change	2015	Change
1 Straight	1 Flat	8.13	0.01	13.00	2.59	13.10	2.80	13.66	-0.35
	2 Moderate	5.95	.	10.77	4.98	9.98	-1.03	12.15	1.44
	3 Steep	.	.	.	.	10.01	3.37	10.01	-0.99
	Total	8.13	0.01	12.95	2.58	13.09	2.77	13.66	-0.37
2 Moderate	1 Flat	5.72	-2.87	13.26	5.62	12.95	3.84	14.32	-1.26
	2 Moderate	.	.	5.77	.	12.65	3.86	11.87	3.08
	3 Steep	.	.	6.32	0.74	7.80	2.46	8.51	3.15
	Total	5.72	-2.87	13.39	5.55	13.12	2.98	14.48	-0.89
3 Sharp	1 Flat	.	.	7.42	0.20	10.95	1.32	10.66	-5.50
	2 Moderate	.	.	7.59	.	13.60	5.31	11.23	-1.90
	3 Steep	.	.	10.70	.	.	.	10.70	1.15
	Total	.	.	7.80	0.57	13.09	3.67	11.22	-4.42
Total	1 Flat	8.12	-0.02	13.03	2.68	13.11	2.68	13.85	-0.35
	2 Moderate	5.95	0.49	11.67	5.88	13.07	2.05	13.96	1.64
	3 Steep	.	.	8.67	-3.09	12.64	5.10	12.59	0.93
	Total	8.11	-0.00	13.04	2.71	13.12	2.66	13.92	-0.29

6.11 Horizontal Curvature and Vehicle Length

The influence of vehicle length and horizontal curvature on speed is presented in Table 28 and Table 29. Overall, speeds for all vehicle sizes deceased as curvature increased on all road types. On straight roads, only the longest vehicles showed a slight increase in speed on limited access highways (67 mph vs. 69 mph) in 2015, while shorter vehicles were largely unchanged year-to-year. The shortest vehicle categories did show significant increases in mean speeds on the straight major arterials ($p < .01$), but insignificant increases on minor arterials and collectors. Relative to 2009, speeds increased (insignificantly) by up to 5 mph for vehicles below 30 feet in length on both of these road types.

Relative to 2009, all length classes showed mean speed increases on moderately curved limited access roads. Large Trucks (50-80 feet) experienced a significant increase of 7 mph on moderately curved limited access highways ($p < .05$).Conversely, all length classes showed a large, though insignificant, decrease in mean speeds on the moderately curved major arterials (5 – 13 mph) compared to 2009. Vehicle mean speeds on moderately curved minor arterials and collectors increased for the medium and smaller vehicles, with the greatest increase observed for the smallest vehicles (8 mph). However, speeds for the larger vehicles decreased 1 mph on moderately curved minor arterials and collectors. The 85th and 95th percentile speeds for most of the vehicle categories increased significantly over the two measurement years ($p < .05$) on moderately curved minor arterials and collectors.

There were no limited access roadways that were classified as sharp in 2015 and very few sharply curved major arterials in 2009. The small sample size for these categories indicates insufficient data was available for a year to year analysis. Minor arterials showed a generally downward trend for year to year changes across most length classes for the sharpest curves (2-5 mph); however the change was not significant when compared to 2009 speeds. Figure 22 provides a graphic view of the statistics from

Table 28. Table 28. Speed by Road Type, Length Class, and Horizontal Curvature Class

			FCC ROAD CLASS							
			1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
			Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
			2015	Change	2015	Change	2015	Change	2015	Change
HOR_ CURVERD CLASS	**VEH_ LENGTH**		**Est. (SE)**	**Est. (SE)**	**Est. (SE)**	**Est. (SE)**	**Est. (SE)**	**Est. (SE)**	**Est. (SE)**	**Est. (SE)**
1 Straight	**1 (<20 ft)**	**Mean**	71.4 (0.7)	-0.2 (1.4)	55.5 (1.2)	4.7 (1.4)	48.5 (2.0)	2.7 (2.1)	63.2 (1.2)	7.8 (1.9)
		Median	72.0 (0.7)	0.0 (1.4)	56.3 (1.5)	5.3 (1.7)	47.6 (2.5)	2.6 (2.6)	66.3 (1.2)	12.7 (2.0)
		Quantile (0.85)	78.8 (0.5)	-0.1 (1.1)	68.0 (1.0)	7.4 (1.0)	61.4 (2.2)	5.8 (2.3)	76.7 (0.6)	3.7 (3.0)
		Quantile (0.95)	82.8 (0.6)	0.2 (1.3)	74.4 (0.9)	8.0 (0.9)	69.4 (2.7)	6.8 (2.8)	81.2 (0.6)	2.2 (1.9)
	2 (20-<30 ft)	**Mean**	70.9 (0.9)	-1.0 (1.2)	60.3 (1.6)	3.8 (2.1)	53.3 (2.1)	2.1 (2.3)	62.9 (1.4)	4.8 (1.7)
		Median	71.7 (0.8)	-1.0 (1.1)	61.2 (1.9)	4.7 (2.5)	52.8 (2.7)	2.3 (3.0)	65.0 (1.2)	7.4 (1.9)
		Quantile (0.85)	78.7 (0.7)	-0.3 (0.7)	72.7 (0.9)	5.7 (1.5)	67.2 (2.2)	4.7 (2.5)	76.3 (0.6)	2.8 (1.9)
		Quantile (0.95)	83.0 (0.7)	0.5 (0.9)	80.2 (1.0)	7.0 (1.2)	76.2 (2.0)	6.3 (2.1)	81.6 (0.6)	2.6 (0.6)
	3 (30-<40 ft)	**Mean**	67.0 (0.7)	-0.7 (1.2)	56.7 (1.1)	0.5 (1.4)	53.5 (1.2)	1.8 (1.6)	61.2 (0.8)	3.3 (1.2)
		Median	67.3 (0.6)	-0.5 (1.0)	58.1 (0.9)	2.0 (1.4)	53.4 (1.5)	2.3 (2.1)	63.2 (0.7)	5.1 (1.4)
		Quantile (0.85)	75.3 (0.5)	-0.7 (0.7)	69.8 (1.1)	2.1 (1.8)	68.4 (1.3)	5.1 (1.6)	73.8 (0.6)	2.2 (1.7)
		Quantile (0.95)	79.7 (0.6)	-0.3 (0.9)	78.6 (1.4)	3.6 (2.0)	80.1 (1.5)	8.5 (2.0)	79.6 (0.6)	2.0 (1.7)
	4 (40-<50 ft)	**Mean**	67.0 (0.7)	0.2 (1.1)	55.8 (1.1)	-0.2 (1.2)	53.5 (1.4)	1.3 (1.9)	61.8 (0.8)	2.7 (1.3)
		Median	67.4 (0.6)	0.5 (1.4)	57.4 (1.0)	0.7 (1.2)	53.6 (1.9)	1.3 (2.9)	64.0 (0.8)	4.0 (1.4)
		Quantile (0.85)	75.1 (0.5)	0.4 (0.9)	69.4 (1.1)	3.1 (1.3)	68.2 (1.5)	5.6 (1.5)	73.8 (0.6)	2.2 (1.7)
		Quantile (0.95)	79.3 (0.5)	0.9 (0.8)	77.9 (1.1)	5.1 (1.5)	78.2 (1.8)	8.6 (2.0)	79.1 (0.6)	2.3 (1.6)
	5 (50-<80 ft)	**Mean**	65.6 (0.6)	-0.1 (1.3)	56.3 (1.1)	0.7 (1.9)	53.8 (1.4)	0.5 (2.4)	64.2 (0.7)	0.5 (1.4)
		Median	65.6 (0.4)	-0.2 (1.5)	57.9 (1.1)	1.4 (1.8)	53.9 (1.9)	-0.7 (3.0)	65.1 (0.5)	0.1 (1.2)
		Quantile (0.85)	71.5 (0.5)	-0.3 (1.4)	69.3 (1.5)	3.0 (1.9)	69.0 (1.2)	5.1 (1.5)	71.4 (0.5)	-0.6 (1.4)
		Quantile (0.95)	74.9 (0.6)	-0.5 (1.2)	78.1 (1.7)	5.9 (1.8)	79.2 (1.4)	9.5 (1.4)	75.2 (0.6)	-0.6 (2.1)
	6 (80-<100 ft)	**Mean**	68.7 (0.7)	2.1 (1.8)	57.5 (1.0)	-0.8 (3.4)	53.9 (1.5)	-1.0 (2.9)	66.8 (0.9)	1.6 (1.7)
		Median	69.2 (0.6)	2.8 (1.7)	59.6 (0.9)	0.2 (2.3)	54.8 (4.2)	-1.6 (4.7)	68.4 (0.9)	2.4 (2.0)
		Quantile (0.85)	74.7 (0.4)	1.6 (2.1)	68.6 (0.9)	2.0 (2.7)	67.1 (2.6)	3.3 (3.3)	74.4 (0.4)	1.5 (2.2)
		Quantile (0.95)	77.6 (0.6)	0.8 (1.7)	75.0 (2.8)	3.5 (5.3)	78.7 (2.0)	8.7 (2.5)	77.5 (0.6)	1.0 (1.9)
	Total	**Mean**	70.4 (0.6)	-0.3 (1.2)	56.7 (1.3)	3.7 (1.6)	49.9 (1.9)	2.2 (2.0)	63.1 (1.1)	6.4 (1.7)
		Median	70.8 (0.6)	-0.1 (1.9)	57.5 (1.6)	4.5 (2.0)	49.2 (2.5)	2.3 (2.6)	65.7 (0.9)	9.6 (2.1)
		Quantile (0.85)	78.1 (0.5)	-0.6 (1.6)	69.4 (1.0)	5.8 (1.4)	63.4 (2.2)	5.0 (2.4)	76.2 (0.6)	3.2 (1.8)
		Quantile (0.95)	82.2 (0.6)	0.2 (1.0)	76.3 (0.9)	6.2 (1.3)	72.2 (2.4)	6.1 (2.4)	80.9 (0.5)	1.9 (1.4)

Table 28. Speed by Road Type, Length Class, and Horizontal Curvature Class (continued)

			FCC ROAD CLASS							
			1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
			Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
			2015	Change	2015	Change	2015	Change	2015	Change
HOR_CURVERD CLASS	VEH_ LENGTH		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
2 Moderate	1 (<20 ft)	Mean	72.4 (0.8)	2.9 (4.1)	48.1 (4.8)	-8.7 (6.4)	48.0 (3.4)	8.0 (4.2)	49.6 (2.7)	0.1 (4.4)
		Median	72.7 (0.5)	3.1 (4.8)	48.1 (9.1)	-9.0 (11.0)	47.0 (3.8)	9.1 (4.8)	48.3 (3.7)	1.8 (6.6)
		Quantile (0.85)	77.7 (1.0)	0.5 (4.0)	61.5 (3.3)	-2.6 (4.9)	61.1 (5.0)	10.3 (6.2)	64.9 (3.7)	-4.1 (7.4)
		Quantile (0.95)	80.9 (1.3)	0.2 (3.8)	68.1 (3.7)	-0.2 (5.3)	70.1 (6.1)	12.2 (7.8)	74.3 (1.8)	-2.6 (6.0)
	2 (20-<30 ft)	Mean	73.1 (0.3)	1.5 (3.7)	52.9 (4.5)	-7.8 (5.3)	51.9 (2.9)	5.6 (3.4)	56.6 (3.4)	-1.6 (5.5)
		Median	73.5 (0.1)	1.4 (4.3)	54.4 (6.1)	-6.4 (7.1)	51.2 (3.5)	6.2 (4.1)	56.2 (5.0)	-3.3 (6.9)
		Quantile (0.85)	77.8 (0.9)	0.1 (2.4)	66.7 (2.4)	-1.2 (3.4)	65.5 (3.7)	7.8 (4.5)	73.8 (4.1)	-0.2 (7.9)
		Quantile (0.95)	80.7 (1.1)	-0.1 (2.1)	75.1 (3.4)	2.0 (4.8)	75.4 (3.4)	11.5 (4.4)	78.7 (1.2)	-0.3 (4.7)
	3 (30-<40 ft)	Mean	70.0 (0.3)	4.2 (3.9)	54.0 (2.6)	-4.6 (3.5)	49.7 (1.5)	1.9 (2.0)	52.2 (1.7)	-3.9 (2.9)
		Median	70.1 (0.3)	4.7 (3.6)	55.1 (3.1)	-3.2 (4.4)	48.9 (2.1)	0.9 (2.8)	51.3 (1.8)	-5.8 (3.1)
		Quantile (0.85)	76.0 (1.4)	0.9 (4.8)	66.6 (1.7)	0.8 (2.5)	64.1 (0.9)	5.5 (1.9)	68.8 (3.1)	-0.2 (5.1)
		Quantile (0.95)	80.4 (0.6)	1.2 (4.1)	79.8 (2.8)	5.2 (3.2)	78.2 (1.8)	12.8 (3.1)	79.0 (1.2)	2.7 (3.8)
	4 (40-<50 ft)	Mean	69.6 (0.5)	5.2 (3.0)	51.9 (3.7)	-5.8 (5.6)	48.7 (2.0)	0.6 (2.4)	52.1 (2.5)	-5.3 (3.5)
		Median	69.5 (0.8)	5.5 (2.4)	52.3 (3.8)	-5.4 (6.5)	48.6 (2.4)	-0.6 (2.8)	51.6 (2.6)	-7.0 (4.2)
		Quantile (0.85)	75.2 (0.4)	2.9 (2.5)	66.5 (4.1)	2.0 (5.6)	61.3 (2.0)	3.1 (2.7)	68.6 (4.3)	0.6 (5.7)
		Quantile (0.95)	78.7 (0.3)	1.9 (3.1)	76.1 (1.7)	6.7 (3.0)	72.6 (1.1)	9.1 (1.3)	76.1 (1.7)	2.1 (4.2)
	5 (50-<80 ft)	Mean	67.5 (0.3)	7.4 (3.3)	52.5 (3.0)	-5.4 (4.9)	49.6 (1.5)	1.1 (2.4)	53.7 (2.6)	-5.0 (3.5)
		Median	67.6 (0.1)	6.6 (3.3)	53.2 (3.3)	-4.9 (5.1)	49.1 (1.8)	-1.3 (2.2)	54.0 (3.4)	-6.0 (5.0)
		Quantile (0.85)	73.2 (0.0)	6.1 (2.7)	63.7 (1.9)	-0.1 (2.8)	63.2 (1.3)	5.1 (1.6)	69.0 (3.1)	2.0 (4.0)
		Quantile (0.95)	76.1 (0.3)	4.7 (2.4)	74.0 (4.2)	7.0 (4.8)	75.2 (2.4)	12.5 (2.4)	75.7 (0.9)	4.7 (2.8)
	6 (80-<100 ft)	Mean	67.7 (0.6)	7.3 (4.1)	46.7 (9.3)	-13.4 (10.4)	49.9 (2.4)	-7.0 (5.3)	59.5 (7.1)	-0.8 (7.7)
		Median	67.2 (1.0)	5.0 (4.5)	42.7 (10.6)	-16.8 (12.3)	51.6 (2.4)	-9.3 (9.3)	63.8 (9.0)	2.1 (9.8)
		Quantile (0.85)	71.1 (2.4)	3.4 (2.7)	60.0 (13.0)	-4.9 (13.9)	60.5 (0.7)	-5.1 (1.0)	69.3 (5.8)	1.7 (6.0)
		Quantile (0.95)	73.7 (2.2)	2.8 (3.0)	61.5 (12.2)	-6.3 (13.4)	63.0 (2.7)	-7.6 (5.1)	72.4 (4.7)	1.8 (4.9)
	Total	Mean	72.2 (0.6)	3.3 (4.1)	49.4 (4.6)	-9.0 (6.0)	48.9 (3.1)	6.9 (3.8)	51.4 (2.7)	-1.5 (4.4)
		Median	72.7 (0.3)	3.3 (4.7)	50.2 (8.2)	-8.5 (10.0)	48.1 (3.6)	8.3 (4.3)	50.2 (3.6)	-3.4 (6.1)
		Quantile (0.85)	77.5 (0.9)	0.6 (3.6)	62.8 (2.8)	-2.9 (3.9)	62.2 (4.4)	8.2 (5.5)	68.1 (3.7)	-2.9 (7.1)
		Quantile (0.95)	80.6 (1.2)	0.3 (3.3)	70.5 (3.4)	-0.3 (4.9)	71.8 (5.0)	11.4 (6.3)	76.2 (1.7)	-0.8 (5.4)

Table 28. Speed by Road Type, Length Class, and Horizontal Curvature Class (continued)

			FCC ROAD CLASS							
			1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
			Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
			2015	Change	2015	Change	2015	Change	2015	Change
HOR_CURVERD CLASS	VEH_ LENGTH		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
3 Sharp	1 (<20 ft)	Mean	. (.)	. (.)	40.0 (2.2)	-16.8 (.)	37.0 (5.4)	-2.7 (5.5)	38.3 (2.6)	-14.6 (6.2)
		Median	. (.)	. (.)	39.4 (2.4)	-17.6 (.)	33.9 (4.0)	-4.1 (4.1)	37.0 (2.7)	-17.6 (15.9)
		Quantile (0.85)	. (.)	. (.)	45.8 (2.6)	-17.5 (.)	49.4 (11.3)	0.2 (12.6)	46.8 (4.6)	-24.2 (5.4)
		Quantile (0.95)	. (.)	. (.)	51.9 (1.9)	-15.6 (.)	60.4 (7.9)	3.3 (9.5)	57.5 (5.8)	-18.5 (6.4)
	2 (20-<30 ft)	Mean	. (.)	. (.)	42.8 (0.9)	-18.0 (.)	49.8 (7.1)	4.8 (7.5)	47.5 (4.8)	-9.9 (6.3)
		Median	. (.)	. (.)	41.7 (1.0)	-18.8 (.)	50.6 (10.1)	7.3 (10.5)	45.4 (6.0)	-15.1 (8.7)
		Quantile (0.85)	. (.)	. (.)	51.7 (1.6)	-15.2 (.)	64.3 (7.7)	7.5 (8.9)	62.5 (7.2)	-9.8 (7.8)
		Quantile (0.95)	. (.)	. (.)	59.5 (1.9)	-12.4 (.)	70.4 (4.9)	7.9 (6.2)	69.4 (5.2)	-7.5 (5.6)
	3 (30-<40 ft)	Mean	. (.)	. (.)	41.4 (3.2)	-14.1 (.)	44.2 (6.1)	-2.5 (7.1)	43.2 (3.2)	-13.6 (5.2)
		Median	. (.)	. (.)	39.6 (2.2)	-15.6 (.)	42.2 (8.7)	-3.6 (10.7)	40.6 (3.0)	-19.0 (6.0)
		Quantile (0.85)	. (.)	. (.)	50.7 (5.2)	-14.2 (.)	61.2 (6.8)	2.4 (7.4)	57.8 (5.2)	-12.2 (5.7)
		Quantile (0.95)	. (.)	. (.)	60.4 (9.0)	-11.3 (.)	74.1 (3.4)	9.6 (4.5)	71.3 (6.2)	-3.7 (6.2)
	4 (40-<50 ft)	Mean	. (.)	. (.)	47.1 (3.5)	-7.7 (.)	46.0 (3.3)	-2.0 (6.1)	46.3 (2.4)	-12.9 (4.3)
		Median	. (.)	. (.)	43.0 (1.8)	-12.3 (.)	44.5 (8.5)	-4.4 (12.2)	43.8 (5.9)	-17.9 (7.3)
		Quantile (0.85)	. (.)	. (.)	64.7 (12.2)	2.3 (.)	59.7 (1.0)	-0.2 (4.8)	59.8 (1.4)	-10.2 (2.9)
		Quantile (0.95)	. (.)	. (.)	80.2 (9.7)	14.6 (.)	74.2 (9.9)	9.1 (11.1)	79.9 (11.0)	6.0 (11.1)
	5 (50-<80 ft)	Mean	. (.)	. (.)	42.7 (0.7)	-9.9 (.)	46.2 (0.9)	0.4 (2.8)	45.2 (1.0)	-15.5 (2.6)
		Median	. (.)	. (.)	40.4 (1.1)	-11.7 (.)	43.8 (4.0)	-1.2 (7.4)	42.2 (1.7)	-19.8 (2.2)
		Quantile (0.85)	. (.)	. (.)	51.9 (1.4)	-8.7 (.)	62.0 (4.3)	1.1 (4.8)	60.4 (2.1)	-8.1 (4.1)
		Quantile (0.95)	. (.)	. (.)	68.9 (2.1)	-0.8 (.)	77.2 (8.3)	12.1 (8.9)	76.4 (6.2)	2.7 (6.7)
	6 (80-<100 ft)	Mean	. (.)	. (.)	45.3 (.)	-15.1 (.)	42.3 (9.5)	-4.5 (.)	42.4 (8.9)	-22.7 (9.3)
		Median	. (.)	. (.)	45.3 (0.0)	-15.1 (0.0)	37.4 (10.9)	-5.9 (.)	38.5 (10.3)	-25.5 (10.7)
		Quantile (0.85)	. (.)	. (.)	45.3 (0.0)	-15.1 (0.0)	53.6 (10.3)	0.6 (.)	53.1 (9.6)	-17.0 (10.5)
		Quantile (0.95)	. (.)	. (.)	45.3 (0.0)	-15.1 (0.0)	58.5 (12.8)	5.0 (.)	57.7 (12.8)	-15.7 (13.6)
	Total	Mean	. (.)	. (.)	40.5 (2.0)	-17.7 (.)	39.9 (6.2)	-1.2 (6.5)	40.2 (3.0)	-14.1 (5.9)
		Median	. (.)	. (.)	39.6 (2.3)	-18.7 (.)	35.8 (7.3)	-3.3 (7.5)	38.1 (2.5)	-19.4 (12.1)
		Quantile (0.85)	. (.)	. (.)	46.9 (2.1)	-18.3 (.)	56.3 (10.1)	3.6 (11.3)	51.8 (6.7)	-20.2 (7.5)
		Quantile (0.95)	. (.)	. (.)	53.9 (1.5)	-15.9 (.)	64.3 (7.0)	4.8 (8.2)	62.1 (6.0)	-14.9 (6.7)

Table 28. Speed by Road Type, Length Class, and Horizontal Curvature Class (continued)

			FCC ROAD CLASS							
			1 Limited access		2 Major arterial		3 Minor		Total	
			Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
			2015	Change	2015	Change	2015	Change	2015	Change
HOR_CURVERD CLASS	VEH_ LENGTH		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
Total	1 (<20 ft)	Mean	71.4 (0.7)	0.1 (1.4)	55.2 (1.2)	4.2 (1.4)	48.3 (2.1)	3.3 (2.1)	62.6 (1.2)	7.7 (1.8)
		Median	72.0 (0.7)	0.1 (1.6)	56.1 (1.5)	4.7 (1.7)	47.4 (2.6)	3.2 (2.7)	65.8 (1.2)	12.4 (1.9)
		Quantile (0.85)	78.8 (0.5)	-0.1 (1.4)	67.8 (1.1)	7.1 (1.0)	61.3 (2.5)	6.1 (2.6)	76.6 (0.6)	3.6 (2.1)
		Quantile (0.95)	82.8 (0.6)	0.3 (1.2)	74.3 (1.0)	7.8 (0.9)	69.4 (3.0)	7.3 (3.0)	81.1 (0.6)	2.1 (1.3)
	2 (20-<30 ft)	Mean	71.0 (0.8)	-0.8 (1.2)	60.1 (1.6)	3.4 (2.1)	53.1 (2.1)	2.4 (2.3)	62.5 (1.4)	4.4 (1.7)
		Median	71.8 (0.8)	-0.9 (1.3)	61.0 (1.9)	4.1 (2.5)	52.6 (2.8)	2.5 (2.9)	64.6 (1.3)	6.9 (1.9)
		Quantile (0.85)	78.7 (0.7)	-0.2 (0.7)	72.6 (0.9)	5.5 (1.5)	67.0 (2.3)	5.0 (2.5)	76.2 (0.6)	2.5 (1.8)
		Quantile (0.95)	82.9 (0.7)	0.7 (0.9)	80.1 (1.0)	6.9 (1.3)	75.9 (2.0)	6.5 (2.1)	81.5 (0.7)	2.5 (0.7)
	3 (30-<40 ft)	Mean	67.1 (0.7)	-0.5 (1.2)	56.6 (1.1)	0.3 (1.4)	53.0 (1.2)	1.6 (1.5)	60.7 (0.8)	3.0 (1.2)
		Median	67.3 (0.6)	-0.4 (1.0)	58.0 (1.0)	1.7 (1.5)	52.7 (1.5)	1.9 (2.0)	62.9 (0.7)	4.9 (1.4)
		Quantile (0.85)	75.3 (0.5)	-0.6 (0.6)	69.7 (1.0)	2.1 (1.6)	68.0 (1.2)	5.1 (1.5)	73.6 (0.6)	2.4 (1.5)
		Quantile (0.95)	79.7 (0.6)	-0.2 (0.9)	78.6 (1.4)	3.6 (2.0)	79.9 (1.3)	8.6 (2.0)	79.6 (0.6)	2.3 (1.7)
	4 (40-<50 ft)	Mean	67.1 (0.7)	0.4 (1.1)	55.8 (1.1)	-0.4 (1.2)	52.8 (1.4)	0.9 (1.7)	61.4 (0.8)	2.4 (1.3)
		Median	67.4 (0.6)	0.7 (1.0)	57.3 (1.0)	0.6 (1.4)	52.8 (1.7)	0.7 (2.5)	63.7 (0.8)	3.7 (1.3)
		Quantile (0.85)	75.1 (0.5)	0.6 (0.9)	69.4 (1.1)	3.3 (1.4)	67.5 (1.4)	5.3 (1.5)	73.7 (0.6)	2.7 (1.4)
		Quantile (0.95)	79.3 (0.5)	1.0 (0.8)	77.8 (1.1)	5.2 (1.5)	77.6 (1.7)	8.5 (1.9)	79.0 (0.5)	3.0 (1.7)
	5 (50-<80 ft)	Mean	65.6 (0.5)	0.3 (1.4)	56.2 (1.1)	0.4 (2.1)	53.2 (1.3)	0.3 (2.4)	64.0 (0.7)	0.7 (1.4)
		Median	65.6 (0.4)	0.6 (1.9)	57.7 (1.0)	0.9 (2.1)	53.1 (1.8)	-1.1 (2.8)	65.0 (0.5)	1.0 (1.6)
		Quantile (0.85)	71.5 (0.4)	-0.1 (1.5)	69.1 (1.4)	3.3 (1.8)	68.4 (1.3)	4.8 (1.7)	71.3 (0.5)	0.3 (2.5)
		Quantile (0.95)	74.9 (0.6)	-0.3 (1.3)	78.1 (1.6)	5.9 (1.8)	78.7 (1.2)	9.3 (1.2)	75.2 (0.6)	0.2 (1.1)
	6 (80-<100 ft)	Mean	68.6 (0.7)	2.5 (1.8)	57.3 (1.0)	-1.2 (3.5)	53.3 (1.5)	-1.7 (2.9)	66.7 (0.9)	1.8 (1.8)
		Median	69.1 (0.6)	3.1 (1.7)	59.5 (0.8)	-0.0 (2.3)	53.6 (4.0)	-2.8 (4.5)	68.2 (0.9)	2.3 (1.7)
		Quantile (0.85)	74.7 (0.4)	1.9 (2.1)	68.6 (1.1)	2.0 (2.8)	66.1 (1.5)	2.2 (2.1)	74.4 (0.4)	1.4 (2.7)
		Quantile (0.95)	77.6 (0.6)	0.9 (1.9)	74.9 (2.8)	3.4 (6.1)	77.9 (2.6)	8.0 (3.3)	77.5 (0.6)	1.2 (2.0)
	Total	Mean	70.4 (0.6)	-0.1 (1.2)	56.4 (1.3)	3.1 (1.6)	49.7 (2.0)	2.7 (2.0)	62.6 (1.1)	6.3 (1.6)
		Median	70.8 (0.6)	-0.0 (1.1)	57.3 (1.6)	4.0 (2.0)	49.0 (2.7)	2.9 (2.7)	65.3 (1.0)	9.3 (1.9)
		Quantile (0.85)	78.1 (0.5)	0.1 (1.7)	69.3 (1.1)	5.6 (1.4)	63.2 (2.3)	5.4 (2.5)	76.0 (0.6)	3.0 (1.7)
		Quantile (0.95)	82.2 (0.6)	0.4 (1.0)	76.2 (0.9)	6.1 (1.3)	72.1 (2.6)	6.6 (2.6)	80.8 (0.5)	1.8 (1.5)

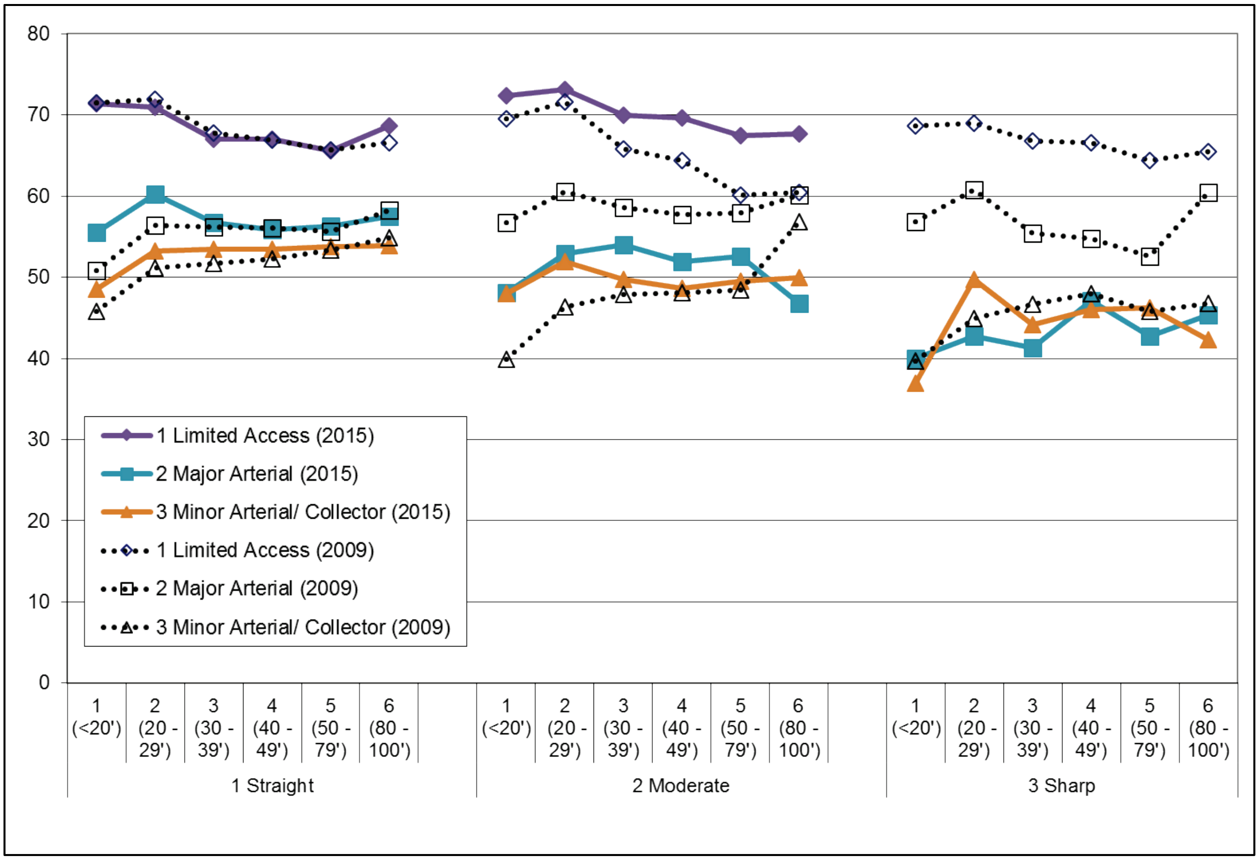

Figure 22. Speed by Road Type, Length Class, and Horizontal Curvature Class (Free-Flow)

Table 29. Standard Deviations for Values Reported in Table 28

		FCC ROAD CLASS							
		1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
		Speed SD		Speed SD		Speed SD		Speed SD	
HOR_CURVE RD CLASS	VEH_LENGTH	2015	Change	2015	Change	2015	Change	2015	Change
1 Straight	1 (<20 ft)	7.87	0.01	12.51	2.78	12.41	2.82	14.14	-0.50
	2 (20-<30 ft)	8.78	0.73	13.05	2.74	13.53	2.94	13.80	0.71
	3 (30-<40 ft)	9.03	-0.02	14.34	3.21	15.35	4.27	13.68	1.20
	4 (40-<50 ft)	8.91	-0.03	14.37	3.85	15.06	4.58	13.24	1.39
	5 (50-<80 ft)	6.30	-0.52	13.93	3.00	15.05	4.06	8.73	-0.17
	6 (80-<100 ft)	6.92	-0.64	13.01	3.69	14.47	4.49	9.36	0.81
	Total	8.13	0.01	12.95	2.58	13.09	2.77	13.66	-0.37
2 Moderate	1 (<20 ft)	5.65	-2.43	12.73	4.99	12.70	3.35	13.76	-1.82
	2 (20-<30 ft)	5.17	-1.88	14.49	7.03	13.52	3.19	15.06	0.78
	3 (30-<40 ft)	7.21	-2.07	15.04	6.59	15.26	4.39	15.85	3.38
	4 (40-<50 ft)	6.27	-2.17	14.71	7.44	13.87	3.62	15.04	3.99
	5 (50-<80 ft)	5.73	-2.66	12.94	6.03	14.08	3.83	14.50	5.44
	6 (80-<100 ft)	3.77	-5.02	12.00	6.99	12.42	0.47	12.65	4.12
	Total	5.72	-2.87	13.39	5.55	13.12	2.98	14.48	-0.89
3 Sharp	1 (<20 ft)	.	.	6.79	0.14	10.83	2.20	9.40	-6.73
	2 (20-<30 ft)	.	.	10.06	3.60	14.27	4.21	13.45	-0.81
	3 (30-<40 ft)	.	.	10.48	1.20	16.35	4.76	14.65	1.43
	4 (40-<50 ft)	.	.	17.25	9.64	15.77	4.77	16.17	4.57
	5 (50-<80 ft)	.	.	13.66	4.40	16.77	3.58	15.96	5.92
	6 (80-<100 ft)	.	.	0.00	0.00	13.14	4.42	12.93	7.94
	Total	.	.	7.80	0.57	13.09	3.67	11.22	-4.42
Total	1 (<20 ft)	7.86	0.02	12.59	2.87	12.48	2.73	14.41	-0.42
	2 (20-<30 ft)	8.71	0.80	13.14	2.95	13.54	2.86	13.96	0.73
	3 (30-<40 ft)	9.02	0.01	14.38	3.39	15.41	4.27	13.93	1.42
	4 (40-<50 ft)	8.89	0.03	14.41	4.10	15.01	4.48	13.47	1.68
	5 (50-<80 ft)	6.30	-0.74	13.94	3.27	15.02	3.94	8.94	-0.06
	6 (80-<100 ft)	6.90	-0.89	13.05	4.11	14.33	4.25	9.50	0.88
	Total	8.11	-0.00	13.04	2.71	13.12	2.66	13.92	-0.29

6.12 Vertical Gradient and Vehicle Length

Table 30 and Table 31 present the relationship among vehicle speeds and gradients (steepness of gradient or vertical curvature) as a function of vehicle class. Like Tables 28 and 29, for limited access roadways, the more extreme gradient measures (moderate and steep conditions) have small sample sizes preventing year to year comparisons or interpretation. On flat limited access roads, while the longest vehicles showed a slight increase in speed (66 mph vs. 69 mph), it was not a significant change from 2009. In addition, speeds in this road class for shorter vehicles were largely unchanged year-to-year. On flat major arterials the small vehicles (less than 20 feet) showed the greatest increase in speeds

(5 mph) ($p < .05$). The 85th and 95th percentile speeds on flat minor arterials and collectors increased significantly for nearly all vehicles categories ($p < .05$). These speed measures also increased significantly for passenger vehicles, some medium sized trucks and some larger trucks on flat major arterials ($p < .05$).

A very small sample size of major arterials with moderate inclines in 2009 does not allow for year to year comparisons. Speeds on moderately inclined minor arterials and collectors decreased across all vehicle types with the medium to larger vehicles showing the greatest reduction in speed (5-6 mph) from 2009, though the shift was not statistically significant.

Speeds for passenger vehicles and medium size vehicles on steep major arterials reduced by 9 to 22 mph. Considering the 2015 estimates and standard errors behind these estimates, most of these differences are not significant, reflecting the smaller sample sizes associated with these subgroups. A year to year comparison of speeds for the longest vehicles could not be made given the small sample size in 2009 and 2015 data. Alternatively, speeds on minor arterials with steep conditions tended to increase substantially, with increases ranging from 5 to 15 mph, depending on the vehicle class. Mean speeds for the passenger vehicles and large trucks (50 to 80 ft) increased significantly by 14-15 mph on steeply inclined minor arterials and collectors ($p <.05$). Figure 23 provides a graphic view of the statistics from Table 30.

Table 30. Speed by Road Type, Length Class, and Vertical Curvature Class

VER_ CURVERD CLASS	VEH_ LENGTH		FCC ROAD CLASS: 1 Limited access, Speed Estimate, 2015	1 Limited access, Change	2 Major arterial, Speed Estimate, 2015	2 Major arterial, Change	3 Minor arterial/collector, Speed Estimate, 2015	3 Minor arterial/collector, Change	Total, Speed Estimate, 2015	Total, Change
			Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
1 Flat	1 (<20 ft)	**Mean**	71.4 (0.7)	-0.0 (1.4)	55.5 (1.3)	4.5 (1.6)	48.4 (2.1)	3.3 (2.1)	62.8 (1.2)	7.5 (1.8)
		Median	72.0 (0.7)	0.1 (1.5)	56.4 (1.6)	5.1 (1.7)	47.5 (2.6)	3.1 (2.6)	66.0 (1.3)	12.1 (1.9)
		Quantile (0.85)	78.8 (0.5)	-0.1 (1.4)	68.1 (1.2)	7.3 (1.1)	61.4 (2.6)	6.2 (2.6)	76.6 (0.6)	3.6 (3.1)
		Quantile (0.95)	82.8 (0.6)	0.3 (1.2)	74.5 (1.0)	8.0 (0.9)	69.5 (3.0)	7.3 (2.9)	81.2 (0.6)	2.2 (1.9)
	2 (20-<30 ft)	**Mean**	71.0 (0.8)	-0.9 (1.2)	60.2 (1.7)	3.5 (2.1)	53.1 (2.2)	2.4 (2.2)	62.6 (1.4)	4.3 (1.7)
		Median	71.8 (0.8)	-0.9 (1.1)	61.2 (1.9)	4.2 (2.6)	52.6 (2.8)	2.5 (3.0)	64.7 (1.2)	6.7 (1.9)
		Quantile (0.85)	78.7 (0.7)	-0.3 (0.7)	72.7 (0.9)	5.6 (1.5)	67.1 (2.3)	5.1 (2.5)	76.2 (0.6)	2.2 (1.8)
		Quantile (0.95)	82.9 (0.7)	0.7 (0.9)	80.2 (1.1)	6.9 (1.3)	76.1 (2.1)	6.7 (2.0)	81.5 (0.6)	2.5 (0.7)
	3 (30-<40 ft)	**Mean**	67.1 (0.7)	-0.6 (1.2)	56.7 (1.1)	0.4 (1.5)	53.1 (1.2)	1.7 (1.4)	60.8 (0.8)	3.0 (1.2)
		Median	67.3 (0.6)	-0.4 (1.0)	58.1 (0.9)	1.8 (1.5)	52.7 (1.5)	2.0 (2.0)	63.0 (0.7)	4.9 (1.4)
		Quantile (0.85)	75.3 (0.5)	-0.6 (0.6)	69.8 (1.0)	2.2 (1.8)	68.1 (1.2)	5.3 (1.2)	73.7 (0.5)	2.1 (1.7)
		Quantile (0.95)	79.7 (0.6)	-0.2 (0.9)	78.6 (1.4)	3.6 (2.1)	79.9 (1.3)	8.7 (1.8)	79.6 (0.6)	2.0 (1.7)
	4 (40-<50 ft)	**Mean**	67.1 (0.7)	0.3 (1.1)	55.8 (1.1)	-0.4 (1.3)	52.9 (1.4)	1.1 (1.6)	61.5 (0.8)	2.4 (1.3)
		Median	67.4 (0.6)	0.7 (1.1)	57.4 (1.0)	0.6 (1.5)	52.9 (1.8)	0.9 (2.4)	63.8 (0.8)	3.8 (1.3)
		Quantile (0.85)	75.1 (0.5)	0.6 (0.9)	69.4 (1.1)	3.3 (1.5)	67.6 (1.4)	5.5 (1.2)	73.7 (0.7)	2.5 (1.8)
		Quantile (0.95)	79.3 (0.5)	1.0 (0.8)	77.8 (1.1)	5.3 (1.6)	77.7 (1.7)	8.8 (1.7)	79.0 (0.6)	2.5 (1.7)
	5 (50-<80 ft)	**Mean**	65.6 (0.6)	0.2 (1.4)	56.2 (1.1)	0.5 (2.2)	53.2 (1.3)	0.7 (1.9)	64.0 (0.7)	0.7 (1.4)
		Median	65.6 (0.4)	0.6 (2.0)	57.8 (1.1)	1.1 (2.1)	53.2 (1.8)	-0.8 (2.5)	65.0 (0.5)	1.0 (1.8)
		Quantile (0.85)	71.5 (0.4)	-0.1 (1.5)	69.2 (1.4)	3.3 (1.8)	68.5 (1.2)	5.5 (1.3)	71.4 (0.5)	0.4 (3.0)
		Quantile (0.95)	74.9 (0.6)	-0.4 (1.3)	78.1 (1.6)	5.9 (1.9)	78.9 (1.3)	9.8 (1.3)	75.2 (0.6)	0.2 (1.6)
	6 (80-<100 ft)	**Mean**	68.6 (0.7)	2.5 (1.9)	57.3 (1.0)	-1.2 (3.6)	53.3 (1.5)	-1.6 (2.6)	66.7 (0.9)	1.7 (1.8)
		Median	69.1 (0.6)	3.1 (1.7)	59.5 (0.9)	-0.1 (2.4)	53.6 (4.1)	-2.7 (4.6)	68.3 (0.9)	2.3 (1.7)
		Quantile (0.85)	74.7 (0.4)	1.8 (2.1)	68.6 (1.0)	2.0 (2.8)	66.1 (1.5)	2.9 (1.6)	74.4 (0.4)	1.4 (2.3)
		Quantile (0.95)	77.6 (0.6)	0.9 (1.9)	75.0 (2.8)	3.5 (5.5)	77.9 (2.6)	8.7 (3.0)	77.5 (0.6)	1.1 (2.0)
	Total	**Mean**	70.4 (0.6)	-0.2 (1.2)	56.6 (1.4)	3.4 (1.7)	49.8 (2.0)	2.7 (2.0)	62.8 (1.2)	6.1 (1.7)
		Median	70.8 (0.6)	-0.1 (1.4)	57.5 (1.7)	4.1 (2.1)	49.1 (2.7)	2.7 (2.6)	65.4 (1.0)	9.0 (2.1)
		Quantile (0.85)	78.1 (0.5)	0.1 (2.1)	69.4 (1.0)	5.6 (1.4)	63.3 (2.4)	5.5 (2.4)	76.1 (0.5)	3.1 (1.9)
		Quantile (0.95)	82.2 (0.6)	0.3 (1.0)	76.3 (1.0)	6.2 (1.5)	72.2 (2.6)	6.6 (2.4)	80.9 (0.5)	1.9 (1.3)

Table 30. Speed by Road Type, Length Class, and Vertical Curvature Class (continued)

			FCC ROAD CLASS							
			1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
			Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
			2015	Change	2015	Change	2015	Change	2015	Change
VER_CURVERD CLASS	VEH_ LENGTH		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
2 Moderate	1 (<20 ft)	Mean	71.7 (.)	4.9 (.)	49.3 (6.9)	-2.3 (.)	42.4 (3.0)	-2.1 (4.3)	49.9 (5.2)	1.2 (6.0)
		Median	71.6 (.)	5.8 (.)	49.2 (7.9)	-2.3 (.)	42.4 (2.8)	-0.2 (4.2)	48.8 (7.1)	2.5 (7.3)
		Quantile (0.85)	77.3 (.)	5.3 (.)	60.6 (9.2)	4.3 (.)	54.8 (4.6)	-1.3 (5.8)	65.0 (5.9)	1.1 (9.0)
		Quantile (0.95)	81.1 (.)	5.2 (.)	67.0 (10.0)	6.6 (.)	61.9 (3.5)	-0.6 (4.4)	73.7 (5.9)	3.7 (8.8)
	2 (20-<30 ft)	Mean	71.8 (.)	4.8 (.)	55.9 (10.3)	1.5 (.)	50.3 (2.6)	-1.4 (5.0)	55.3 (3.7)	0.8 (3.8)
		Median	71.8 (.)	5.8 (.)	56.8 (11.8)	3.0 (.)	50.4 (3.7)	-0.8 (7.0)	55.9 (4.4)	0.9 (3.9)
		Quantile (0.85)	77.2 (.)	5.2 (.)	67.9 (10.9)	8.0 (.)	63.1 (2.4)	-0.8 (5.9)	69.6 (3.0)	2.6 (4.1)
		Quantile (0.95)	81.5 (.)	5.8 (.)	76.2 (9.6)	11.0 (.)	70.7 (2.1)	0.2 (6.5)	76.6 (1.8)	4.1 (3.1)
	3 (30-<40 ft)	Mean	67.2 (.)	1.6 (.)	52.2 (9.0)	0.2 (.)	49.8 (2.5)	-3.1 (5.0)	52.7 (3.2)	-2.2 (3.5)
		Median	66.8 (.)	2.2 (.)	52.9 (10.7)	2.2 (.)	49.1 (3.2)	-4.2 (5.9)	52.9 (4.1)	-2.9 (4.2)
		Quantile (0.85)	72.0 (.)	1.5 (.)	64.7 (9.2)	6.8 (.)	64.0 (2.8)	-1.1 (7.3)	67.9 (2.3)	0.9 (3.2)
		Quantile (0.95)	75.6 (.)	0.9 (.)	77.4 (8.5)	13.0 (.)	76.4 (3.9)	3.0 (9.5)	76.4 (0.9)	2.7 (2.4)
	4 (40-<50 ft)	Mean	68.1 (.)	2.9 (.)	54.1 (5.5)	3.4 (.)	49.0 (2.9)	-5.0 (6.5)	54.1 (3.4)	-1.5 (3.6)
		Median	67.5 (.)	3.0 (.)	54.7 (8.3)	4.8 (.)	50.2 (3.4)	-5.1 (7.7)	54.8 (3.0)	-2.2 (3.5)
		Quantile (0.85)	73.9 (.)	3.8 (.)	67.1 (4.5)	13.0 (.)	61.4 (1.9)	-3.5 (5.5)	68.8 (4.7)	1.8 (5.3)
		Quantile (0.95)	76.3 (.)	2.4 (.)	79.3 (4.9)	21.2 (.)	71.5 (6.0)	-0.7 (9.2)	76.3 (2.2)	3.8 (2.3)
	5 (50-<80 ft)	Mean	66.2 (.)	3.3 (.)	51.8 (7.2)	0.3 (.)	52.2 (2.4)	-5.7 (9.9)	58.3 (4.4)	-1.2 (4.7)
		Median	65.8 (.)	3.6 (.)	51.7 (9.2)	0.2 (.)	50.8 (3.8)	-9.6 (11.4)	62.4 (7.0)	1.0 (7.2)
		Quantile (0.85)	70.4 (.)	4.2 (.)	66.3 (7.5)	11.9 (.)	65.8 (3.7)	-1.5 (9.5)	69.4 (2.0)	2.6 (2.5)
		Quantile (0.95)	73.2 (.)	3.9 (.)	76.4 (1.8)	17.4 (.)	75.8 (7.2)	4.1 (10.3)	74.6 (1.8)	3.8 (2.4)
	6 (80-<100 ft)	Mean	70.3 (.)	6.1 (.)	61.2 (2.9)	. (.)	53.7 (3.9)	-5.2 (5.3)	61.8 (3.3)	0.2 (4.4)
		Median	69.0 (.)	5.6 (.)	58.7 (4.7)	. (.)	54.2 (3.0)	-9.2 (10.6)	60.3 (4.7)	-3.3 (4.8)
		Quantile (0.85)	73.7 (.)	5.4 (.)	63.8 (3.7)	. (.)	57.0 (3.4)	-12.9 (5.0)	70.9 (5.7)	1.0 (6.4)
		Quantile (0.95)	76.3 (.)	5.7 (.)	65.3 (2.1)	. (.)	69.5 (9.7)	-0.6 (11.7)	76.2 (4.3)	5.8 (4.4)
	Total	Mean	70.9 (.)	4.2 (.)	50.4 (7.5)	-2.2 (.)	45.0 (3.0)	-2.0 (4.7)	51.2 (4.8)	0.5 (5.4)
		Median	70.8 (.)	5.1 (.)	50.9 (8.6)	-1.3 (.)	44.4 (3.8)	-0.4 (5.6)	51.0 (6.8)	1.1 (6.3)
		Quantile (0.85)	76.6 (.)	4.8 (.)	62.1 (9.9)	4.3 (.)	58.3 (3.7)	-1.3 (5.4)	66.7 (5.0)	1.7 (6.8)
		Quantile (0.95)	80.6 (.)	4.9 (.)	69.3 (11.0)	6.7 (.)	66.0 (2.0)	-0.5 (4.7)	74.5 (4.5)	3.6 (6.1)

Table 30. Speed by Road Type, Length Class, and Vertical Curvature Class (continued)

			FCC ROAD CLASS							
			1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
			Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
			2015	Change	2015	Change	2015	Change	2015	Change
VER_CURVERD CLASS	VEH_ LENGTH		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
3 Steep	1 (<20 ft)	**Mean**	. (.)	. (.)	44.1 (1.9)	-9.4 (12.7)	51.1 (8.2)	12.4 (10.2)	50.7 (7.4)	8.1 (9.8)
		Median	. (.)	. (.)	43.2 (2.7)	-11.6 (13.5)	53.4 (11.4)	15.0 (14.8)	52.5 (10.1)	11.5 (13.3)
		Quantile (0.85)	. (.)	. (.)	50.2 (1.0)	-15.1 (15.2)	62.4 (5.0)	16.2 (6.9)	62.4 (5.5)	8.9 (12.0)
		Quantile (0.95)	. (.)	. (.)	57.5 (3.7)	-14.1 (14.8)	68.5 (4.4)	18.2 (6.9)	68.3 (4.3)	3.9 (13.2)
	2 (20-<30 ft)	**Mean**	. (.)	. (.)	44.3 (5.2)	-14.0 (14.3)	57.1 (2.2)	14.3 (3.9)	56.1 (2.6)	7.6 (6.0)
		Median	. (.)	. (.)	44.0 (5.0)	-15.0 (13.7)	57.5 (1.0)	14.5 (3.4)	56.9 (1.4)	10.1 (3.7)
		Quantile (0.85)	. (.)	. (.)	51.6 (5.9)	-18.1 (16.5)	67.5 (2.0)	16.6 (4.8)	66.9 (2.2)	4.7 (10.5)
		Quantile (0.95)	. (.)	. (.)	58.1 (6.3)	-16.9 (20.0)	75.2 (2.5)	19.4 (5.1)	74.9 (3.1)	4.8 (12.2)
	3 (30-<40 ft)	**Mean**	. (.)	. (.)	49.2 (0.2)	-10.5 (7.5)	49.4 (5.7)	7.3 (7.0)	49.4 (4.7)	-2.7 (9.5)
		Median	. (.)	. (.)	42.5 (2.7)	-17.4 (10.9)	51.4 (9.0)	10.1 (11.5)	51.2 (6.5)	-2.6 (13.1)
		Quantile (0.85)	. (.)	. (.)	63.0 (7.8)	-5.9 (5.3)	59.3 (1.1)	6.6 (3.5)	59.4 (2.2)	-6.0 (8.2)
		Quantile (0.95)	. (.)	. (.)	71.0 (3.5)	-4.6 (7.5)	67.1 (7.4)	6.9 (9.5)	70.4 (5.6)	-2.5 (8.7)
	4 (40-<50 ft)	**Mean**	. (.)	. (.)	37.2 (2.2)	-22.1 (18.3)	53.0 (8.5)	14.7 (11.5)	52.0 (8.5)	-0.8 (16.8)
		Median	. (.)	. (.)	32.2 (5.3)	-27.3 (22.6)	52.4 (9.3)	15.0 (12.8)	51.5 (10.2)	-4.6 (20.5)
		Quantile (0.85)	. (.)	. (.)	45.8 (4.8)	-22.5 (16.2)	67.6 (8.2)	22.1 (11.6)	65.1 (8.5)	-0.6 (21.7)
		Quantile (0.95)	. (.)	. (.)	46.5 (2.3)	-28.8 (22.0)	72.4 (4.3)	17.8 (12.2)	72.3 (7.8)	-0.4 (13.8)
	5 (50-<80 ft)	**Mean**	. (.)	. (.)	38.7 (.)	-21.2 (.)	50.6 (3.8)	14.6 (4.9)	50.5 (3.9)	-4.7 (14.5)
		Median	. (.)	. (.)	39.2 (.)	-21.6 (.)	51.1 (5.8)	18.3 (7.6)	50.5 (6.1)	-7.9 (18.4)
		Quantile (0.85)	. (.)	. (.)	41.7 (.)	-26.4 (.)	61.7 (4.3)	15.5 (12.4)	61.6 (4.3)	-5.9 (15.6)
		Quantile (0.95)	. (.)	. (.)	45.7 (.)	-27.4 (.)	76.0 (5.0)	23.0 (11.2)	75.8 (5.4)	3.4 (11.6)
	6 (80-<100 ft)	**Mean**	. (.)	. (.)	33.1 (.)	-25.1 (.)	43.5 (3.5)	4.6 (7.8)	42.8 (0.9)	-7.0 (10.1)
		Median	. (.)	. (.)	33.1 (0.0)	-17.0 (.)	42.9 (1.9)	9.2 (5.2)	38.2 (1.9)	-7.3 (11.5)
		Quantile (0.85)	. (.)	. (.)	33.1 (0.0)	-28.3 (.)	42.9 (3.4)	1.9 (7.8)	42.3 (2.1)	-22.8 (22.1)
		Quantile (0.95)	. (.)	. (.)	33.1 (0.0)	-31.5 (.)	45.8 (3.0)	2.7 (8.9)	45.6 (3.0)	-20.2 (20.2)
	Total	**Mean**	. (.)	. (.)	44.1 (2.6)	-11.5 (12.9)	52.5 (6.2)	12.8 (7.9)	52.0 (5.8)	7.4 (8.4)
		Median	. (.)	. (.)	43.2 (2.8)	-13.8 (14.1)	54.5 (9.7)	15.0 (12.8)	53.5 (8.4)	10.9 (11.2)
		Quantile (0.85)	. (.)	. (.)	50.6 (1.9)	-16.9 (14.4)	64.2 (3.3)	16.6 (5.4)	63.7 (3.5)	5.3 (11.2)
		Quantile (0.95)	. (.)	. (.)	57.7 (2.2)	-15.5 (13.5)	71.3 (3.3)	18.7 (5.6)	70.9 (3.1)	3.8 (12.7)

Table 30. Speed by Road Type, Length Class, and Vertical Curvature Class (continued)

			FCC ROAD CLASS							
			1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
			Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
			2015	Change	2015	Change	2015	Change	2015	Change
VER_CURVERD CLASS	VEH_ LENGTH		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
Total	1 (<20 ft)	Mean	71.4 (0.7)	0.1 (1.4)	55.2 (1.2)	4.2 (1.4)	48.3 (2.1)	3.3 (2.1)	62.6 (1.2)	7.7 (1.8)
		Median	72.0 (0.7)	0.1 (1.6)	56.1 (1.5)	4.7 (1.7)	47.4 (2.6)	3.2 (2.7)	65.8 (1.2)	12.4 (1.9)
		Quantile (0.85)	78.8 (0.5)	-0.1 (1.4)	67.8 (1.1)	7.1 (1.0)	61.3 (2.5)	6.1 (2.6)	76.6 (0.6)	3.6 (2.1)
		Quantile (0.95)	82.8 (0.6)	0.3 (1.2)	74.3 (1.0)	7.8 (0.9)	69.4 (3.0)	7.3 (3.0)	81.1 (0.6)	2.1 (1.3)
	2 (20-<30 ft)	Mean	71.0 (0.8)	-0.8 (1.2)	60.1 (1.6)	3.4 (2.1)	53.1 (2.1)	2.4 (2.3)	62.5 (1.4)	4.4 (1.7)
		Median	71.8 (0.8)	-0.9 (1.3)	61.0 (1.9)	4.1 (2.5)	52.6 (2.8)	2.5 (2.9)	64.6 (1.3)	6.9 (1.9)
		Quantile (0.85)	78.7 (0.7)	-0.2 (0.7)	72.6 (0.9)	5.5 (1.5)	67.0 (2.3)	5.0 (2.5)	76.2 (0.6)	2.5 (1.8)
		Quantile (0.95)	82.9 (0.7)	0.7 (0.9)	80.1 (1.0)	6.9 (1.3)	75.9 (2.0)	6.5 (2.1)	81.5 (0.7)	2.5 (0.7)
	3 (30-<40 ft)	Mean	67.1 (0.7)	-0.5 (1.2)	56.6 (1.1)	0.3 (1.4)	53.0 (1.2)	1.6 (1.5)	60.7 (0.8)	3.0 (1.2)
		Median	67.3 (0.6)	-0.4 (1.0)	58.0 (1.0)	1.7 (1.5)	52.7 (1.5)	1.9 (2.0)	62.9 (0.7)	4.9 (1.4)
		Quantile (0.85)	75.3 (0.5)	-0.6 (0.6)	69.7 (1.0)	2.1 (1.6)	68.0 (1.2)	5.1 (1.5)	73.6 (0.6)	2.4 (1.5)
		Quantile (0.95)	79.7 (0.6)	-0.2 (0.9)	78.6 (1.4)	3.6 (2.0)	79.9 (1.3)	8.6 (2.0)	79.6 (0.6)	2.3 (1.7)
	4 (40-<50 ft)	Mean	67.1 (0.7)	0.4 (1.1)	55.8 (1.1)	-0.4 (1.2)	52.8 (1.4)	0.9 (1.7)	61.4 (0.8)	2.4 (1.3)
		Median	67.4 (0.6)	0.7 (1.0)	57.3 (1.0)	0.6 (1.4)	52.8 (1.7)	0.7 (2.5)	63.7 (0.8)	3.7 (1.3)
		Quantile (0.85)	75.1 (0.5)	0.6 (0.9)	69.4 (1.1)	3.3 (1.4)	67.5 (1.4)	5.3 (1.5)	73.7 (0.6)	2.7 (1.4)
		Quantile (0.95)	79.3 (0.5)	1.0 (0.8)	77.8 (1.1)	5.2 (1.5)	77.6 (1.7)	8.5 (1.9)	79.0 (0.5)	3.0 (1.7)
	5 (50-<80 ft)	Mean	65.6 (0.5)	0.3 (1.4)	56.2 (1.1)	0.4 (2.1)	53.2 (1.3)	0.3 (2.4)	64.0 (0.7)	0.7 (1.4)
		Median	65.6 (0.4)	0.6 (1.9)	57.7 (1.0)	0.9 (2.1)	53.1 (1.8)	-1.1 (2.8)	65.0 (0.5)	1.0 (1.6)
		Quantile (0.85)	71.5 (0.4)	-0.1 (1.5)	69.1 (1.4)	3.3 (1.8)	68.4 (1.3)	4.8 (1.7)	71.3 (0.5)	0.3 (2.5)
		Quantile (0.95)	74.9 (0.6)	-0.3 (1.3)	78.1 (1.6)	5.9 (1.8)	78.7 (1.2)	9.3 (1.2)	75.2 (0.6)	0.2 (1.1)
	6 (80-<100 ft)	Mean	68.6 (0.7)	2.5 (1.8)	57.3 (1.0)	-1.2 (3.5)	53.3 (1.5)	-1.7 (2.9)	66.7 (0.9)	1.8 (1.8)
		Median	69.1 (0.6)	3.1 (1.7)	59.5 (0.8)	-0.0 (2.3)	53.6 (4.0)	-2.8 (4.5)	68.2 (0.9)	2.3 (1.7)
		Quantile (0.85)	74.7 (0.4)	1.9 (2.1)	68.6 (1.1)	2.0 (2.8)	66.1 (1.5)	2.2 (2.1)	74.4 (0.4)	1.4 (2.7)
		Quantile (0.95)	77.6 (0.6)	0.9 (1.9)	74.9 (2.8)	3.4 (6.1)	77.9 (2.6)	8.0 (3.3)	77.5 (0.6)	1.2 (2.0)
	Total	Mean	70.4 (0.6)	-0.1 (1.2)	56.4 (1.3)	3.1 (1.6)	49.7 (2.0)	2.7 (2.0)	62.6 (1.1)	6.3 (1.6)
		Median	70.8 (0.6)	-0.0 (1.1)	57.3 (1.6)	4.0 (2.0)	49.0 (2.7)	2.9 (2.7)	65.3 (1.0)	9.3 (1.9)
		Quantile (0.85)	78.1 (0.5)	0.1 (1.7)	69.3 (1.1)	5.6 (1.4)	63.2 (2.3)	5.4 (2.5)	76.0 (0.6)	3.0 (1.7)
		Quantile (0.95)	82.2 (0.6)	0.4 (1.0)	76.2 (0.9)	6.1 (1.3)	72.1 (2.6)	6.6 (2.6)	80.8 (0.5)	1.8 (1.5)

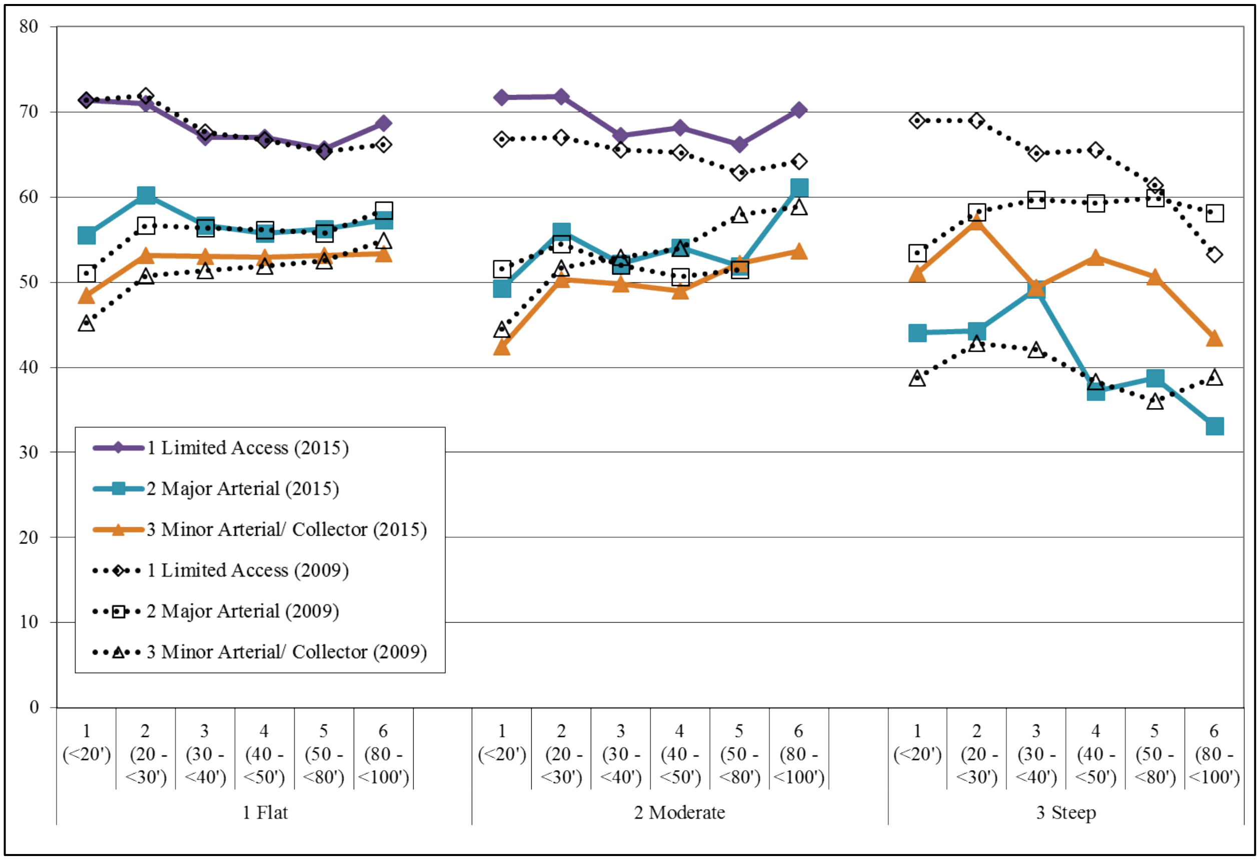

Figure 23. Speed by Road Type, Length Class, and Vertical Curvature Class (Free-Flow)

Table 31. Standard Deviations for Values Reported in Table 30

		FCC ROAD CLASS							
		1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
		Speed SD		Speed SD		Speed SD		Speed SD	
VER_CURVERD CLASS	VEH LENGTH	2015	Change	2015	Change	2015	Change	2015	Change
1 Flat	1 (<20 ft)	7.87	0.01	12.59	2.86	12.46	2.73	14.34	-0.51
	2 (20-<30 ft)	8.72	0.79	13.13	2.90	13.55	2.91	13.94	0.69
	3 (30-<40 ft)	9.03	-0.02	14.36	3.35	15.42	4.38	13.88	1.39
	4 (40-<50 ft)	8.89	0.00	14.40	4.09	15.03	4.61	13.43	1.66
	5 (50-<80 ft)	6.31	-0.75	13.92	3.23	15.04	4.09	8.90	-0.08
	6 (80-<100 ft)	6.90	-0.90	13.10	4.15	14.39	4.68	9.49	0.90
	Total	8.12	-0.02	13.03	2.68	13.11	2.68	13.85	-0.35
2 Moderate	1 (<20 ft)	5.80	0.32	10.95	5.60	11.98	2.08	13.68	1.45
	2 (20-<30 ft)	5.89	0.52	12.80	6.84	13.05	1.79	13.83	2.36
	3 (30-<40 ft)	4.92	-0.51	14.36	7.21	14.75	2.57	14.82	2.87
	4 (40-<50 ft)	5.53	0.35	14.37	10.21	14.36	2.99	14.90	3.77
	5 (50-<80 ft)	4.36	0.26	14.77	10.25	14.24	3.41	13.18	3.91
	6 (80-<100 ft)	3.94	0.05	4.60	.	11.03	-0.68	9.69	0.67
	Total	5.95	0.49	11.67	5.88	13.07	2.05	13.96	1.64
3 Steep	1 (<20 ft)	.	.	7.89	-4.15	12.45	5.39	12.33	1.50
	2 (20-<30 ft)	.	.	9.16	-1.67	11.69	3.80	12.00	0.22
	3 (30-<40 ft)	.	.	13.92	3.73	12.64	2.76	12.70	-0.67
	4 (40-<50 ft)	.	.	6.86	-3.61	12.94	3.84	13.20	-0.84
	5 (50-<80 ft)	.	.	5.74	-3.50	14.22	4.42	14.21	0.79
	6 (80-<100 ft)	.	.	0.00	-8.06	1.69	-3.53	3.05	-8.93
	Total	.	.	8.67	-3.09	12.64	5.10	12.59	0.93
Total	1 (<20 ft)	7.86	0.02	12.59	2.87	12.48	2.73	14.41	-0.42
	2 (20-<30 ft)	8.71	0.80	13.14	2.95	13.54	2.86	13.96	0.73
	3 (30-<40 ft)	9.02	0.01	14.38	3.39	15.41	4.27	13.93	1.42
	4 (40-<50 ft)	8.89	0.03	14.41	4.10	15.01	4.48	13.47	1.68
	5 (50-<80 ft)	6.30	-0.74	13.94	3.27	15.02	3.94	8.94	-0.06
	6 (80-<100 ft)	6.90	-0.89	13.05	4.11	14.33	4.25	9.50	0.88
	Total	8.11	-0.00	13.04	2.71	13.12	2.66	13.92	-0.29

6.13 Horizontal Curvature and Light Condition

Table 32 and Table 33 present the relationship between the roadway's curvature and light condition as a function of FCC roadway class. In 2015, speeds on moderately curved limited access roadways were slightly higher than speeds on straight roadways in both day and night conditions. Conversely, speeds on both major and minor arterials showed a moderate reduction in speeds as roadway curvature increased for both light conditions in 2015.

Speeds on limited access roadways remained relatively unchanged between 2009 and 2015 for the various curvature and lighting conditions. Relative to 2009, speeds on straight major arterials increased significantly by approximately 4 mph in both light conditions ($p < .05$), but decreased on moderately or sharply curved roadways by 9-18 mph under both light conditions, though these changes were not statistically significant. The differences with respect to straight major arterials is largely consistent with increased speeds on arterials overall (see Table 7), while most of the differences with respect to moderate/sharp major arterials are not significant, reflecting the smaller sample sizes associated with these subgroups. Minor arterials showed greater speed increases (6 to 7 mph) on moderately curved roads under both light conditions than for straight conditions (1-2 mph) and a slight decrease for both lighting conditions for the sharp curve case. However, none of these changes were statistically different from 2009. Figure 24 provides a graphic view of the statistics from Table 32.

Table 32. Speed by Road Type, Horizontal Curvature Class, and Light Condition

			FCC ROAD CLASS							
			1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
			Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
			2015	Change	2015	Change	2015	Change	2015	Change
LIGHT CONDITION	HOR_CURVERD CLASS		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
1 Day (0600-2059)	1 Straight	Mean	70.8 (0.6)	-0.4 (1.1)	56.8 (1.3)	3.7 (1.7)	50.1 (2.0)	2.4 (2.0)	63.1 (1.1)	6.7 (1.7)
		Median	71.3 (0.6)	-0.6 (1.5)	57.6 (1.6)	4.4 (2.1)	49.3 (2.6)	2.5 (2.7)	65.7 (0.9)	10.2 (2.0)
		Quantile (0.85)	78.4 (0.5)	-0.4 (1.0)	69.4 (0.9)	5.8 (1.4)	63.6 (2.2)	5.2 (2.4)	76.4 (0.5)	3.4 (1.7)
		Quantile (0.95)	82.6 (0.6)	0.2 (1.0)	76.3 (0.9)	6.2 (1.5)	72.3 (2.4)	6.2 (2.4)	81.1 (0.6)	2.1 (1.4)
	2 Moderate	Mean	72.5 (0.6)	3.2 (3.9)	49.8 (4.4)	-9.0 (5.8)	48.9 (3.1)	7.0 (3.9)	51.4 (2.7)	-1.2 (4.3)
		Median	72.9 (0.4)	3.1 (4.5)	50.5 (7.8)	-8.5 (9.4)	48.2 (3.5)	8.4 (4.3)	50.2 (3.5)	-2.8 (6.0)
		Quantile (0.85)	77.7 (1.0)	0.6 (3.5)	62.9 (2.7)	-3.0 (3.9)	62.2 (4.5)	8.2 (5.6)	68.1 (3.8)	-2.9 (7.0)
		Quantile (0.95)	80.8 (1.1)	0.3 (3.1)	70.5 (3.1)	-0.6 (4.8)	71.8 (5.0)	11.4 (6.5)	76.2 (1.8)	-0.8 (5.1)
	3 Sharp	Mean	. (.)	. (.)	40.5 (2.2)	-18.0 (.)	39.9 (6.3)	-1.1 (6.6)	40.2 (3.0)	-13.2 (5.7)
		Median	. (.)	. (.)	39.5 (2.3)	-18.8 (.)	35.8 (7.3)	-3.2 (7.4)	38.1 (2.3)	-16.9 (12.7)
		Quantile (0.85)	. (.)	. (.)	46.8 (2.4)	-18.5 (.)	56.3 (10.1)	3.6 (11.6)	51.6 (6.5)	-19.4 (7.5)
		Quantile (0.95)	. (.)	. (.)	53.6 (1.8)	-16.5 (.)	64.3 (7.1)	4.7 (8.4)	62.1 (6.1)	-14.7 (6.8)
	Total	Mean	70.8 (0.6)	-0.1 (1.1)	56.5 (1.3)	3.1 (1.7)	49.9 (2.0)	2.9 (2.1)	62.5 (1.2)	6.5 (1.7)
		Median	71.4 (0.6)	-0.5 (2.0)	57.4 (1.6)	3.9 (2.0)	49.2 (2.7)	3.0 (2.7)	65.2 (1.0)	9.9 (1.9)
		Quantile (0.85)	78.4 (0.5)	-0.3 (1.3)	69.3 (1.0)	5.5 (1.3)	63.4 (2.4)	5.5 (2.5)	76.2 (0.6)	3.2 (1.7)
		Quantile (0.95)	82.5 (0.6)	0.4 (1.0)	76.3 (0.9)	6.0 (1.4)	72.2 (2.6)	6.6 (2.5)	81.0 (0.6)	2.0 (1.4)
2 Night (2100-0559)	1 Straight	Mean	68.8 (0.8)	-0.3 (1.3)	56.0 (1.5)	3.6 (1.5)	49.1 (1.8)	1.3 (2.0)	63.5 (1.1)	5.3 (1.7)
		Median	69.0 (0.8)	0.0 (1.5)	56.7 (1.8)	4.6 (2.0)	48.1 (2.3)	1.2 (2.6)	65.8 (0.9)	6.8 (2.3)
		Quantile (0.85)	76.5 (0.6)	-0.1 (1.1)	68.8 (1.2)	5.9 (1.4)	62.3 (1.9)	4.0 (2.3)	75.2 (0.6)	2.2 (1.7)
		Quantile (0.95)	80.7 (0.5)	0.1 (1.0)	75.9 (1.1)	6.1 (1.2)	71.2 (2.1)	5.5 (2.2)	79.9 (0.5)	1.9 (2.2)
	2 Moderate	Mean	71.1 (0.8)	3.5 (4.9)	47.3 (5.8)	-9.7 (7.4)	48.2 (2.9)	6.2 (3.5)	51.5 (2.7)	-2.9 (5.0)
		Median	71.5 (0.3)	3.9 (5.5)	45.9 (10.0)	-11.1 (12.1)	46.9 (3.7)	6.5 (4.5)	50.1 (4.1)	-5.2 (6.8)
		Quantile (0.85)	76.7 (0.7)	0.5 (4.8)	61.7 (4.4)	-2.5 (5.8)	62.0 (4.2)	8.6 (4.9)	69.2 (3.6)	-2.8 (8.1)
		Quantile (0.95)	79.5 (1.4)	-0.2 (4.2)	71.3 (4.9)	1.2 (6.6)	71.7 (4.6)	12.2 (5.7)	76.3 (1.3)	-1.7 (6.3)
	3 Sharp	Mean	. (.)	. (.)	40.9 (0.7)	-15.0 (.)	40.0 (5.9)	-1.2 (6.1)	40.4 (3.4)	-17.6 (6.2)
		Median	. (.)	. (.)	40.5 (0.5)	-15.8 (.)	35.2 (6.3)	-3.9 (6.5)	38.0 (3.1)	-24.0 (7.3)
		Quantile (0.85)	. (.)	. (.)	47.5 (0.3)	-14.6 (.)	57.3 (10.6)	4.8 (11.3)	53.5 (7.7)	-18.3 (8.0)
		Quantile (0.95)	. (.)	. (.)	56.0 (2.3)	-11.2 (.)	64.5 (6.9)	6.3 (7.5)	62.7 (5.6)	-14.1 (6.0)

LIGHT CONDITION	HOR_CURVERD CLASS		FCC ROAD CLASS: 1 Limited access, Speed Estimate, 2015, Est. (SE)	1 Limited access, Change, Est. (SE)	2 Major arterial, 2015, Est. (SE)	2 Major arterial, Change, Est. (SE)	3 Minor arterial/collector, 2015, Est. (SE)	3 Minor arterial/collector, Change, Est. (SE)	Total, 2015, Est. (SE)	Total, Change, Est. (SE)
2 Night (2100-0559)	Total	Mean	68.8 (0.8)	-0.1 (1.3)	55.8 (1.5)	3.2 (1.6)	48.9 (1.8)	1.9 (2.0)	63.2 (1.1)	5.2 (1.6)
		Median	69.0 (0.8)	0.1 (1.5)	56.5 (1.9)	4.2 (2.0)	47.9 (2.5)	1.7 (2.6)	65.6 (0.9)	6.6 (2.2)
		Quantile (0.85)	76.5 (0.5)	0.0 (1.1)	68.8 (1.2)	5.8 (1.4)	62.3 (2.0)	4.6 (2.3)	75.1 (0.6)	2.1 (1.5)
		Quantile (0.95)	80.7 (0.5)	0.3 (1.0)	75.8 (1.1)	5.9 (1.3)	71.2 (2.3)	6.1 (2.3)	79.8 (0.5)	1.8 (1.3)
Total	1 Straight	Mean	70.4 (0.6)	-0.3 (1.2)	56.7 (1.3)	3.7 (1.6)	49.9 (1.9)	2.2 (2.0)	63.1 (1.1)	6.4 (1.7)
		Median	70.8 (0.6)	-0.1 (1.9)	57.5 (1.6)	4.5 (2.0)	49.2 (2.5)	2.3 (2.6)	65.7 (0.9)	9.6 (2.1)
		Quantile (0.85)	78.1 (0.5)	-0.6 (1.6)	69.4 (1.0)	5.8 (1.4)	63.4 (2.2)	5.0 (2.4)	76.2 (0.6)	3.2 (1.8)
		Quantile (0.95)	82.2 (0.6)	0.2 (1.0)	76.3 (0.9)	6.2 (1.3)	72.2 (2.4)	6.1 (2.4)	80.9 (0.5)	1.9 (1.4)
	2 Moderate	Mean	72.2 (0.6)	3.3 (4.1)	49.4 (4.6)	-9.0 (6.0)	48.9 (3.1)	6.9 (3.8)	51.4 (2.7)	-1.5 (4.4)
		Median	72.7 (0.3)	3.3 (4.7)	50.2 (8.2)	-8.5 (10.0)	48.1 (3.6)	8.3 (4.3)	50.2 (3.6)	-3.4 (6.1)
		Quantile (0.85)	77.5 (0.9)	0.6 (3.6)	62.8 (2.8)	-2.9 (3.9)	62.2 (4.4)	8.2 (5.5)	68.1 (3.7)	-2.9 (7.1)
		Quantile (0.95)	80.6 (1.2)	0.3 (3.3)	70.5 (3.4)	-0.3 (4.9)	71.8 (5.0)	11.4 (6.3)	76.2 (1.7)	-0.8 (5.4)
	3 Sharp	Mean	. (.)	. (.)	40.5 (2.0)	-17.7 (.)	39.9 (6.2)	-1.2 (6.5)	40.2 (3.0)	-14.1 (5.9)
		Median	. (.)	. (.)	39.6 (2.3)	-18.7 (.)	35.8 (7.3)	-3.3 (7.5)	38.1 (2.5)	-19.4 (12.1)
		Quantile (0.85)	. (.)	. (.)	46.9 (2.1)	-18.3 (.)	56.3 (10.1)	3.6 (11.3)	51.8 (6.7)	-20.2 (7.5)
		Quantile (0.95)	. (.)	. (.)	53.9 (1.5)	-15.9 (.)	64.3 (7.0)	4.8 (8.2)	62.1 (6.0)	-14.9 (6.7)
	Total	Mean	70.4 (0.6)	-0.1 (1.2)	56.4 (1.3)	3.1 (1.6)	49.7 (2.0)	2.7 (2.0)	62.6 (1.1)	6.3 (1.6)
		Median	70.8 (0.6)	-0.0 (1.1)	57.3 (1.6)	4.0 (2.0)	49.0 (2.7)	2.9 (2.7)	65.3 (1.0)	9.3 (1.9)
		Quantile (0.85)	78.1 (0.5)	0.1 (1.7)	69.3 (1.1)	5.6 (1.4)	63.2 (2.3)	5.4 (2.5)	76.0 (0.6)	3.0 (1.7)
		Quantile (0.95)	82.2 (0.6)	0.4 (1.0)	76.2 (0.9)	6.1 (1.3)	72.1 (2.6)	6.6 (2.6)	80.8 (0.5)	1.8 (1.5)

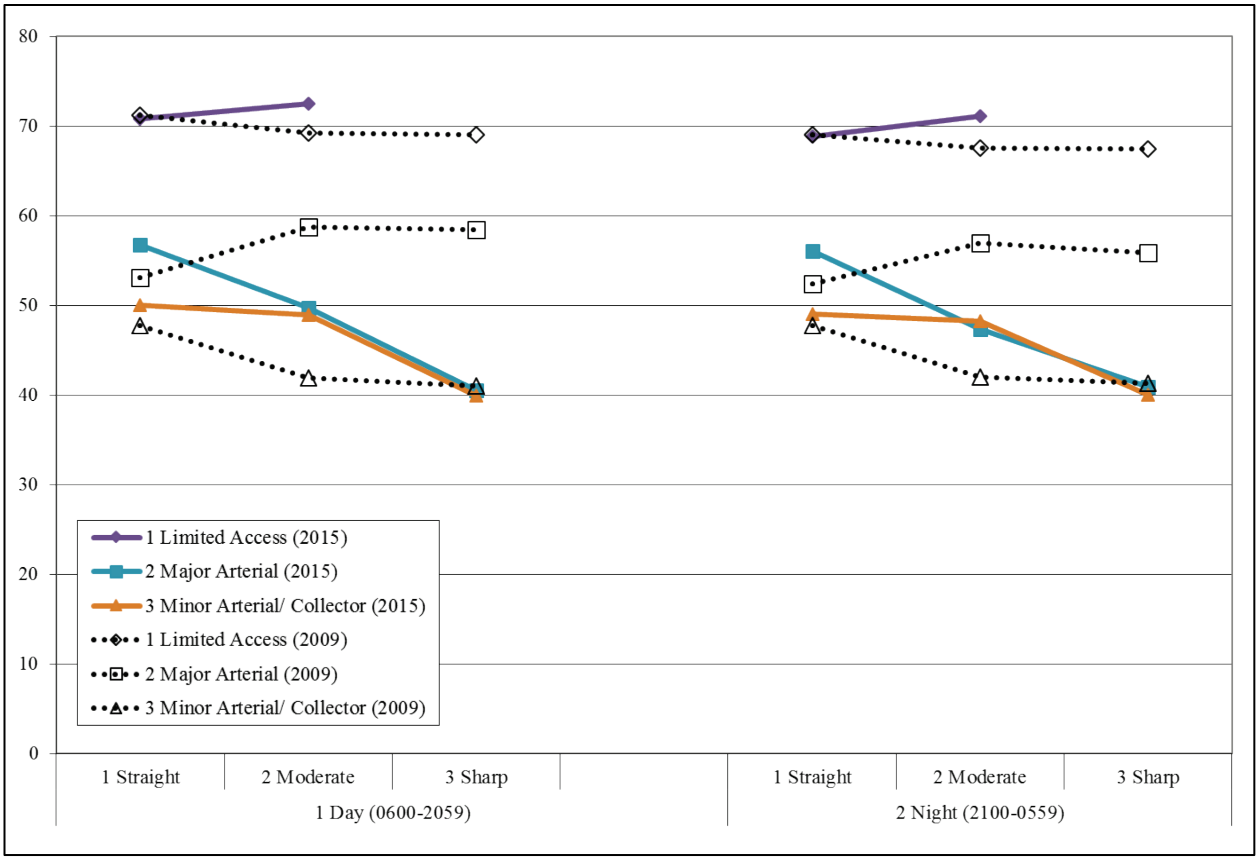

Figure 24. Speed by Road Type, Horizontal Curvature, and Light Condition (Free-Flow)

Table 33. Standard Deviations for Values Reported in Table 32

		FCC ROAD CLASS							
		1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
		Speed SD		Speed SD		Speed SD		Speed SD	
LIGHT CONDITION	**HOR_ CURVERD CLASS**	**2015**	**Change**	**2015**	**Change**	**2015**	**Change**	**2015**	**Change**
1 Day (0600-2059)	**1 Straight**	8.12	-0.06	12.96	2.53	13.12	2.78	13.91	-0.23
	2 Moderate	5.63	-2.83	13.25	5.44	13.11	2.90	14.42	-1.01
	3 Sharp	.	.	7.74	0.56	13.07	3.61	11.15	-4.65
	Total	8.11	-0.06	13.04	2.66	13.15	2.66	14.16	-0.15
2 Night (2100-0559)	**1 Straight**	7.95	0.27	12.92	2.81	12.87	2.67	12.61	-0.82
	2 Moderate	5.99	-2.91	14.04	6.23	13.17	3.47	14.91	-0.08
	3 Sharp	.	.	8.38	1.20	13.29	4.12	11.78	-2.69
	Total	7.94	0.23	13.00	2.95	12.92	2.61	12.83	-0.77
Total	**1 Straight**	8.13	0.01	12.95	2.58	13.09	2.77	13.66	-0.37
	2 Moderate	5.72	-2.87	13.39	5.55	13.12	2.98	14.48	-0.89
	3 Sharp	.	.	7.80	0.57	13.09	3.67	11.22	-4.42
	Total	8.11	-0.00	13.04	2.71	13.12	2.66	13.92	-0.29

6.14 *Vertical Curvature and Light Condition*

The impact of vertical curvature and light condition within roadway classes is shown in Table 34 and Table 35. Limited access roads and major arterials both had inadequate data to allow reliable calculation of speed measures for moderate and/or steep hills in the 2009 and 2015 data. However, speeds on flat limited access roads were faster during daylight hours relative to evening hours, but remained relatively unchanged from 2009. Under both light conditions, speeds on major arterials and collectors showed similar patterns. That is, speeds were fastest on the flat roads and decreased as gradients increased.

Relative to 2009, speeds on flat major arterials increased during both day and night conditions by approximately 3 mph, though only the night condition was statistically significant ($p \leq .05$). Conversely, speeds on moderately inclined and steep minor arterials decreased by 1-2 mph in both the day and night conditions, compared to 2009; however, neither was significantly different from 2009. For the minor arterials, both day and night data showed a similar increase (2-3 mph) for the flat segments, while the steep segments showed a sharp uptick (more than 10 mph). 85th and 95th percentile speeds on both flat and steep major arterials and minor arterials/collectors showed a significant increase relative to 2009 ($p < .05$). Figure 25 provides a graphic view of the statistics from Table 34.

Table 34. Speed by Road Type, Vertical Curvature, and Light Condition.

			FCC ROAD CLASS							
			1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
			Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
			2015	Change	2015	Change	2015	Change	2015	Change
LIGHT CONDITION	VER_CURVERD CLASS		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
1 Day (0600-2059)	1 Flat	Mean	70.8 (0.6)	-0.2 (1.1)	56.8 (1.3)	3.4 (1.8)	49.9 (2.1)	2.8 (2.0)	62.7 (1.2)	6.3 (1.7)
		Median	71.4 (0.6)	-0.6 (1.7)	57.8 (1.7)	4.2 (2.2)	49.2 (2.7)	2.8 (2.7)	65.4 (1.0)	9.6 (1.9)
		Quantile (0.85)	78.4 (0.5)	-0.3 (1.3)	69.5 (1.0)	5.6 (1.4)	63.5 (2.4)	5.6 (2.4)	76.3 (0.5)	3.3 (1.9)
		Quantile (0.95)	82.5 (0.6)	0.4 (1.0)	76.4 (0.9)	6.1 (1.6)	72.3 (2.6)	6.7 (2.4)	81.1 (0.6)	2.1 (1.3)
	2 Moderate	Mean	71.2 (.)	4.0 (.)	50.4 (7.6)	-2.3 (.)	45.0 (3.0)	-1.9 (4.8)	51.1 (5.0)	0.9 (5.2)
		Median	71.1 (.)	5.0 (.)	50.9 (8.8)	-1.3 (.)	44.6 (3.7)	-0.2 (5.7)	50.9 (6.9)	1.8 (6.3)
		Quantile (0.85)	76.8 (.)	4.5 (.)	62.3 (10.1)	4.6 (.)	58.3 (3.7)	-1.2 (5.5)	66.7 (5.0)	2.3 (6.6)
		Quantile (0.95)	80.8 (.)	4.8 (.)	69.3 (11.1)	6.7 (.)	66.1 (2.1)	-0.3 (4.9)	74.5 (4.5)	3.7 (6.0)
	3 Steep	Mean	. (.)	. (.)	44.0 (2.8)	-11.9 (13.1)	52.6 (6.1)	13.1 (7.8)	52.0 (5.8)	7.6 (8.5)
		Median	. (.)	. (.)	43.2 (3.1)	-14.3 (14.3)	54.5 (9.0)	15.2 (11.9)	53.5 (7.8)	11.1 (10.8)
		Quantile (0.85)	. (.)	. (.)	50.5 (2.7)	-17.1 (14.5)	63.7 (3.1)	16.7 (4.8)	63.4 (3.2)	5.0 (11.1)
		Quantile (0.95)	. (.)	. (.)	57.8 (2.3)	-15.6 (13.3)	70.7 (2.8)	18.6 (5.0)	70.4 (2.8)	3.0 (12.8)
	Total	Mean	70.8 (0.6)	-0.1 (1.1)	56.5 (1.3)	3.1 (1.7)	49.9 (2.0)	2.9 (2.1)	62.5 (1.2)	6.5 (1.7)
		Median	71.4 (0.6)	-0.5 (2.0)	57.4 (1.6)	3.9 (2.0)	49.2 (2.7)	3.0 (2.7)	65.2 (1.0)	9.9 (1.9)
		Quantile (0.85)	78.4 (0.5)	-0.3 (1.3)	69.3 (1.0)	5.5 (1.3)	63.4 (2.4)	5.5 (2.5)	76.2 (0.6)	3.2 (1.7)
		Quantile (0.95)	82.5 (0.6)	0.4 (1.0)	76.3 (0.9)	6.0 (1.4)	72.2 (2.6)	6.6 (2.5)	81.0 (0.6)	2.0 (1.4)
2 Night (2100-0559)	1 Flat	Mean	68.8 (0.8)	-0.2 (1.3)	56.0 (1.6)	3.4 (1.7)	49.0 (1.8)	1.8 (1.9)	63.3 (1.1)	5.1 (1.7)
		Median	69.0 (0.8)	0.1 (1.5)	56.7 (1.9)	4.5 (2.0)	48.0 (2.5)	1.6 (2.7)	65.6 (0.9)	6.1 (2.3)
		Quantile (0.85)	76.5 (0.6)	-0.0 (1.1)	68.8 (1.3)	5.9 (1.4)	62.3 (2.1)	4.6 (2.2)	75.1 (0.6)	2.1 (1.7)
		Quantile (0.95)	80.7 (0.5)	0.2 (1.0)	76.0 (1.2)	6.1 (1.3)	71.3 (2.3)	6.1 (2.2)	79.8 (0.5)	1.8 (2.5)
	2 Moderate	Mean	69.3 (.)	3.6 (.)	50.3 (7.2)	-1.4 (.)	44.5 (2.9)	-2.6 (4.3)	51.5 (4.3)	-1.6 (6.6)
		Median	69.0 (.)	4.3 (.)	51.1 (7.9)	0.1 (.)	42.8 (3.8)	-2.6 (5.5)	51.7 (6.5)	-1.9 (9.9)
		Quantile (0.85)	75.3 (.)	4.7 (.)	60.6 (8.4)	2.6 (.)	57.7 (4.0)	-1.7 (5.3)	66.2 (5.3)	-0.8 (8.7)
		Quantile (0.95)	79.2 (.)	4.6 (.)	67.6 (9.4)	4.9 (.)	65.5 (2.5)	-0.3 (4.9)	74.0 (5.2)	2.3 (7.1)
2 Night (2100-0559)	3 Steep	Mean	. (.)	. (.)	46.6 (6.8)	-7.9 (11.7)	52.1 (6.6)	11.0 (9.0)	51.9 (6.3)	6.7 (8.6)
		Median	. (.)	. (.)	45.6 (1.3)	-9.2 (10.1)	54.4 (11.0)	13.8 (14.9)	54.3 (10.3)	10.8 (13.2)

LIGHT CONDITION	VER_CURVERD CLASS		FCC ROAD CLASS: 1 Limited access, Speed Estimate, 2015, Est. (SE)	1 Limited access, Change, Est. (SE)	2 Major arterial, 2015, Est. (SE)	2 Major arterial, Change, Est. (SE)	3 Minor arterial/collector, 2015, Est. (SE)	3 Minor arterial/collector, Change, Est. (SE)	Total, 2015, Est. (SE)	Total, Change, Est. (SE)
		Quantile (0.85)	. (.)	. (.)	55.8 (5.5)	-11.0 (10.9)	65.7 (4.7)	17.1 (7.8)	65.6 (5.1)	7.9 (11.3)
		Quantile (0.95)	. (.)	. (.)	56.0 (2.7)	-16.8 (12.4)	72.4 (3.9)	18.4 (7.9)	72.3 (4.4)	5.3 (12.7)
	Total	**Mean**	68.8 (0.8)	-0.1 (1.3)	55.8 (1.5)	3.2 (1.6)	48.9 (1.8)	1.9 (2.0)	63.2 (1.1)	5.2 (1.6)
		Median	69.0 (0.8)	0.1 (1.5)	56.5 (1.9)	4.2 (2.0)	47.9 (2.5)	1.7 (2.6)	65.6 (0.9)	6.6 (2.2)
		Quantile (0.85)	76.5 (0.5)	0.0 (1.1)	68.8 (1.2)	5.8 (1.4)	62.3 (2.0)	4.6 (2.3)	75.1 (0.6)	2.1 (1.5)
		Quantile (0.95)	80.7 (0.5)	0.3 (1.0)	75.8 (1.1)	5.9 (1.3)	71.2 (2.3)	6.1 (2.3)	79.8 (0.5)	1.8 (1.3)
Total	**1 Flat**	**Mean**	70.4 (0.6)	-0.2 (1.2)	56.6 (1.4)	3.4 (1.7)	49.8 (2.0)	2.7 (2.0)	62.8 (1.2)	6.1 (1.7)
		Median	70.8 (0.6)	-0.1 (1.4)	57.5 (1.7)	4.1 (2.1)	49.1 (2.7)	2.7 (2.6)	65.4 (1.0)	9.0 (2.1)
		Quantile (0.85)	78.1 (0.5)	0.1 (2.1)	69.4 (1.0)	5.6 (1.4)	63.3 (2.4)	5.5 (2.4)	76.1 (0.5)	3.1 (1.9)
		Quantile (0.95)	82.2 (0.6)	0.3 (1.0)	76.3 (1.0)	6.2 (1.5)	72.2 (2.6)	6.6 (2.4)	80.9 (0.5)	1.9 (1.3)
	2 Moderate	**Mean**	70.9 (.)	4.2 (.)	50.4 (7.5)	-2.2 (.)	45.0 (3.0)	-2.0 (4.7)	51.2 (4.8)	0.5 (5.4)
		Median	70.8 (.)	5.1 (.)	50.9 (8.6)	-1.3 (.)	44.4 (3.8)	-0.4 (5.6)	51.0 (6.8)	1.1 (6.3)
		Quantile (0.85)	76.6 (.)	4.8 (.)	62.1 (9.9)	4.3 (.)	58.3 (3.7)	-1.3 (5.4)	66.7 (5.0)	1.7 (6.8)
		Quantile (0.95)	80.6 (.)	4.9 (.)	69.3 (11.0)	6.7 (.)	66.0 (2.0)	-0.5 (4.7)	74.5 (4.5)	3.6 (6.1)
	3 Steep	**Mean**	. (.)	. (.)	44.1 (2.6)	-11.5 (12.9)	52.5 (6.2)	12.8 (7.9)	52.0 (5.8)	7.4 (8.4)
		Median	. (.)	. (.)	43.2 (2.8)	-13.8 (14.1)	54.5 (9.7)	15.0 (12.8)	53.5 (8.4)	10.9 (11.2)
		Quantile (0.85)	. (.)	. (.)	50.6 (1.9)	-16.9 (14.4)	64.2 (3.3)	16.6 (5.4)	63.7 (3.5)	5.3 (11.2)
		Quantile (0.95)	. (.)	. (.)	57.7 (2.2)	-15.5 (13.5)	71.3 (3.3)	18.7 (5.6)	70.9 (3.1)	3.8 (12.7)
	Total	**Mean**	70.4 (0.6)	-0.1 (1.2)	56.4 (1.3)	3.1 (1.6)	49.7 (2.0)	2.7 (2.0)	62.6 (1.1)	6.3 (1.6)
		Median	70.8 (0.6)	-0.0 (1.1)	57.3 (1.6)	4.0 (2.0)	49.0 (2.7)	2.9 (2.7)	65.3 (1.0)	9.3 (1.9)
		Quantile (0.85)	78.1 (0.5)	0.1 (1.7)	69.3 (1.1)	5.6 (1.4)	63.2 (2.3)	5.4 (2.5)	76.0 (0.6)	3.0 (1.7)
		Quantile (0.95)	82.2 (0.6)	0.4 (1.0)	76.2 (0.9)	6.1 (1.3)	72.1 (2.6)	6.6 (2.6)	80.8 (0.5)	1.8 (1.5)

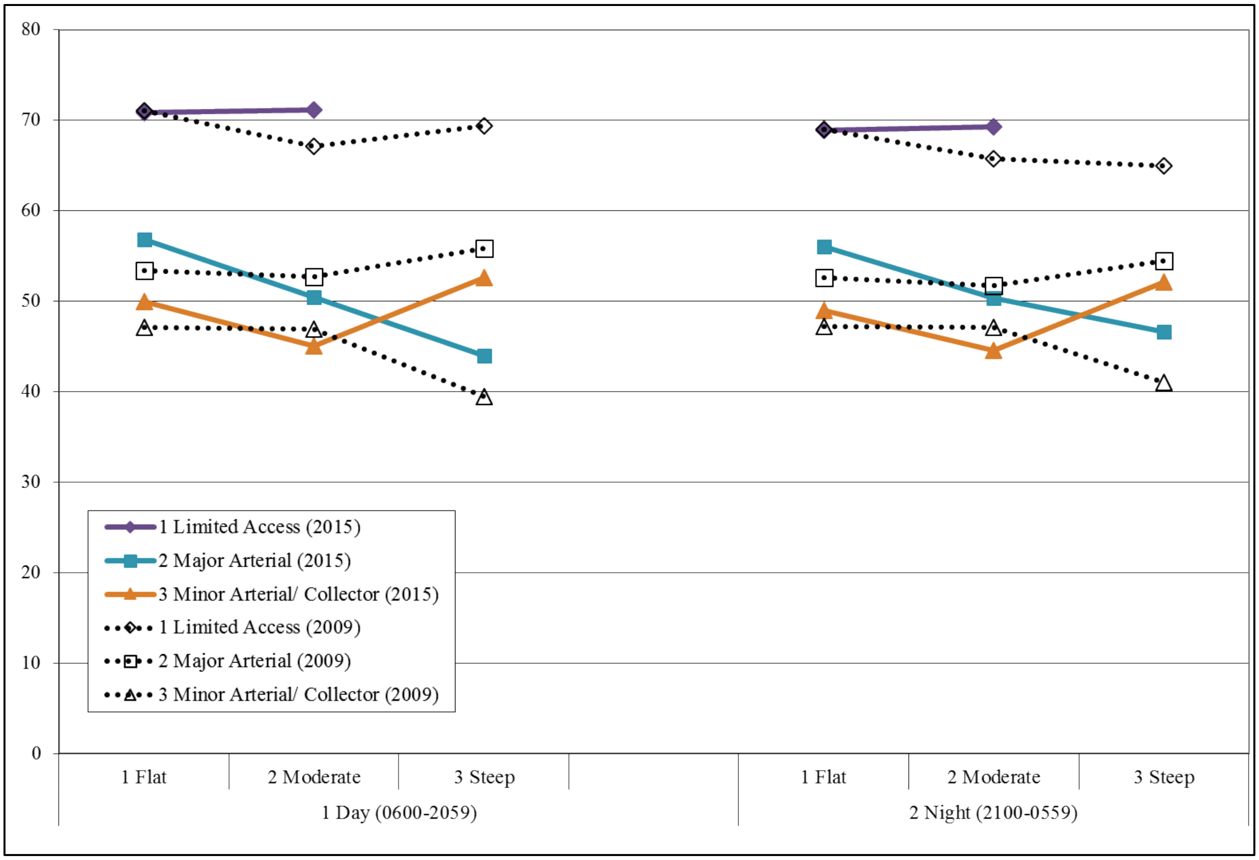

Figure 25. Speed by Road Type, Vertical Curvature Class, and Light Condition (Free-Flow)

Table 35. Standard Deviations for Values Reported in Error! Reference source not found..

		FCC ROAD CLASS							
		1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
		Speed SD		Speed SD		Speed SD		Speed SD	
LIGHT CONDITION	**VER_CURVERD CLASS**	**2015**	**Change**	**2015**	**Change**	**2015**	**Change**	**2015**	**Change**
1 Day (0600-2059)	**1 Flat**	8.11	-0.08	13.03	2.62	13.14	2.69	14.10	-0.22
	2 Moderate	5.86	0.44	11.75	6.02	13.14	2.06	14.02	1.79
	3 Steep	.	.	8.78	-3.04	12.36	4.87	12.34	0.55
	Total	8.11	-0.06	13.04	2.66	13.15	2.66	14.16	-0.15
2 Night (2100-0559)	**1 Flat**	7.95	0.20	13.02	2.97	12.91	2.61	12.77	-0.80
	2 Moderate	6.17	0.77	11.16	4.83	12.52	1.85	13.57	1.07
	3 Steep	.	.	6.04	-5.33	14.10	6.43	13.98	2.99
	Total	7.94	0.23	13.00	2.95	12.92	2.61	12.83	-0.77
Total	**1 Flat**	8.12	-0.02	13.03	2.68	13.11	2.68	13.85	-0.35
	2 Moderate	5.95	0.49	11.67	5.88	13.07	2.05	13.96	1.64
	3 Steep	.	.	8.67	-3.09	12.64	5.10	12.59	0.93
	Total	8.11	-0.00	13.04	2.71	13.12	2.66	13.92	-0.29

6.15 Vehicle Length and Light Condition

The influence of vehicle length and light condition on speed for a given roadway class is shown in Table 36 and Table 37. Year-to-year differences on limited access roadways were relatively minimal with the exception of a slight increase in speed (2-3 mph) for the longest vehicles in both light conditions. Overall, mean speeds for passenger vehicles on major arterials showed a significant increase by 4 mph ($p < .05$) under daylight conditions. Similar increases were observed for passenger vehicles; while some medium trucks decreased speeds under night conditions ($p < .05$). The 85th and 95th percentile speeds for all vehicles traveling on minor arterials and collectors showed significant increases during both day and night conditions ($p < .05$). Figure 26 provides a graphic view of the statistics from Table 36.

Table 36. Speed by Road Type, Length Class, and Light Condition

			FCC ROAD CLASS							
			1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
			Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
			2015	Change	2015	Change	2015	Change	2015	Change
LIGHT CONDITION	VEH_LENGTH		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
1 Day (0600-2059)	1 (<20 ft)	Mean	71.9 (0.7)	0.1 (1.3)	55.4 (1.2)	4.2 (1.5)	48.5 (2.1)	3.4 (2.1)	62.5 (1.2)	7.9 (1.8)
		Median	72.5 (0.6)	0.0 (1.7)	56.2 (1.5)	4.7 (1.7)	47.7 (2.7)	3.5 (2.8)	65.7 (1.2)	13.0 (1.9)
		Quantile (0.85)	79.1 (0.5)	0.1 (0.7)	67.9 (1.1)	7.0 (1.0)	61.5 (2.6)	6.3 (2.6)	76.8 (0.6)	3.8 (2.2)
		Quantile (0.95)	83.1 (0.6)	0.3 (1.2)	74.4 (1.0)	7.8 (0.9)	69.7 (3.1)	7.5 (3.0)	81.3 (0.6)	2.3 (1.7)
	2 (20-<30 ft)	Mean	71.3 (0.8)	-0.8 (1.2)	60.1 (1.6)	3.3 (2.1)	53.2 (2.2)	2.5 (2.2)	62.3 (1.4)	4.5 (1.7)
		Median	72.1 (0.7)	-0.7 (0.9)	60.9 (1.9)	3.9 (2.6)	52.6 (2.8)	2.6 (3.0)	64.4 (1.3)	6.9 (1.9)
		Quantile (0.85)	78.9 (0.7)	-0.0 (0.7)	72.6 (0.9)	5.5 (1.5)	67.1 (2.3)	5.1 (2.5)	76.2 (0.6)	2.8 (2.0)
		Quantile (0.95)	83.2 (0.7)	0.8 (0.9)	80.1 (1.1)	6.8 (1.3)	76.0 (2.1)	6.4 (2.2)	81.6 (0.6)	2.6 (0.8)
	3 (30-<40 ft)	Mean	67.4 (0.7)	-0.4 (1.2)	56.6 (1.0)	0.2 (1.5)	52.9 (1.2)	1.8 (1.5)	60.6 (0.8)	3.2 (1.2)
		Median	67.6 (0.6)	-0.2 (1.1)	57.9 (1.0)	1.6 (1.5)	52.6 (1.5)	2.0 (2.1)	62.8 (0.7)	5.1 (1.3)
		Quantile (0.85)	75.7 (0.5)	-0.4 (0.8)	69.5 (0.9)	1.9 (1.6)	67.8 (1.2)	5.1 (1.5)	73.8 (0.5)	2.6 (1.4)
		Quantile (0.95)	80.0 (0.5)	-0.1 (0.9)	78.3 (1.3)	3.2 (2.0)	79.5 (1.2)	8.5 (1.9)	79.8 (0.6)	2.2 (1.7)
	4 (40-<50 ft)	Mean	67.3 (0.7)	0.5 (1.1)	56.0 (1.1)	-0.0 (1.3)	52.9 (1.4)	1.3 (1.8)	61.3 (0.8)	2.8 (1.3)
		Median	67.7 (0.6)	0.8 (1.3)	57.4 (1.0)	0.9 (1.4)	52.9 (1.7)	1.1 (2.5)	63.5 (0.8)	4.2 (1.4)
		Quantile (0.85)	75.4 (0.5)	0.7 (0.8)	69.4 (1.2)	3.5 (1.5)	67.3 (1.5)	5.2 (1.5)	73.8 (0.7)	2.8 (1.1)
		Quantile (0.95)	79.7 (0.6)	1.1 (0.8)	77.8 (1.1)	5.5 (1.6)	77.3 (1.4)	8.4 (1.6)	79.2 (0.6)	3.1 (1.9)
	5 (50-<80 ft)	Mean	65.7 (0.5)	0.2 (1.4)	56.3 (1.1)	0.5 (2.1)	53.6 (1.3)	0.9 (2.4)	63.9 (0.7)	0.9 (1.4)
		Median	65.7 (0.5)	-0.1 (2.0)	57.6 (1.0)	0.8 (2.1)	53.6 (1.7)	-0.6 (2.9)	65.0 (0.6)	1.0 (1.5)
		Quantile (0.85)	71.6 (0.4)	-0.3 (1.4)	69.4 (1.5)	3.4 (2.1)	68.8 (1.2)	5.4 (1.6)	71.5 (0.5)	-0.4 (2.7)
		Quantile (0.95)	75.1 (0.6)	-0.4 (1.2)	78.3 (1.8)	6.1 (2.0)	78.9 (1.3)	9.8 (1.4)	75.4 (0.7)	-0.2 (2.0)
	6 (80-<100 ft)	Mean	68.6 (0.7)	2.5 (2.0)	57.2 (1.0)	-1.9 (3.6)	53.8 (1.5)	-1.1 (3.4)	66.4 (0.8)	1.7 (1.9)
		Median	69.0 (0.5)	2.8 (1.7)	59.3 (1.0)	-0.2 (3.2)	54.7 (3.9)	-1.8 (5.1)	68.0 (0.9)	2.0 (1.7)
		Quantile (0.85)	74.6 (0.4)	1.5 (2.1)	68.7 (0.5)	1.8 (3.3)	66.8 (2.9)	3.2 (5.1)	74.3 (0.4)	1.4 (2.3)
		Quantile (0.95)	77.5 (0.7)	0.5 (2.2)	75.3 (3.6)	3.7 (7.7)	78.7 (2.7)	8.8 (4.0)	77.5 (0.9)	1.0 (2.4)
	Total	Mean	70.8 (0.6)	-0.1 (1.1)	56.5 (1.3)	3.1 (1.7)	49.9 (2.0)	2.9 (2.1)	62.5 (1.2)	6.5 (1.7)
		Median	71.4 (0.6)	-0.5 (2.0)	57.4 (1.6)	3.9 (2.0)	49.2 (2.7)	3.0 (2.7)	65.2 (1.0)	9.9 (1.9)
		Quantile (0.85)	78.4 (0.5)	-0.3 (1.3)	69.3 (1.0)	5.5 (1.3)	63.4 (2.4)	5.5 (2.5)	76.2 (0.6)	3.2 (1.7)
		Quantile (0.95)	82.5 (0.6)	0.4 (1.0)	76.3 (0.9)	6.0 (1.4)	72.2 (2.6)	6.6 (2.5)	81.0 (0.6)	2.0 (1.4)

Table 36. Speed by Road Type, Length Class, and Light Condition (continued)

LIGHT CONDITION	VEH_LENGTH		FCC ROAD CLASS: 1 Limited access, Speed Estimate, 2015, Est. (SE)	1 Limited access, Change, Est. (SE)	2 Major arterial, 2015, Est. (SE)	2 Major arterial, Change, Est. (SE)	3 Minor arterial/collector, 2015, Est. (SE)	3 Minor arterial/collector, Change, Est. (SE)	Total, 2015, Est. (SE)	Total, Change, Est. (SE)
2 Night (2100-0559)	1 (<20 ft)	**Mean**	69.7 (1.0)	0.1 (1.6)	54.5 (1.5)	4.1 (1.6)	47.5 (1.9)	2.5 (2.0)	63.1 (1.2)	6.6 (1.7)
		Median	70.1 (1.0)	0.5 (2.0)	54.9 (1.7)	4.7 (1.8)	46.5 (2.3)	2.3 (2.5)	65.9 (1.1)	9.6 (2.2)
		Quantile (0.85)	77.3 (0.6)	0.4 (1.4)	67.2 (1.5)	7.4 (1.3)	60.2 (2.3)	5.2 (2.4)	75.7 (0.7)	2.7 (1.7)
		Quantile (0.95)	81.4 (0.6)	0.4 (1.3)	73.8 (1.2)	8.0 (1.0)	68.1 (2.5)	6.7 (2.7)	80.2 (0.6)	2.2 (3.2)
	2 (20-<30 ft)	**Mean**	69.8 (1.1)	-0.8 (1.3)	60.3 (1.7)	4.1 (1.9)	52.8 (2.0)	1.8 (2.3)	63.3 (1.5)	4.1 (1.9)
		Median	70.5 (1.0)	-0.5 (2.6)	61.2 (1.9)	5.1 (2.5)	52.2 (2.6)	1.7 (2.9)	65.5 (1.2)	6.0 (2.0)
		Quantile (0.85)	77.5 (0.8)	-0.3 (0.8)	72.8 (1.0)	6.2 (1.6)	66.7 (2.1)	4.6 (2.6)	75.8 (0.7)	1.8 (1.4)
		Quantile (0.95)	81.8 (0.8)	0.4 (0.9)	80.0 (0.9)	7.1 (1.1)	75.7 (1.7)	6.6 (2.0)	80.9 (0.6)	1.9 (0.9)
	3 (30-<40 ft)	**Mean**	65.7 (1.0)	-1.3 (1.3)	56.9 (1.3)	0.4 (1.3)	53.1 (0.9)	0.1 (1.4)	61.2 (0.9)	2.0 (1.2)
		Median	66.1 (0.7)	-0.9 (1.4)	58.6 (1.3)	2.5 (1.4)	53.4 (1.3)	0.8 (2.1)	63.6 (0.8)	3.6 (0.9)
		Quantile (0.85)	73.4 (0.5)	-0.9 (0.9)	70.9 (1.2)	3.0 (1.4)	69.4 (1.2)	4.7 (2.1)	72.9 (0.5)	1.6 (1.7)
		Quantile (0.95)	77.7 (0.5)	-0.9 (0.7)	79.9 (1.5)	5.1 (1.6)	81.8 (1.8)	8.7 (3.0)	78.5 (0.8)	1.5 (0.9)
	4 (40-<50 ft)	**Mean**	66.0 (1.0)	-0.3 (1.2)	54.3 (1.4)	-3.1 (1.4)	51.8 (1.7)	-2.4 (1.5)	62.0 (1.0)	0.5 (1.3)
		Median	66.6 (0.6)	0.3 (1.6)	56.5 (1.5)	-1.3 (1.4)	52.1 (2.6)	-2.9 (2.4)	64.6 (0.8)	1.7 (1.4)
		Quantile (0.85)	73.8 (0.7)	0.4 (1.2)	69.3 (1.2)	2.1 (1.5)	69.4 (1.1)	4.4 (1.2)	73.1 (0.6)	1.1 (0.7)
		Quantile (0.95)	77.6 (0.5)	0.5 (0.9)	78.5 (2.4)	5.0 (2.9)	80.9 (3.2)	9.7 (3.4)	78.0 (0.7)	2.0 (1.4)
	5 (50-<80 ft)	**Mean**	65.4 (0.6)	0.3 (1.4)	55.8 (1.2)	0.0 (2.2)	50.4 (1.4)	-3.4 (2.1)	64.3 (0.8)	0.2 (1.4)
		Median	65.4 (0.5)	0.9 (1.0)	58.0 (1.2)	1.5 (1.8)	49.3 (1.8)	-5.5 (2.3)	65.1 (0.5)	0.3 (2.0)
		Quantile (0.85)	71.1 (0.5)	0.2 (1.6)	68.0 (1.5)	2.8 (1.4)	65.3 (1.2)	1.1 (1.6)	71.1 (0.5)	0.1 (1.7)
		Quantile (0.95)	74.5 (0.5)	-0.2 (1.4)	75.4 (1.6)	4.1 (1.7)	76.7 (2.0)	6.8 (2.1)	74.6 (0.5)	-0.4 (1.5)
	6 (80-<100 ft)	**Mean**	68.8 (1.0)	2.4 (1.7)	57.9 (1.4)	1.6 (3.2)	50.8 (2.6)	-4.7 (3.2)	67.4 (1.1)	2.0 (1.7)
		Median	69.4 (0.6)	3.6 (1.6)	60.0 (1.0)	1.1 (1.4)	49.1 (2.7)	-6.2 (4.2)	68.8 (0.9)	3.0 (1.5)
		Quantile (0.85)	74.8 (0.5)	2.6 (2.0)	67.4 (1.6)	1.6 (2.2)	65.1 (3.2)	0.2 (4.6)	74.6 (0.4)	2.7 (1.6)
		Quantile (0.95)	77.6 (0.5)	1.4 (1.7)	70.4 (1.1)	0.4 (3.5)	69.0 (3.7)	-4.6 (5.8)	77.4 (0.5)	1.4 (1.6)
	Total	**Mean**	68.8 (0.8)	-0.1 (1.3)	55.8 (1.5)	3.2 (1.6)	48.9 (1.8)	1.9 (2.0)	63.2 (1.1)	5.2 (1.6)
		Median	69.0 (0.8)	0.1 (1.5)	56.5 (1.9)	4.2 (2.0)	47.9 (2.5)	1.7 (2.6)	65.6 (0.9)	6.6 (2.2)
		Quantile (0.85)	76.5 (0.5)	0.0 (1.1)	68.8 (1.2)	5.8 (1.4)	62.3 (2.0)	4.6 (2.3)	75.1 (0.6)	2.1 (1.5)
		Quantile (0.95)	80.7 (0.5)	0.3 (1.0)	75.8 (1.1)	5.9 (1.3)	71.2 (2.3)	6.1 (2.3)	79.8 (0.5)	1.8 (1.3)

Table 36. Speed by Road Type, Length Class, and Light Condition (continued)

			FCC ROAD CLASS							
			1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
			Speed Estimate		Speed Estimate		Speed Estimate		Speed Estimate	
			2015	Change	2015	Change	2015	Change	2015	Change
LIGHT CONDITION	VEH_LENGTH		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
Total	1 (<20 ft)	Mean	71.4 (0.7)	0.1 (1.4)	55.2 (1.2)	4.2 (1.4)	48.3 (2.1)	3.3 (2.1)	62.6 (1.2)	7.7 (1.8)
		Median	72.0 (0.7)	0.1 (1.6)	56.1 (1.5)	4.7 (1.7)	47.4 (2.6)	3.2 (2.7)	65.8 (1.2)	12.4 (1.9)
		Quantile (0.85)	78.8 (0.5)	-0.1 (1.4)	67.8 (1.1)	7.1 (1.0)	61.3 (2.5)	6.1 (2.6)	76.6 (0.6)	3.6 (2.1)
		Quantile (0.95)	82.8 (0.6)	0.3 (1.2)	74.3 (1.0)	7.8 (0.9)	69.4 (3.0)	7.3 (3.0)	81.1 (0.6)	2.1 (1.3)
	2 (20-<30 ft)	Mean	71.0 (0.8)	-0.8 (1.2)	60.1 (1.6)	3.4 (2.1)	53.1 (2.1)	2.4 (2.3)	62.5 (1.4)	4.4 (1.7)
		Median	71.8 (0.8)	-0.9 (1.3)	61.0 (1.9)	4.1 (2.5)	52.6 (2.8)	2.5 (2.9)	64.6 (1.3)	6.9 (1.9)
		Quantile (0.85)	78.7 (0.7)	-0.2 (0.7)	72.6 (0.9)	5.5 (1.5)	67.0 (2.3)	5.0 (2.5)	76.2 (0.6)	2.5 (1.8)
		Quantile (0.95)	82.9 (0.7)	0.7 (0.9)	80.1 (1.0)	6.9 (1.3)	75.9 (2.0)	6.5 (2.1)	81.5 (0.7)	2.5 (0.7)
	3 (30-<40 ft)	Mean	67.1 (0.7)	-0.5 (1.2)	56.6 (1.1)	0.3 (1.4)	53.0 (1.2)	1.6 (1.5)	60.7 (0.8)	3.0 (1.2)
		Median	67.3 (0.6)	-0.4 (1.0)	58.0 (1.0)	1.7 (1.5)	52.7 (1.5)	1.9 (2.0)	62.9 (0.7)	4.9 (1.4)
		Quantile (0.85)	75.3 (0.5)	-0.6 (0.6)	69.7 (1.0)	2.1 (1.6)	68.0 (1.2)	5.1 (1.5)	73.6 (0.6)	2.4 (1.5)
		Quantile (0.95)	79.7 (0.6)	-0.2 (0.9)	78.6 (1.4)	3.6 (2.0)	79.9 (1.3)	8.6 (2.0)	79.6 (0.6)	2.3 (1.7)
	4 (40-<50 ft)	Mean	67.1 (0.7)	0.4 (1.1)	55.8 (1.1)	-0.4 (1.2)	52.8 (1.4)	0.9 (1.7)	61.4 (0.8)	2.4 (1.3)
		Median	67.4 (0.6)	0.7 (1.0)	57.3 (1.0)	0.6 (1.4)	52.8 (1.7)	0.7 (2.5)	63.7 (0.8)	3.7 (1.3)
		Quantile (0.85)	75.1 (0.5)	0.6 (0.9)	69.4 (1.1)	3.3 (1.4)	67.5 (1.4)	5.3 (1.5)	73.7 (0.6)	2.7 (1.4)
		Quantile (0.95)	79.3 (0.5)	1.0 (0.8)	77.8 (1.1)	5.2 (1.5)	77.6 (1.7)	8.5 (1.9)	79.0 (0.5)	3.0 (1.7)
	5 (50-<80 ft)	Mean	65.6 (0.5)	0.3 (1.4)	56.2 (1.1)	0.4 (2.1)	53.2 (1.3)	0.3 (2.4)	64.0 (0.7)	0.7 (1.4)
		Median	65.6 (0.4)	0.6 (1.9)	57.7 (1.0)	0.9 (2.1)	53.1 (1.8)	-1.1 (2.8)	65.0 (0.5)	1.0 (1.6)
		Quantile (0.85)	71.5 (0.4)	-0.1 (1.5)	69.1 (1.4)	3.3 (1.8)	68.4 (1.3)	4.8 (1.7)	71.3 (0.5)	0.3 (2.5)
		Quantile (0.95)	74.9 (0.6)	-0.3 (1.3)	78.1 (1.6)	5.9 (1.8)	78.7 (1.2)	9.3 (1.2)	75.2 (0.6)	0.2 (1.1)
	6 (80-<100 ft)	Mean	68.6 (0.7)	2.5 (1.8)	57.3 (1.0)	-1.2 (3.5)	53.3 (1.5)	-1.7 (2.9)	66.7 (0.9)	1.8 (1.8)
		Median	69.1 (0.6)	3.1 (1.7)	59.5 (0.8)	-0.0 (2.3)	53.6 (4.0)	-2.8 (4.5)	68.2 (0.9)	2.3 (1.7)
		Quantile (0.85)	74.7 (0.4)	1.9 (2.1)	68.6 (1.1)	2.0 (2.8)	66.1 (1.5)	2.2 (2.1)	74.4 (0.4)	1.4 (2.7)
		Quantile (0.95)	77.6 (0.6)	0.9 (1.9)	74.9 (2.8)	3.4 (6.1)	77.9 (2.6)	8.0 (3.3)	77.5 (0.6)	1.2 (2.0)
	Total	Mean	70.4 (0.6)	-0.1 (1.2)	56.4 (1.3)	3.1 (1.6)	49.7 (2.0)	2.7 (2.0)	62.6 (1.1)	6.3 (1.6)
		Median	70.8 (0.6)	-0.0 (1.1)	57.3 (1.6)	4.0 (2.0)	49.0 (2.7)	2.9 (2.7)	65.3 (1.0)	9.3 (1.9)
		Quantile (0.85)	78.1 (0.5)	0.1 (1.7)	69.3 (1.1)	5.6 (1.4)	63.2 (2.3)	5.4 (2.5)	76.0 (0.6)	3.0 (1.7)
		Quantile (0.95)	82.2 (0.6)	0.4 (1.0)	76.2 (0.9)	6.1 (1.3)	72.1 (2.6)	6.6 (2.6)	80.8 (0.5)	1.8 (1.5)

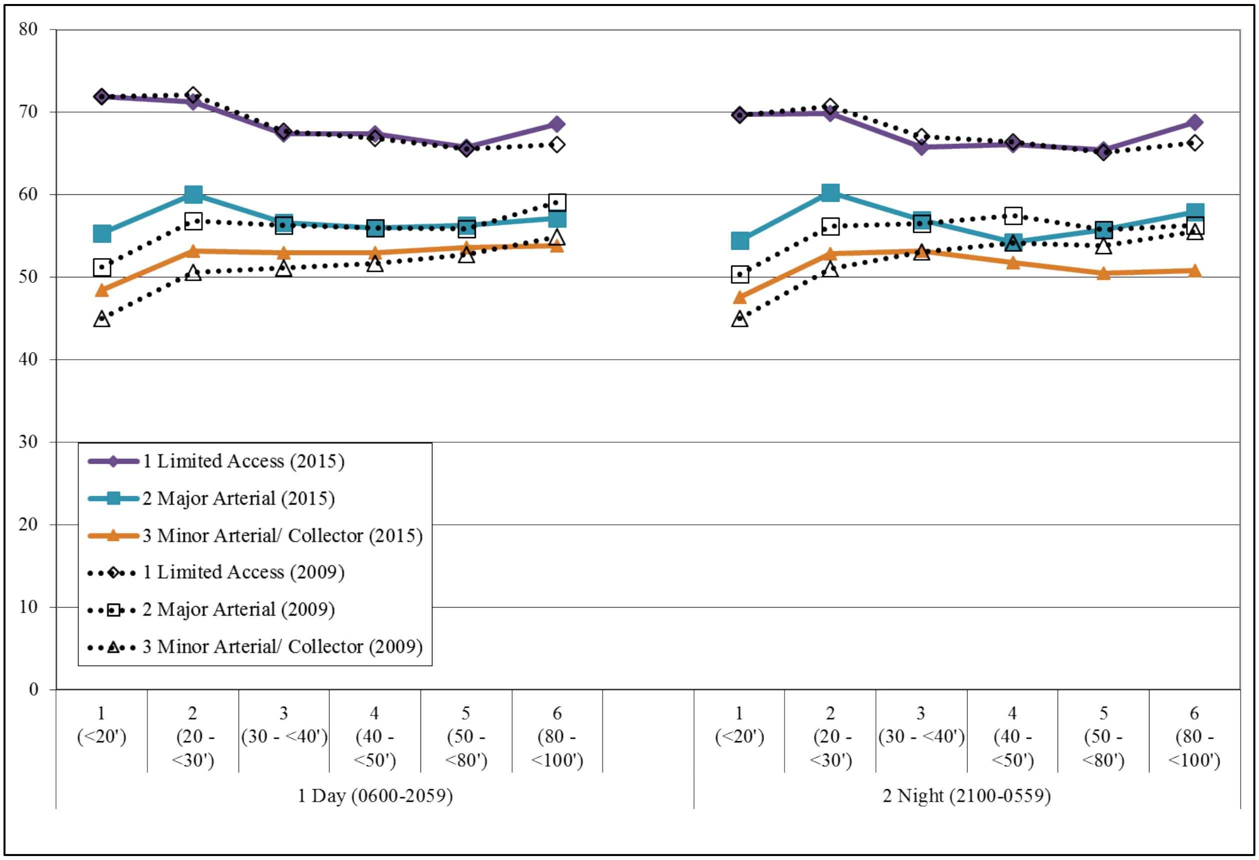

Figure 26. Speed by Road Type, Length Class, and Light Condition (Free-Flow)

Table 37. Standard Deviations for Values Reported in Table 36

		FCC ROAD CLASS							
		1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
		Speed SD		Speed SD		Speed SD		Speed SD	
LIGHT CONDITION	VEH LENGTH	2015	Change	2015	Change	2015	Change	2015	Change
1 Day (0600-2059)	1 (<20 ft)	7.78	-0.02	12.62	2.83	12.54	2.76	14.64	-0.27
	2 (20-<30 ft)	8.73	0.78	13.14	2.93	13.54	2.84	14.09	0.81
	3 (30-<40 ft)	9.03	-0.24	14.15	3.11	15.21	4.11	13.97	1.34
	4 (40-<50 ft)	8.90	-0.27	14.18	3.84	14.64	4.15	13.50	1.53
	5 (50-<80 ft)	6.37	-1.02	14.05	3.28	14.95	3.84	9.27	-0.30
	6 (80-<100 ft)	6.92	-1.53	13.32	4.79	14.42	4.54	9.80	0.64
	Total	8.11	-0.06	13.04	2.66	13.15	2.66	14.16	-0.15

		FCC ROAD CLASS							
		1 Limited access		2 Major arterial		3 Minor arterial/collector		Total	
		Speed SD		Speed SD		Speed SD		Speed SD	
LIGHT CONDITION	VEH LENGTH	2015	Change	2015	Change	2015	Change	2015	Change
2 Night (2100-0559)	1 (<20 ft)	7.91	0.18	12.39	3.09	12.04	2.57	13.38	-0.98
	2 (20-<30 ft)	8.56	0.87	13.13	3.05	13.55	3.02	13.28	0.39
	3 (30-<40 ft)	8.86	1.22	15.66	4.96	16.77	5.49	13.67	2.05
	4 (40-<50 ft)	8.77	1.22	15.74	5.73	17.88	7.18	13.33	2.89
	5 (50-<80 ft)	6.14	-0.12	13.39	3.28	15.16	4.34	8.00	0.60
	6 (80-<100 ft)	6.85	0.43	11.92	1.98	13.61	2.77	8.68	1.26
	Total	7.94	0.23	13.00	2.95	12.92	2.61	12.83	-0.77
Total	1 (<20 ft)	7.86	0.02	12.59	2.87	12.48	2.73	14.41	-0.42
	2 (20-<30 ft)	8.71	0.80	13.14	2.95	13.54	2.86	13.96	0.73
	3 (30-<40 ft)	9.02	0.01	14.38	3.39	15.41	4.27	13.93	1.42
	4 (40-<50 ft)	8.89	0.03	14.41	4.10	15.01	4.48	13.47	1.68
	5 (50-<80 ft)	6.30	-0.74	13.94	3.27	15.02	3.94	8.94	-0.06
	6 (80-<100 ft)	6.90	-0.89	13.05	4.11	14.33	4.25	9.50	0.88
	Total	8.11	-0.00	13.04	2.71	13.12	2.66	13.92	-0.29

7. Conclusions

The following are the principal findings and conclusions from the 2015 wave of the National Travel Speed Survey with comparisons between the 2015 and 2009 results.

1. A total of 12,330,540 vehicle speeds were recorded in the 2015 survey wave. 6,915,956 were constrained vehicles (within 5 seconds of the preceding vehicle) while 5,414,584 were free-flow vehicles. These numbers were slightly greater than the 2009 survey, when a total of 10,721,095 vehicle speeds were recorded, 5,016,051 of the vehicles were recorded as free flow, and 5,705,044 were constrained.

2. For all flow conditions and vehicle types combined (free flow and constrained), there was no difference between 2009 and 2015 speeds measured on limited access roadways (less than 1 mph change). While the mean, 85th percentile, and 95th percentile speeds on major arterials and minor arterials/collectors increased relative to 2009, the mean speeds were not significantly different between the two measurement years. The 85th and 95th percentile speeds on major arterials and minor arterials were, however, significantly higher in 2015 (+5-7 mph) relative to 2009 (p's $< .05$). The change between the 2009 and 2015 speeds for free-flow vehicles was similar to the change in the all traffic condition. There were no significant changes in the mean or 85th percentile speeds on limited access roads in 2015 (mean =70.5 mph; 85th percentile= 78.1 mph) relative to 2009 (mean = 69.1 mph; 85th percentile =78.0 mph). The mean speeds on major arterials and minor arterials and collectors increased by 3 mph in 2015 (Major arterials mean = 56.4 mph; minor arterials mean = 49.5 mph) relative to 2009 (Major arterials mean = 53.3 mph; minor arterials mean = 47.0 mph); however, this increase was not statistically significant. The 85th and 95th percentile speeds on major arterials and minor arterials were significantly higher in 2015 (+5-7 mph) relative to 2009 ($p < .05$). The standard deviation of free-flow traffic speed, a measure of the spread in the distribution of speeds, ranged from about 9 mph on limited access highways to 13 mph on major arterials and minor arterials/collectors. Compared to 2009, the standard deviations in 2015 are wider for major arterials and minor arterials collectors, but relatively unchanged for limited access roadways at 8 mph.

3. The increase in speeds for all traffic on major arterials and minor arterials/collectors represents a 3-4 percentage point increase from 2009 in the proportion of vehicles on those roads exceeding the speed limit by more than 5 mph (34-35% in 2015) and a 3-4 percentage point increase for vehicles exceeding the speed limit by more than 10 mph over the speed limit (16-17% in 2015). This increase was not statistically different from 2009. The proportion of vehicles traveling more than 10 mph over the speed limit on major and minor arterials was up 4-5 points (18-19% in 2015). This

increase from 2009 was only significant for major arterials ($p < .05$), but not for minor arterials and collectors.

4. As in 2009, time of day had little influence on traffic speeds. The greatest variations in speeds appeared to be on the limited access roadways, though the means were not significantly different across time periods. Relative to 2009, 85th and 95th percentile speeds on major arterials and minor arterials increased significantly across time of day in 2015 ($p < .05$).

5. Light condition (daylight or darkness) had little effect on travel speeds within any of the road conditions. The differences are extremely small (i.e., 1-2 mph) between light conditions within each road type in 2015. This pattern is similar to that observed in 2009, where the changes were between 1-2 mph. Relative to 2009, 85th and 95th percentile speeds on major arterials and minor arterials increased significantly across time of day in 2015 ($p < .05$).

6. Relative to 2009, significant increases in mean speeds occurred for Monday (+8 mph), Tuesday (+7 mph), Wednesday (+ 9 mph), and Saturday (+8 mph) ($p < .05$). Mean speeds on limited access roadways showed little difference across day of week (2 mph). Mean speeds on major arterials were between 55-59 mph, with an increase of 1-7 mph across day of week from 2009 measures. These increases in mean speed were not significantly different from similar measures in 2009. However, significant increases in the 85th and 95th percentile speeds on major arterials occurred for Tuesday (+ 6-7 mph), Wednesday (+ 8-9 mph), and Saturday (+9 mph) ($p \leq .01$). In 2015, mean speeds on minor arterials and collectors were in the range of 47-53 mph, increasing by 2-6 mph from the 2009 measures. On minor arterials and collector roads the largest increase in mean speed occurred on Friday (6 mph) in 2015; however, this increase was not significantly different than 2009. The 95th percentile speeds on minor arterials/collectors showed a significant increase on Tuesday (+ 7 mph), Friday (+11 mph), and Sunday (+10 mph) ($p \leq .05$).

7. Relative to 2009, mean speeds on limited access highways increased significantly on moderately curved roads by 3 mph (69 mph vs. 72 mph) ($p < .05$), which is slightly higher than speeds on straight limited access roadways (70 mph) in 2015. In addition, speeds increased significantly by 4 mph on straight major arterials as well as minor arterials/collectors in 2015 relative to 2009 ($p < .05$). The increase in mean speeds on curved minor arterials were not a significant change relative to 2015. The 2015 speed trends appear relatively predictable for the major and minor arterial roadways. That is, speeds were 7-16 mph and 1-10 mph higher on straight roads when compared to moderate or sharp counterparts in these classes, respectively.

8. In 2015, speeds on urban roads were lower than in more suburban or rural locations for major arterials and collectors. Vehicles on major arterials, and minor arterials/collectors in rural areas, were 15-17 mph faster than on their counterparts in urban areas. This is slightly more pronounced than in 2009, where there was a 12-14 mph difference in mean speeds on urban versus suburban and rural roads.

9. While speeds on limited access roadways for most vehicle lengths remained constant relative to the 2009 estimates, the longest vehicles (80-100 ft.) showed the greatest increases in mean speeds (2 mph), though the increase was not significant. Relative to 2009, moderate increases in mean speeds were noted on major arterials for some passenger vehicles (4 mph), but medium and larger trucks showed no similar increase. Relative to 2009, 85th and 95th percentile speeds on minor arterials and collectors showed significant increases in 2015 for all vehicle sizes ($p < .05$). Consistent with 2009 findings, there was an interaction among curvature (both horizontal and vertical), road class, and vehicle size. In general, speeds decreased as curvature and gradient increased on major arterials. That is, on major arterials the fastest speeds were recorded on flat/straight roadways (57 mph). Speeds on major arterials decreased on moderately and sharply curved roads with increased vertical gradients. The impact of gradient (i.e., vertical curvature) on speeds is most pronounced on major arterials with moderate or sharp horizontal curvature (37 mph and 39 mph, respectively). On minor arterials and collectors, speeds were greatest on straight roads with steep gradients (57 mph), and slowest on roads with sharp curvature with no incline (36 mph).

10. Speeds on major arterials and collectors showed greater variation between 2009 and 2015, but the direction of the changes were inconsistent. Mean speeds on straight flat major arterials significantly increased by 4 mph over the two measurement cycles ($p < .05$).

11. Relative to 2009, mean speeds on straight, steep minor arterials increased significantly by 13 mph ($p < .01$). A similar increase in mean speeds (+ 10 mph) was measured on moderately curved flat minor arterials ($p < .05$). Conversely, on moderately curved and moderately steep minor arterials, the mean speeds decreased by 12 mph between 2009 and 2015 ($p < .05$). In addition, the 85th and 95th percentile speeds on straight and flat, straight and steep, and moderately curved flat minor arterials significantly increased between 2009 and 2015 ($p< .05$).

12. There was little influence of light condition on speed across combinations of vehicle size and road type. Year-to-year differences on limited access roadways were relatively minimal with the exception of a slight increase (2-3 mph) for the longest vehicles in both light conditions that was not significantly different from 2009.

> Overall, speeds for all vehicle lengths (except the longest) increased on major arterials by 3-6 mph under daylight conditions. Minor arterials showed slightly lower speeds for medium and longer vehicles at night. The shortest vehicles showed a slight increase on minor arterials that was more pronounced during day conditions than at night.

Overall, there was an increase in speeds measured between 2009 and 2015. The increase is especially noted on minor arterials and major arterials where the mean and 85th percentile speeds have increased by 2-3 mph and 5-6 mph, respectively. Interestingly, there is greater variation between vehicle speeds on these road types as evidenced by the increase in the standard deviation from 10-13 mph for the two measurement periods. The increase in both measured speeds and the variation in speed on these roadways may contribute to the understanding of why 87 percent of speeding-related fatalities occurred on roads that were non-interstate highways and that the proportion of fatalities on local, collector, and arterial roads was approximately 3 times higher than on interstate highways in 2014 (NHTSA, 2016).

Interestingly, the mean and 85th percentile speeds and the standard deviation of the mean speed on limited access roadways remains relative unchanged between 2009 and 2015. The relative stability of the speed measurements suggest that most drivers have reached a maximum travel speed at which they feel comfortable driving within limited access roadway prevailing conditions.

The lack of change in estimated speeds on limited access roadways between the 2009 and 2015 measurement waves may be attributed to differences in traffic patterns over the two measurement periods. The economic conditions in 2008-2009 have been associated with lower vehicle miles travelled (VMT) (as measured by various sources including FHWA's Highway Performance Monitoring System and the 2008-2009 National Household Travel Survey (USDOT, 2009)). Cumulative travel for 2009 changed by -.8 percent (FHWA, 2009). Thus, there may have been less congestion, resulting in higher speeds. Conversely, the economy began to improve in 2010 and gasoline prices were markedly reduced in the summer of 2015 relative to recent years. These factors, either individually or in combination may have contributed to the greater VMT, increasing congestion, and suppressing any increase in speed on the limited access roadways.

One of the major findings from the comparison of 2015 to 2009 data is that the larger standard deviations and higher 85th and 95th percentile values on the major arterial and minor arterial/collector speeds may point to a serious safety concern. Though in many cases the mean speeds on these roads showed insignificant increases or decreases, the fringe vehicles were further out on the upper tails of the speed distribution. This finding aligns with recent increases in serious and fatal crash rates. That is, the greater the disparity in speeds, the greater the likelihood of a crash of increased severity. Though much of the increase in crash rate is attributed to factors like distraction or the likelihood that more people are driving with lower gas prices and better economic conditions, the increase in the distribution seems to indicate that some motorists are electing to drive at higher speeds while others may drive at slower speeds.

Another possible source of the uptick in distribution could be from the ever-increasing adoption of higher speed limits on limited access highways. It is possible that the increase is also associated with a level of comfort or perhaps impatience with the slow speed limits on lower speed roads. As such, there may be a tendency for residual speeds to remain high as drivers transition from limited access to major or minor arterials. This dynamic creates the potential for disparately high speeds relative to drivers who may not have that same dose of higher speed before entering the surface street traffic stream.

The implication for the greater speed distribution seems clear. With greater speed variance comes greater likelihood of crashes and greater severity and injury when they occur. The implication for verifying and/or quantifying the problem to formulate possible solutions/countermeasures is not as clear. Until it is possible to evaluate data surrounding the driving habits of a greater sample of the driving population it will be difficult to prove, or disprove, these hypotheses. Being able to cross-reference the speed of a given vehicle with whether or not that driver was distracted (i.e., allowing speed or headway to shift while attending to something else) or driving faster than the prevailing speeds for some other reason would be interesting, but very challenging to collect and interpret. However, a carefully designed study and sample could shed some light on the issue.

If further study of speeding data for arterials in proximity to higher speed limited access highways seems to indicate residual high speeds on those roads, methods for “traffic calming” typically reserved for residential streets might be explored. This approach might create a cleaner distinction between higher and lower speed roads and better stratify the speeds of the streams on those lower category roads.

References

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Appendix A – Statistical Methodology – Further Details

1.1 Independent or Overlapping PSU Samples

NTSS III point estimates would benefit from a new sample design, especially a new PSU sample, since the previous NTSS II dates from 2009 and has ties to even earlier NMVCCS. Alternatively, estimates of differences between the NTSS III and NTSS II would benefit from overlap between the two studies/samples, at least at the PSU level. The precision of estimates of change can be expected to be improved through overlap between the NTSS III and NTSS II samples, relative to completely independent designs. In general, the variance of an estimate of change (e.g., between NTSS III and II) can be expressed as follows:

$$V\ (III - II) = V\ (III) + V\ (II) - 2\ COV(III, II)$$

A compromise would be to strike a balance between both of these estimation and analysis objectives, by controlling the overlap between the NTSS III and NTSS II samples. Westat recommended and NHTSA approved a partial overlap in the PSU samples to strike a balance between NTSS III point estimates, and estimates of differences between the NTSS III and NTSS II. A dual frame approach was used, where the total NTSS III PSU sample size is shared between a new NTSS III PSU sample, and a subsample of the previous NTSS II PSUs. Unbiased, nationally representative estimates for the NTSS III would result from each of these independent PSU samples, and composite estimation (Schaible, 1978) can be used to blend the data from both samples together through overall weights that reflect the relative efficiency (i.e., variance) of each sample.

1.2 The FOPV PSU Sample

The NTSS III PSU sample consisted of 24 PSUs in two independent samples:

A) A subsample of 8 of the 20 NTSS II PSUs,

B) The NASS FOPV 16 PSU sample.

NHTSA had recently redesigned the National Automotive Sampling System (NASS) Follow-On Passenger Vehicle (FOPV) module, including the FOPV PSU samples, immediately prior to the start of the NTSS III. It was therefore appealing to consider using the FOPV 16 PSU sample to work in conjunction with the subsample of 8 NTSS II PSUs. This was evaluated and recommended to NHTSA, and NHTSA accepted, for the NTSS III. The FOPV PSU sample can be described concisely as follows:

A) PSU stratification – PSUs were stratified by Census region (4 regions) x urbanicity (urban / rural).

B) PSU formation – PSUs were formed subject to the following rules:

- Such that at least 5 fatal crashes would be expected per PSU per year.
- PSUs were composed of counties or groups of adjacent counties.
- PSUs formations respected Census region and urbanicity, but were allowed to cross state lines.
- The outlying areas of AK and HI were excluded.

C) PSU measure of size (MOS) – Since the NASS FOPV was a multi-purpose study, a composite measure of size was used that reflected fatalities from FARS (2007 – 2011), and old (<= 2006) and new (>= 2007) vehicle registration counts from Polk.

For more details, see: Survey Modernization Analysis Designs for a Modernized NASS, 8/15/14.

1.3 Composite Estimation

Striking a compromise between the precision of estimates of vehicle speeds in 2015 and estimates of change since 2009 could be accomplished under a dual frame design. The dual frame design would combine data from two independent samples, where, for example, one sample is drawn specifically for the NTSS III, and one sample is drawn as a subsample of the previous NTSS II PSUs. Under this approach, a composite estimator (Schaible, 1978) could be used, to blend the data from the two independent samples. The blending factor would reflect the variance of estimates of interest from one of the two samples, relative to the variance of the other sample.

A composite estimator, combining data from two independent samples (i.e., the new NTSS III PSU sample, and the NTSS II PSU subsample), and their corresponding estimates (y_{III}, y_{II}) can be written as follows:

$$Y = B_{III} y_{III} + (1 - B_{III}) y_{II}$$

The composite factor is calculated as follows, assuming the estimator from each independent sample is unbiased, and reflects the variance of each estimator relative to the other:

$$B_{III} = \frac{V\,(y_{II})}{V\,(y_{III}) + V(y_{II})}$$

In the case of the NTSS III, we chose to use composite estimation factors of 1/3 and 2/3 for the “A” and “B” PSU samples, reflecting the ratio of their PSU and road segment sample sizes.

References

Schaible, W. L. (1978). Choosing Weights for Composite Estimators for Small Area Statistics. Proceedings of the Section on Survey Research Methods, pp. 741-746. Alexandria, VA: American Statistical Association.

Appendix B: NTSS III – Hi-Star Calibration - Speeds

Introduction

As in the NTSS I and II, calibration models were developed and applied to the speeds measured by each and every Hi-Star during the field period. The data for developing the calibration models were obtained from a carefully designed experiment. The calibration models were developed by fitting simple linear regression models using SAS PROC GLM. The details of the experimental design and the development of the regression models for calibration are described in this appendix.

Pre-Fielding Reconditioning

Prior to the NTSS III field period, all of the Hi-Stars used in the previous NTSS II were returned to the manufacturer for necessary refurbishing (battery replacements, etc.) and calibration. Additionally, any necessary new devices (new models) were purchased for use in the NTSS III. The speeds measured by all Hi-Stars, new or not, were subject to calibration based on the methodology and results below. It should be noted that neither new Hi-Stars nor older, refurbished and recalibrated Hi-Stars seemed to differ with respect to the results below.

Experimental Design

In order to obtain good measurements with which to develop calibration models, we designed and conducted an experiment at a local racetrack. The parameters for the experimental design were as follows.

- Vehicles – 6 different vehicles – Honda Civic, Toyota Rav4, Volkswagen Golf, Ford F250, Volvo XC60, Subaru Outback
- Speeds – 6 different speeds - 20-70 MPH in this order: 20, 50, 70, 30, 60, 40
- Runs – 5 runs for each vehicle and speed combination
- Hi-Stars – 127 Hi-Stars

Each vehicle was outfitted with a GPS device, which measured location, speed, and time and were synchronized with each other and the Hi-Star clocks.

Given the above, a theoretical maximum of 22,860 speed measurements, or 180 data points per Hi Star, were possible. 21,580 actual measurements were made by the Hi-Stars, with the difference (1,280) being attributable to missing data. The missing data includes 7 Hi Stars with no readings (x 180 expected observations per Hi-Star) = 1,260 missing observations. The 20 remaining missing observations are attributable to 11 Hi Stars.

Merging the GPS and Hi-Star Data

Despite the attempts to synchronize the GPS device and Hi-Star clocks, merging the GPS and Hi-Star data by time itself proved inaccurate, largely due to "drift" time-set resolution in the Hi-Star clocks. Fortunately, given the parameters and order of the experiment, the GPS device and Hi-Star data was merged based on a combination of GPS coordinates (which identified a block of GPS measurements that occurred during a run over the line of laid down Hi-Stars) and the absolute order of observations given the experimental design.

Development of Linear Regression Models for Calibration

Using the GPS measurement of speed as the gold standard (or dependent variable), we used SAS PROC GLM to fit linear regression models (with intercepts) to calibrate the Hi-Star speeds (or independent variables). We considered overall calibration models (i.e., across all Hi-Stars), calibration models by Hi-Star type (defined by 2 different hardware models and associated software configurations), and calibration models for Hi-Stars individually. The results indicated that individual Hi-Star models were the most appropriate. Generally speaking, the linear regression models were very good, and a summary of their model characteristics and parameters can be found below.

Measure	Intercept (B0)	Slope (B1)	Rsquare (r^2)
Mean	1.5498	0.9312	0.9674
Median	1.5503	0.9232	0.9856
Minimum	-5.0154	0.6464	0.7448
Maximum	9.3904	1.2610	0.9967
25th percentile	-0.4351	0.8363	0.9624
75th percentile	3.6253	1.0138	0.9918

We should note that reasonable calibration models could not be developed for a few Hi-Stars (2) that were used in the field data collection. In such instances, the speeds observed were neither used nor calibrated, and the device and lane were considered nonresponding. See the data weighting section of this report for non-response adjustment.

For future NTSS studies, we recommend similar calibration experiments and model development both before and after the field data collection.

Appendix C. Comparisons Tables for the 2009 and 2015 Data

Table C-1a. Overall Speeds by Road Class (All Traffic)

	FCC ROAD CLASS											
	1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
	Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
	2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
Mean	69.05	68.95	-0.1	51.87	54.88	3.02	46.44	48.78	2.34	57.26	62.91	5.65
Median	69.96	69.82	-0.14	52.03	55.9	3.87	45.56	47.79	2.23	57.99	65.7	7.7
Quantile (0.85)	77.5	77.29	-0.2	62.48	68.26	5.77	57.05	62.11	5.06	73.48	75.8	2.32
Quantile (0.95)	80.97	81.33	0.36	68.9	75.17	6.27	64.67	71.18	6.5	78.99	80.39	1.4

Table C-1b. Standard Error of Speed by Road Class (All Traffic)

	FCC ROAD CLASS											
	1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
	Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
	2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
Mean	1.24	1.01	1.54	1.24	1.62	1.98	1.14	2	2.06	1.31	1.29	1.7
Median	2.08	0.99	2.17	1.33	2.15	2.61	1.3	2.64	2.69	1.92	1.14	2.05
Quantile (0.85)	1.14	0.59	1.21	1.61	1.21	1.68	1.81	2.34	2.47	2	0.65	2.12
Quantile (0.95)	0.8	0.61	1.02	1.67	0.83	1.47	1.59	2.67	2.65	1.52	0.63	1.67

Table C-1c. Standard Deviations for Speed by Road Class (All Traffic)

	FCC ROAD CLASS											
	1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
	Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation		
	2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
Std Dev	9.07	9.25	0.18	10.52	13.42	2.9	10.3	12.98	2.68	14.33	13.7	-0.64

Table C-2a. Speed Estimate of Overall Speeds by Road Class (Free-Flow)

	FCC ROAD CLASS											
	1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
	Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
	2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
Mean	70.5	70.38	-0.12	53.28	56.41	3.12	47.01	49.73	2.72	56.39	62.64	6.25
Median	70.84	70.82	-0.02	53.37	57.34	3.97	46.15	49.04	2.89	56	65.3	9.3
Quantile (0.85)	77.96	78.06	0.11	63.68	69.27	5.58	57.82	63.23	5.41	72.99	76	3.01
Quantile (0.95)	81.83	82.21	0.38	70.14	76.22	6.08	65.56	72.14	6.58	78.99	80.8	1.81

Table C-2b. Standard Error of Overall Speeds by Road Class (Free-Flow)

	FCC ROAD CLASS											
	1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
	Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
	2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
Mean	1.02	0.63	1.17	1.22	1.31	1.62	1.23	2.01	2.03	1.47	1.14	1.63
Median	0.84	0.62	1.1	1.3	1.61	1.97	1.37	2.66	2.67	2.03	0.95	1.93
Quantile (0.85)	1.63	0.51	1.72	1.49	1.1	1.37	1.97	2.34	2.46	1.55	0.56	1.72
Quantile (0.95)	0.74	0.57	0.98	1.46	0.9	1.31	1.66	2.63	2.58	1.38	0.5	1.48

Table C-2c. Standard Deviations of Overall Speeds by Road Class (Free-Flow)

	FCC ROAD CLASS											
	1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
	Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation		
	2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
Std Dev	8.11	8.11	0	10.33	13.04	2.71	10.46	13.12	2.66	14.21	13.92	-0.29

Table C-3a. Proportion of Traffic Exceeding Speed Limit by Road Class (All Traffic)

	FCC ROAD CLASS											
	1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
	2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
% Exceeding Speed Limit by Any Amount	70.60%	68.80%	-1.80%	54.70%	56.10%	1.40%	57.40%	58.40%	1.10%	62.50%	64.80%	2.30%
% Exceeding Speed Limit by > 5 mph	44.50%	43.00%	-1.50%	29.70%	33.90%	4.20%	31.40%	34.70%	3.30%	36.70%	40.00%	3.30%
% Exceeding Speed Limit by > 10 mph	19.30%	19.10%	-0.10%	12.10%	16.40%	4.30%	13.80%	17.10%	3.30%	15.80%	18.30%	2.50%

Table C-4a. Proportion of Traffic Exceeding Speed Limit by Road Class (Free-Flow)

	FCC ROAD CLASS											
	1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
	2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
% Exceeding Speed Limit by Any Amount	71.70%	70.10%	-1.60%	55.90%	58.70%	2.80%	59.10%	60.30%	1.20%	62.70%	65.50%	2.90%
% Exceeding Speed Limit by > 5 mph	45.50%	44.90%	-0.60%	31.00%	36.20%	5.20%	33.30%	36.70%	3.40%	36.90%	41.20%	4.30%
% Exceeding Speed Limit by > 10 mph	20.10%	20.30%	0.20%	13.30%	18.10%	4.90%	15.00%	18.60%	3.60%	16.30%	19.40%	3.10%

Table C-5a. Speed Estimate of Speed by Road Type and Time of Day (Free-Flow)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
TIMEDAY		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Late night (000-0559)	Mean	68.62	68.54	-0.08	53.38	57.05	3.68	48.67	50.28	1.61	59.41	64.04	4.64
	Median	67.98	68.6	0.62	53.13	58.06	4.93	48.07	49.44	1.37	61	66	5
	Quantile (0.85)	76.24	76.25	0.01	63.87	70.03	6.16	59.62	63.72	4.11	73	75.1	2.1
	Quantile (0.95)	80.4	80.53	0.14	70.74	77.12	6.37	66.87	72.89	6.02	78	79.87	1.87
2 Morning peak 3 hrs. (0600-0859)	Mean	70.88	70.61	-0.27	54.37	57.6	3.23	48.27	50.83	2.56	56.99	62.92	5.93
	Median	70.98	71.33	0.35	54.6	58.44	3.84	47.45	50.31	2.86	56.69	65.49	8.8
	Quantile (0.85)	78.31	78.39	0.08	64.88	70.25	5.37	59.18	64.17	4.99	73	76.3	3.3
	Quantile (0.95)	82.33	82.46	0.13	71.43	77.08	5.66	66.94	72.82	5.88	78.99	81	2.01
3 Mid-day 7 hrs. (0900-1559)	Mean	70.98	70.88	-0.1	53.14	56.02	2.88	46.82	49.66	2.84	56	62.37	6.37
	Median	71.88	71.31	-0.57	53.37	57.05	3.68	45.98	48.96	2.98	55.31	65.11	9.8
	Quantile (0.85)	78.72	78.31	-0.41	63.52	68.78	5.26	57.69	63.26	5.57	72.99	76.1	3.1
	Quantile (0.95)	81.99	82.4	0.4	69.9	75.93	6.03	65.17	72.19	7.02	78.99	80.9	1.9
4 Evening peak 3 hrs. (1600-1859)	Mean	71.16	70.94	-0.23	53.64	56.99	3.35	46.96	50	3.04	55.55	62.37	6.82
	Median	71.97	71.68	-0.29	53.93	57.99	4.06	46	49.31	3.31	54.6	65.1	10.49
	Quantile (0.85)	78.91	78.87	-0.04	64.08	69.79	5.71	57.88	63.49	5.61	72.99	76.5	3.51
	Quantile (0.95)	82.54	83	0.45	70.51	76.81	6.29	65.62	72.31	6.69	78.99	81.4	2.4
5 Early night 5 hrs. (1900-2359)	Mean	69.94	69.92	-0.02	52.27	55.48	3.21	45.97	48.48	2.51	56.25	62.52	6.27
	Median	69.88	70.18	0.29	52.14	56.2	4.06	44.99	47.37	2.39	56	65.3	9.3
	Quantile (0.85)	77.6	77.51	-0.09	62.56	68.31	5.75	56.37	61.88	5.51	72.99	75.6	2.61
	Quantile (0.95)	81.16	81.65	0.49	69.08	75.1	6.02	63.89	70.7	6.81	78	80.39	2.39
Total	Mean	70.5	70.38	-0.12	53.28	56.41	3.12	47.01	49.73	2.72	56.39	62.64	6.25
	Median	70.84	70.82	-0.02	53.37	57.34	3.97	46.15	49.04	2.89	56	65.3	9.3
	Quantile (0.85)	77.96	78.06	0.11	63.68	69.27	5.58	57.82	63.23	5.41	72.99	76	3.01
	Quantile (0.95)	81.83	82.21	0.38	70.14	76.22	6.08	65.56	72.14	6.58	78.99	80.8	1.81

Table C-5b. Standard Error of Speed by Road Type and Time of Day (Free-Flow)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
TIMEDAY		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Late night (000-0559)	Mean	0.94	0.87	1.3	1.29	1.66	1.69	1.23	1.69	1.84	1.31	1.01	1.54
	Median	1.04	0.81	1.35	1.66	1.93	2.13	1.53	2.13	2.36	1.53	0.84	1.74
	Quantile (0.85)	1.1	0.51	1.25	1.81	1.52	1.5	1.68	2.03	2.23	1.5	0.55	1.71
	Quantile (0.95)	0.83	0.43	1.01	1.41	1.29	1.2	1.19	2.41	2.41	2.72	0.45	2.8
2 Morning peak 3 hrs. (0600-0859)	Mean	1.03	0.64	1.14	1.38	1.34	1.76	1.2	1.95	2.01	1.53	1.17	1.62
	Median	2.58	0.62	2.64	1.44	1.57	2.08	1.46	2.52	2.56	2.11	1.03	1.9
	Quantile (0.85)	0.72	0.4	0.83	1.72	1.15	1.46	1.89	2.08	2.38	1.57	0.45	1.64
	Quantile (0.95)	0.82	0.42	0.92	1.61	1.07	1.18	1.47	2.4	2.51	1.26	0.45	1.3
3 Mid-day 7 hrs. (0900-1559)	Mean	0.98	0.56	1.09	1.14	1.3	1.66	1.29	2.1	2.06	1.5	1.12	1.67
	Median	2.1	0.54	2.09	1.25	1.62	2.01	1.44	2.74	2.7	2.01	0.97	1.9
	Quantile (0.85)	1.37	0.52	1.51	1.42	1.04	1.47	1.92	2.56	2.54	1.71	0.53	1.79
	Quantile (0.95)	0.78	0.62	1.05	1.5	1.08	1.44	1.79	2.86	2.75	1.51	0.55	1.61
4 Evening peak 3 hrs. (1600-1859)	Mean	1.23	0.74	1.33	1.32	1.32	1.68	1.38	2	2.06	1.61	1.23	1.69
	Median	1.26	0.64	1.37	1.41	1.57	2.03	1.46	2.65	2.72	2.11	1.1	1.84
	Quantile (0.85)	0.3	0.56	0.66	1.61	1.07	1.41	2.25	2.25	2.43	1.74	0.62	1.82
	Quantile (0.95)	0.83	0.61	1.07	1.67	1.04	1.51	1.95	2.29	2.22	1.26	0.57	1.34
5 Early night 5 hrs. (1900-2359)	Mean	0.99	0.71	1.28	1.13	1.41	1.57	0.99	1.97	2.04	1.4	1.26	1.69
	Median	1.84	0.74	2.06	1.17	1.71	1.96	1.12	2.53	2.61	2.02	1	2.07
	Quantile (0.85)	0.86	0.6	1.14	1.7	1.11	1.51	1.6	2.29	2.37	1.72	0.62	1.77
	Quantile (0.95)	0.66	0.62	0.95	1.67	0.74	1.42	1.64	2.37	2.27	3.07	0.61	3.18
Total	Mean	1.02	0.63	1.17	1.22	1.31	1.62	1.23	2.01	2.03	1.47	1.14	1.63
	Median	0.84	0.62	1.1	1.3	1.61	1.97	1.37	2.66	2.67	2.03	0.95	1.93
	Quantile (0.85)	1.63	0.51	1.72	1.49	1.1	1.37	1.97	2.34	2.46	1.55	0.56	1.72
	Quantile (0.95)	0.74	0.57	0.98	1.46	0.9	1.31	1.66	2.63	2.58	1.38	0.5	1.48

Table C-5c. Standard Deviations for Speed by Road Type and Time of Day (Free-Flow)

	FCC ROAD CLASS											
	1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
	Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation		
TIMEDAY	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**
1 Late night (000-0559)	7.73	7.99	0.25	10.18	13.13	2.95	10.53	13.12	2.59	12.99	12.12	-0.87
2 Morning peak 3 hrs. (0600-0859)	8.08	8.56	0.49	10.47	12.85	2.38	10.53	13.06	2.53	13.9	13.86	-0.05
3 Mid-day 7 (0900-1559)	7.86	7.74	-0.12	10.34	13.09	2.74	10.49	13.19	2.71	14.32	14.18	-0.15
4 Evening peak 3 Hrs. (1600-1859)	9.22	8.82	-0.4	10.41	13.14	2.73	10.55	13.16	2.61	14.49	14.46	-0.03
5 Early night 5 hrs. (1900-2359)	7.71	7.78	0.07	10.04	12.8	2.76	10.07	12.86	2.78	14.25	13.72	-0.52
Total	8.11	8.11	0	10.33	13.04	2.71	10.46	13.12	2.66	14.21	13.92	-0.29

Table C-6a. Speed Estimate of Speed by Road Type and Light Condition (Spring; Day=6am-9pm, Night=9pm-6am) (Free-Flow)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
LIGHTCONDITION		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Day (0600-2059)	Mean	70.98	70.83	-0.14	53.41	56.51	3.11	47	49.86	2.86	56.06	62.5	6.45
	Median	71.89	71.36	-0.53	53.51	57.41	3.91	46.14	49.16	3.01	55.35	65.2	9.85
	Quantile (0.85)	78.76	78.43	-0.33	63.85	69.33	5.47	57.85	63.38	5.53	72.99	76.2	3.21
	Quantile (0.95)	82.15	82.54	0.39	70.25	76.29	6.04	65.58	72.23	6.64	78.99	81	2.01
2 Night (2100-0559)	Mean	68.91	68.83	-0.08	52.62	55.82	3.2	47.08	48.93	1.85	57.96	63.19	5.24
	Median	68.88	68.97	0.09	52.27	56.5	4.23	46.2	47.92	1.72	59	65.59	6.59
	Quantile (0.85)	76.48	76.5	0.02	63	68.77	5.78	57.71	62.26	4.55	72.99	75.1	2.1
	Quantile (0.95)	80.46	80.71	0.25	69.83	75.76	5.93	65.16	71.22	6.07	78	79.79	1.8
Total	Mean	70.5	70.38	-0.12	53.28	56.41	3.12	47.01	49.73	2.72	56.39	62.64	6.25
	Median	70.84	70.82	-0.02	53.37	57.34	3.97	46.15	49.04	2.89	56	65.3	9.3
	Quantile (0.85)	77.96	78.06	0.11	63.68	69.27	5.58	57.82	63.23	5.41	72.99	76	3.01
	Quantile (0.95)	81.83	82.21	0.38	70.14	76.22	6.08	65.56	72.14	6.58	78.99	80.8	1.81

Table C-6b. Standard Error of Speed by Road Type and Light Condition (Spring; Day=6am-9pm, Night=9pm-6am) (Free-Flow)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
LIGHTCONDITION		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Day (0600-2059)	Mean	1.02	0.59	1.13	1.22	1.3	1.66	1.27	2.04	2.05	1.51	1.15	1.65
	Median	2.05	0.57	2.04	1.34	1.56	2.01	1.39	2.66	2.67	2.07	0.98	1.91
	Quantile (0.85)	1.16	0.51	1.31	1.43	1.02	1.29	2.01	2.38	2.49	1.61	0.55	1.67
	Quantile (0.95)	0.77	0.59	1.01	1.54	0.87	1.44	1.7	2.59	2.54	1.26	0.55	1.38
2 Night (2100-0559)	Mean	0.97	0.81	1.31	1.23	1.52	1.56	1.08	1.82	1.96	1.37	1.14	1.62
	Median	1.06	0.78	1.49	1.49	1.85	2.02	1.26	2.49	2.62	1.97	0.91	2.15
	Quantile (0.85)	0.91	0.54	1.14	1.76	1.2	1.4	1.7	2.02	2.25	1.26	0.59	1.47
	Quantile (0.95)	0.77	0.52	0.99	1.72	1.14	1.27	1.35	2.26	2.29	1.06	0.53	1.26
Total	Mean	1.02	0.63	1.17	1.22	1.31	1.62	1.23	2.01	2.03	1.47	1.14	1.63
	Median	0.84	0.62	1.1	1.3	1.61	1.97	1.37	2.66	2.67	2.03	0.95	1.93
	Quantile (0.85)	1.63	0.51	1.72	1.49	1.1	1.37	1.97	2.34	2.46	1.55	0.56	1.72
	Quantile (0.95)	0.74	0.57	0.98	1.46	0.9	1.31	1.66	2.63	2.58	1.38	0.5	1.48

Table C-6b. Standard Error of Speed by Road Type and Light Condition (Spring; Day=6am-9pm, Night=9pm-6am) (Free-Flow)

	FCC ROAD CLASS											
	1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
	Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation		
LIGHTCONDITION	2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Day (0600-2059)	8.17	8.11	-0.06	10.38	13.04	2.66	10.49	13.15	2.66	14.31	14.16	-0.15
2 Night (2100-0559)	7.71	7.94	0.23	10.05	13	2.95	10.31	12.92	2.61	13.6	12.83	-0.77
Total	8.11	8.11	0	10.33	13.04	2.71	10.46	13.12	2.66	14.21	13.92	-0.29

Table C-7a. Speed Estimate of Speed by Road Type and Day of Week (Free-Flow)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
DAYWEEK		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
Mon	**Mean**	67.61	70.14	2.53	52.24	57.16	4.92	46.53	48.55	2.02	52.53	60.81	8.28
	Median	66.93	70.42	3.49	52.3	57.38	5.08	45.16	46.82	1.66	51.94	63.09	11.16
	Quantile (0.85)	74.97	77.96	2.99	65.05	68.35	3.3	58.17	62.01	3.84	67.21	75.2	7.98
	Quantile (0.95)	79.58	82.14	2.56	71.48	75.42	3.94	65.87	72.19	6.33	74.17	80.39	6.22
Tue	**Mean**	70.25	69.14	-1.11	55.36	56.5	1.14	46.88	49.5	2.62	54.14	61.21	7.08
	Median	70.59	70.05	-0.54	55.31	57.12	1.81	46.59	49.37	2.78	53.36	63.73	10.37
	Quantile (0.85)	77.31	77.31	0	63.85	70.08	6.23	56.73	61.61	4.87	69	75.09	6.09
	Quantile (0.95)	80.9	81.34	0.44	69.86	77.11	7.26	63.29	69.9	6.61	76	79.9	3.9
Wed	**Mean**	67.61	70.45	2.85	52.46	56.2	3.74	47.08	49.52	2.45	53.82	63.2	9.38
	Median	67.6	71	3.4	52.68	57.92	5.24	45.36	49.47	4.12	53.37	66.02	12.65
	Quantile (0.85)	75.23	78.11	2.88	62.37	70.78	8.41	59.01	61.92	2.91	69	76.31	7.31
	Quantile (0.95)	79.49	82.18	2.69	68.89	77.88	8.99	66.45	69.53	3.08	75	81	6
Thu	**Mean**	69.84	70.31	0.48	52.71	59.44	6.72	49.23	51.86	2.63	57.86	62.94	5.08
	Median	69.75	70.56	0.81	53.99	61.31	7.33	48.38	51.59	3.21	59	65.49	6.49
	Quantile (0.85)	77.84	77.76	-0.08	64.88	70.6	5.72	62.22	66.48	4.25	74	75.7	1.7
	Quantile (0.95)	81.85	81.76	-0.09	71.56	76.5	4.93	69.97	74.71	4.74	79	80.49	1.49
Fri	**Mean**	71.39	70.89	-0.5	54	56.93	2.93	46.14	52.55	6.41	60.13	63.54	3.41
	Median	71.12	71.25	0.13	53.74	57.4	3.66	45.36	52.5	7.14	63	66.05	3.05
	Quantile (0.85)	78.42	78.27	-0.15	64.46	68.86	4.41	56.71	66.79	10.08	75.97	76.2	0.23
	Quantile (0.95)	82.44	82.3	-0.15	70.57	75.74	5.17	63.5	74.74	11.25	80.98	80.9	-0.09
Sat	**Mean**	72.3	71.08	-1.22	51.73	54.28	2.55	47.21	47.49	0.28	55.73	63.43	7.7
	Median	72.83	71.41	-1.43	51.94	54.98	3.04	47.33	46.5	-0.84	53.89	66.3	12.41
	Quantile (0.85)	78.98	78.55	-0.43	60.31	66.45	6.14	56.8	59.99	3.19	73.27	76.69	3.42
	Quantile (0.95)	82.46	82.89	0.43	65.82	74.52	8.71	63.2	68.13	4.92	79	81.5	2.5

Table C-7a. Speed Estimate of Speed by Road Type and Day of Week (Free-Flow) (continued)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
DAYWEEK		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
Sun	Mean	71.57	70.6	-0.97	55.27	54.48	-0.79	44.89	47.41	2.52	59.04	63.77	4.73
	Median	72.51	70.95	-1.57	53.98	55.08	1.1	44.88	46.04	1.16	59.59	66.59	7.01
	Quantile (0.85)	78.83	78.38	-0.45	65.19	67.76	2.57	53.65	60.07	6.43	75.81	76.79	0.98
	Quantile (0.95)	82.26	82.62	0.36	71.88	75.43	3.55	59.46	69.51	10.05	79.98	81.5	1.51
Total	Mean	70.5	70.38	-0.12	53.28	56.41	3.12	47.01	49.73	2.72	56.39	62.64	6.25
	Median	70.84	70.82	-0.02	53.37	57.34	3.97	46.15	49.04	2.89	56	65.3	9.3
	Quantile (0.85)	77.96	78.06	0.11	63.68	69.27	5.58	57.82	63.23	5.41	72.99	76	3.01
	Quantile (0.95)	81.83	82.21	0.38	70.14	76.22	6.08	65.56	72.14	6.58	78.99	80.8	1.81

Table C-7b. Standard Error of Speed by Road Type and Day of Week (Free-Flow)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
DAYWEEK		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
Mon	Mean	1.55	0.81	1.68	5.62	1.95	6.05	2.52	2.23	3.45	2.05	1.08	2.33
	Median	1.61	0.94	1.8	7.44	2.15	7.56	2.54	2.5	3.59	3.73	1.01	3.61
	Quantile (0.85)	1.09	0.72	1.27	5.85	2.06	6.11	3.89	3.43	5.4	1.93	0.85	2.25
	Quantile (0.95)	0.93	0.68	1.12	5.18	1.98	5.58	3.94	4.42	6.65	1.75	0.77	2.06
Tue	Mean	2.19	0.68	2.28	1.32	2.31	3.85	2.03	1.64	2.71	2.18	0.91	2.3
	Median	1.92	0.64	1.98	1.55	2.76	4.43	2.2	2.05	3.11	2.15	0.96	2.55
	Quantile (0.85)	1.14	0.38	1.21	0.93	1.24	1.95	2.49	1.35	2.72	4.57	0.51	4.42
	Quantile (0.95)	1.1	0.44	1.21	1.04	1.09	1.78	2.84	1.43	3.16	2.8	0.42	2.74
Wed	Mean	1.58	0.63	1.7	2.61	1.54	2.83	3.93	2.19	4.42	1.53	1.52	2.01
	Median	1.38	0.54	1.5	2.17	2.34	2.94	3.13	2.97	4.15	2.11	1.39	2.01
	Quantile (0.85)	1.71	0.47	1.77	2.62	1.51	2.93	7.39	1.83	7.53	2.52	0.65	2.7
	Quantile (0.95)	1.93	0.57	1.99	2.71	1.29	2.97	7.95	1.48	8.05	2.31	0.64	2.55
Thu	Mean	1.88	0.42	1.9	6.28	2.2	6.44	2.93	3.13	3.14	2.85	1.62	2.91
	Median	2.55	0.48	2.6	5.29	1.82	5.56	3.97	4.48	4.59	3.78	1.02	3.56
	Quantile (0.85)	1.38	0.45	1.46	5.1	0.86	5.13	4.44	2.97	3.33	2.78	0.48	2.76
	Quantile (0.95)	1.34	0.46	1.43	5.02	0.6	4.97	3.58	2.64	3.53	2.55	0.42	2.56
Fri	Mean	1.39	0.67	1.7	4.36	1.49	4.1	1.59	3.32	4.37	2.06	1.31	2.53
	Median	1.73	0.66	2.03	5.03	2.14	4.78	2.03	4.46	5.58	3.01	1.1	3.13
	Quantile (0.85)	1.44	0.61	1.69	4.76	1.28	4.29	1.69	3.6	5.15	1.28	0.55	1.64
	Quantile (0.95)	1.37	0.71	1.65	4.34	1.33	3.49	1.95	3.73	5.46	1.54	0.56	1.79
Sat	Mean	2.66	0.95	2.75	3.61	1.78	5.02	1.57	1.68	2.12	3.28	1.77	3.47
	Median	2.72	0.92	2.77	4.25	1.53	5.1	1.65	2.08	2.51	3.15	1.61	3.29
	Quantile (0.85)	1.12	0.83	1.35	3	1.48	3.71	1.9	2.14	2.53	6.05	0.97	6.05
	Quantile (0.95)	0.97	0.93	1.35	2.34	1.8	3.23	2.72	1.54	2.55	2.49	0.93	2.6

Table C-7b. Standard Error of Speed by Road Type and Day of Week (Free-Flow) (continued)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
DAYWEEK		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
Sun	Mean	1.52	0.86	1.84	3.44	2.14	2.21	0.95	1.71	2.32	4.57	1.89	4.16
	Median	1.77	0.95	2.1	4.86	2.47	3.34	0.97	1.83	2.42	8.47	1.75	8.09
	Quantile (0.85)	0.28	0.92	1.03	4.06	2.02	3.05	0.76	2.6	3.37	3.55	1.04	3.76
	Quantile (0.95)	0.72	1	1.39	3.3	1.64	2.86	1.3	3.45	4.5	1.6	1.03	1.96
Total	Mean	1.02	0.63	1.17	1.22	1.31	1.62	1.23	2.01	2.03	1.47	1.14	1.63
	Median	0.84	0.62	1.1	1.3	1.61	1.97	1.37	2.66	2.67	2.03	0.95	1.93
	Quantile (0.85)	1.63	0.51	1.72	1.49	1.1	1.37	1.97	2.34	2.46	1.55	0.56	1.72
	Quantile (0.95)	0.74	0.57	0.98	1.46	0.9	1.31	1.66	2.63	2.58	1.38	0.5	1.48

Table C-7c. Standard Deviation of Speed by Road Type and Day of Week (Free-Flow)

	FCC ROAD CLASS											
	1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
	Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation		
DAYWEEK	2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
Mon	7.98	8.08	0.1	11.71	11.8	0.08	10.75	13.17	2.42	13.14	14.26	1.12
Tue	8.59	9.01	0.42	8.82	13.25	4.43	9.71	12.46	2.74	12.85	13.96	1.1
Wed	8.99	8.3	-0.68	10.21	14.33	4.12	10.8	12.52	1.71	13.2	13.97	0.77
Thu	8.37	7.56	-0.82	12.51	12.64	0.12	11.83	13.99	2.16	14.5	13.6	-0.91
Fri	7.38	7.75	0.37	10.02	12.45	2.43	10.09	13.7	3.61	14.79	13.37	-1.42
Sat	7.49	7.8	0.31	8.81	12.88	4.07	9.68	12.14	2.46	14	14.01	0
Sun	7.81	7.95	0.13	9.29	13.27	3.99	8.87	12.42	3.55	14.59	13.83	-0.76
Total	8.11	8.11	0	10.33	13.04	2.71	10.46	13.12	2.66	14.21	13.92	-0.29

Table C-8a. Speed Estimate of Speed by Road Type and Horizontal Curvature Class (Free-Flow)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
HOR_CURVERDCLASS		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Straight	Mean	70.69	70.36	-0.32	52.99	56.65	3.66	47.71	49.93	2.21	56.72	63.14	6.42
	Median	70.92	70.81	-0.11	52.99	57.48	4.49	46.88	49.17	2.29	56.06	65.7	9.64
	Quantile (0.85)	78.69	78.07	-0.62	63.52	69.36	5.84	58.35	63.38	5.02	73	76.2	3.2
	Quantile (0.95)	82	82.22	0.22	70.09	76.3	6.21	66.08	72.2	6.12	78.99	80.9	1.9
2 Moderate	Mean	68.91	72.24	3.33	58.45	49.43	-9.02	41.92	48.86	6.94	52.87	51.4	-1.47
	Median	69.33	72.67	3.34	58.7	50.22	-8.49	39.81	48.05	8.25	53.55	50.2	-3.35
	Quantile (0.85)	76.89	77.5	0.61	65.7	62.77	-2.93	53.95	62.19	8.24	70.99	68.13	-2.86
	Quantile (0.95)	80.32	80.61	0.29	70.84	70.54	-0.29	60.36	71.76	11.39	76.99	76.2	-0.79
3 Sharp	Mean	68.56	.	.	58.19	40.53	-17.67	41.09	39.93	-1.16	54.3	40.18	-14.12
	Median	67.77	.	.	58.2	39.55	-18.65	39.04	35.75	-3.29	57.5	38.13	-19.37
	Quantile (0.85)	74.88	.	.	65.12	46.85	-18.27	52.63	56.25	3.63	71.98	51.81	-20.17
	Quantile (0.95)	78.36	.	.	69.82	53.88	-15.94	59.52	64.27	4.75	76.97	62.08	-14.88
Total	Mean	70.5	70.38	-0.12	53.28	56.41	3.12	47.01	49.73	2.72	56.39	62.64	6.25
	Median	70.84	70.82	-0.02	53.37	57.34	3.97	46.15	49.04	2.89	56	65.3	9.3
	Quantile (0.85)	77.96	78.06	0.11	63.68	69.27	5.58	57.82	63.23	5.41	72.99	76	3.01
	Quantile (0.95)	81.83	82.21	0.38	70.14	76.22	6.08	65.56	72.14	6.58	78.99	80.8	1.81

Table C-8b. Standard Error of Speed by Road Type and Horizontal Curvature Class (Free-Flow)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
HOR_CURVERDCLASS		**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**
1 Straight	**Mean**	1.01	0.63	1.16	1.2	1.29	1.61	1.25	1.92	2.02	1.55	1.11	1.69
	Median	1.72	0.63	1.86	1.31	1.58	1.99	1.39	2.52	2.64	2.19	0.89	2.09
	Quantile (0.85)	1.56	0.51	1.6	1.63	1	1.39	2.05	2.17	2.38	1.65	0.55	1.75
	Quantile (0.95)	0.73	0.56	0.97	1.57	0.9	1.34	1.7	2.4	2.38	1.26	0.51	1.37
2 Moderate	**Mean**	3.98	0.58	4.11	1.7	4.56	6.01	1.83	3.1	3.8	3.35	2.65	4.4
	Median	4.66	0.31	4.72	2.1	8.18	9.96	1.72	3.56	4.32	4.95	3.61	6.11
	Quantile (0.85)	3.44	0.91	3.63	0.96	2.78	3.89	3.19	4.44	5.51	6	3.73	7.09
	Quantile (0.95)	2.85	1.16	3.25	1.11	3.41	4.87	2.36	4.95	6.26	5.12	1.7	5.35
3 Sharp	**Mean**	1.78	.	.	.	2.01	.	1.75	6.23	6.48	5.03	3.02	5.87
	Median	2.57	.	.	.	2.25	.	1.32	7.33	7.45	11.89	2.49	12.14
	Quantile (0.85)	1.86	.	.	.	2.13	.	5.15	10.08	11.32	3.48	6.66	7.51
	Quantile (0.95)	1.34	.	.	.	1.5	.	4.38	6.96	8.22	2.9	6	6.67
Total	**Mean**	1.02	0.63	1.17	1.22	1.31	1.62	1.23	2.01	2.03	1.47	1.14	1.63
	Median	0.84	0.62	1.1	1.3	1.61	1.97	1.37	2.66	2.67	2.03	0.95	1.93
	Quantile (0.85)	1.63	0.51	1.72	1.49	1.1	1.37	1.97	2.34	2.46	1.55	0.56	1.72
	Quantile (0.95)	0.74	0.57	0.98	1.46	0.9	1.31	1.66	2.63	2.58	1.38	0.5	1.48

Table C-8c. Standard Deviation of Speed by Road Type and Horizontal Curvature Class (Free-Flow)

	FCC ROAD CLASS											
	1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
	Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation			Speed Standard		
HOR_CURVERD CLASS	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**
1 Straight	8.12	8.13	0.01	10.38	12.95	2.58	10.33	13.09	2.77	14.03	13.66	-0.37
2 Moderate	8.59	5.72	-2.87	7.83	13.39	5.55	10.14	13.12	2.98	15.37	14.48	-0.89
3 Sharp	6.39	.	.	7.22	7.8	0.57	9.42	13.09	3.67	15.64	11.22	-4.42
Total	8.11	8.11	0	10.33	13.04	2.71	10.46	13.12	2.66	14.21	13.92	-0.29

Table C-9a. Speed Estimate of Speed by Road Type and Vertical Curvature Class (Free-Flow)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
VER_CURVERD CLASS		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Flat	Mean	70.56	70.38	-0.19	53.26	56.64	3.38	47.13	49.8	2.67	56.69	62.79	6.1
	Median	70.88	70.82	-0.06	53.37	57.51	4.14	46.38	49.07	2.69	56.38	65.4	9.02
	Quantile (0.85)	77.99	78.07	0.08	63.74	69.39	5.64	57.82	63.28	5.46	73	76.09	3.1
	Quantile (0.95)	81.87	82.21	0.34	70.14	76.32	6.18	65.56	72.19	6.63	78.99	80.87	1.88
2 Moderate	Mean	66.67	70.86	4.19	52.59	50.39	-2.2	46.93	44.96	-1.97	50.72	51.18	0.46
	Median	65.68	70.81	5.13	52.19	50.91	-1.28	44.77	44.37	-0.4	49.82	50.95	1.12
	Quantile (0.85)	71.81	76.59	4.78	57.77	62.1	4.33	59.54	58.29	-1.25	65	66.66	1.67
	Quantile (0.95)	75.7	80.57	4.88	62.62	69.32	6.7	66.45	65.99	-0.46	70.91	74.49	3.58
3 Steep	Mean	68.59	.	.	55.62	44.1	-11.51	39.73	52.49	12.76	44.53	51.95	7.42
	Median	68.45	.	.	57.02	43.23	-13.79	39.48	54.47	14.99	42.6	53.49	10.89
	Quantile (0.85)	74.55	.	.	67.45	50.59	-16.85	47.63	64.21	16.58	58.37	63.7	5.33
	Quantile (0.95)	77.99	.	.	73.27	57.73	-15.54	52.59	71.29	18.7	67.07	70.85	3.78
Total	Mean	70.5	70.38	-0.12	53.28	56.41	3.12	47.01	49.73	2.72	56.39	62.64	6.25
	Median	70.84	70.82	-0.02	53.37	57.34	3.97	46.15	49.04	2.89	56	65.3	9.3
	Quantile (0.85)	77.96	78.06	0.11	63.68	69.27	5.58	57.82	63.23	5.41	72.99	76	3.01
	Quantile (0.95)	81.83	82.21	0.38	70.14	76.22	6.08	65.56	72.14	6.58	78.99	80.8	1.81

Table C-9b. Standard Error of Speed by Road Type and Vertical Curvature Class (Free-Flow)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
VER_CURVERD CLASS		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Flat	Mean	1.02	0.63	1.17	1.24	1.36	1.73	1.17	2.04	1.99	1.49	1.15	1.65
	Median	1.23	0.62	1.42	1.3	1.67	2.1	1.32	2.69	2.64	2.13	0.96	2.05
	Quantile (0.85)	2.09	0.51	2.11	1.56	1.03	1.38	1.86	2.38	2.4	1.8	0.52	1.88
	Quantile (0.95)	0.72	0.57	0.96	1.54	0.95	1.46	1.65	2.61	2.42	1.26	0.54	1.34
2 Moderate	Mean	.	.	.	.	7.47	.	4.05	2.97	4.69	3.44	4.84	5.37
	Median	.	.	.	.	8.63	.	4.46	3.78	5.63	5.87	6.78	6.27
	Quantile (0.85)	.	.	.	.	9.89	.	5.34	3.7	5.42	4.57	4.95	6.75
	Quantile (0.95)	.	.	.	.	11.02	.	4.75	2.03	4.71	4.02	4.53	6.06
3 Steep	Mean	.	.	.	10.87	2.61	12.92	2.73	6.18	7.9	4.44	5.81	8.44
	Median	.	.	.	11.8	2.82	14.08	3.68	9.69	12.83	3.12	8.35	11.23
	Quantile (0.85)	.	.	.	14.19	1.89	14.41	3.32	3.32	5.35	10.26	3.49	11.15
	Quantile (0.95)	.	.	.	14.6	2.16	13.53	3.79	3.27	5.58	11.97	3.11	12.67
Total	Mean	1.02	0.63	1.17	1.22	1.31	1.62	1.23	2.01	2.03	1.47	1.14	1.63
	Median	0.84	0.62	1.1	1.3	1.61	1.97	1.37	2.66	2.67	2.03	0.95	1.93
	Quantile (0.85)	1.63	0.51	1.72	1.49	1.1	1.37	1.97	2.34	2.46	1.55	0.56	1.72
	Quantile (0.95)	0.74	0.57	0.98	1.46	0.9	1.31	1.66	2.63	2.58	1.38	0.5	1.48

Table C-9c. Standard Deviation of Speed by Road Type and Vertical Curvature Class (Free-Flow)

	FCC ROAD CLASS											
	1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
	Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation			Speed Standard		
VER_CURVERDCLASS	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**
1 Flat	8.13	8.12	-0.02	10.35	13.03	2.68	10.43	13.11	2.68	14.21	13.85	-0.35
2 Moderate	5.46	5.95	0.49	5.79	11.67	5.88	11.02	13.07	2.05	12.33	13.96	1.64
3 Steep	7.16	.	.	11.76	8.67	-3.09	7.54	12.64	5.1	11.67	12.59	0.93
Total	8.11	8.11	0	10.33	13.04	2.71	10.46	13.12	2.66	14.21	13.92	-0.29

Table C-10a. Speed Estimate of Speed by Road Type by Urbanicity (Urban/Suburban, Suburban, Rural) (Free-Flow)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
URBANICITY		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Urban	Mean	61.53	70.67	9.15	47.34	43.8	-3.54	39.82	38.71	-1.11	44.33	56.81	12.48
	Median	63.2	71.15	7.95	46.85	42.97	-3.88	39.65	37.99	-1.66	42.27	60.89	18.61
	Quantile (0.85)	70.58	78.63	8.04	53.65	52.5	-1.15	47.2	46.55	-0.65	57.23	75.88	18.65
	Quantile (0.95)	74.92	82.95	8.04	58.94	63.19	4.25	52.68	53.22	0.54	66.99	80.9	13.91
2 Urban-Suburban	Mean	71.6	69.03	-2.57	54.65	53.69	-0.97	47.83	42.57	-5.25	57.84	64.03	6.19
	Median	71.98	69.45	-2.53	54.35	53.23	-1.12	47.24	42.5	-4.74	57.34	66.58	9.24
	Quantile (0.85)	78.77	77.21	-1.56	63.85	63.42	-0.43	58.3	51.91	-6.4	74	76.27	2.27
	Quantile (0.95)	81.99	81.25	-0.74	70.09	76.29	6.2	65.77	59.38	-6.39	79	80.7	1.7
3 Suburban	Mean	67.37	68.98	1.61	47.48	52.87	5.39	44.53	44.63	0.1	53.24	59.92	6.68
	Median	66.79	69.36	2.57	47.21	52.26	5.06	43.55	43.78	0.23	52.1	63.3	11.19
	Quantile (0.85)	74.9	76.94	2.03	58.84	67.58	8.75	54.26	55.24	0.98	69.97	74.79	4.83
	Quantile (0.95)	79.32	80.95	1.63	66.1	75.08	8.98	61	63.38	2.38	75.96	79.58	3.62
4 Rural	Mean	72.97	72.03	-0.94	54.79	59.16	4.37	51.89	55.93	4.04	58.54	65.02	6.48
	Median	73	72.32	-0.67	55.74	59.95	4.21	52.25	56.11	3.87	58.97	66.7	7.73
	Quantile (0.85)	80.38	79.09	-1.29	65.95	70.32	4.37	63.97	67.94	3.97	74	76.9	2.9
	Quantile (0.95)	84.29	83.31	-0.99	72.18	76.95	4.76	70.23	75.77	5.54	79.99	81.74	1.76
Total	Mean	70.5	70.38	-0.12	53.28	56.41	3.12	47.01	49.73	2.72	56.39	62.64	6.25
	Median	70.84	70.82	-0.02	53.37	57.34	3.97	46.15	49.04	2.89	56	65.3	9.3
	Quantile (0.85)	77.96	78.06	0.11	63.68	69.27	5.58	57.82	63.23	5.41	72.99	76	3.01
	Quantile (0.95)	81.83	82.21	0.38	70.14	76.22	6.08	65.56	72.14	6.58	78.99	80.8	1.81

Table C-10b. Standard Error of Speed by Road Type by Urbanicity (Urban/Suburban, Suburban, Rural) (Free-Flow)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
URBANICITY		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Urban	Mean	.	2.01	.	3.79	2.57	4.87	2.83	0.74	2.85	4.85	7.45	8.8
	Median	.	2.21	.	3.74	3.67	5.32	2.78	0.71	2.8	3.49	15.98	16.93
	Quantile (0.85)	.	1.07	.	5.48	7.54	9.77	3.62	1.33	3.79	10.27	3.48	10.59
	Quantile (0.95)	.	0.93	.	6.71	9.28	12.5	4	2.47	4.61	12.91	2.26	13.04
2 Urban-Suburban	Mean	1.14	1.76	1.69	1.79	1.22	1.51	1.57	1.23	2.07	1.91	5.1	4.88
	Median	1.34	1.65	1.47	1.92	0.68	1.65	1.67	1.36	2.43	2.88	5.67	4.84
	Quantile (0.85)	0.92	1.39	0.98	2.74	2.36	2.35	2.39	1.37	2.59	2.01	2.83	3.04
	Quantile (0.95)	0.86	1.3	0.99	3.13	7.03	6.49	2.19	2.09	3.11	1.08	2.04	2.11
3 Suburban	Mean	0.51	0.89	1.07	3.12	1.66	3.57	1.44	1.48	2.18	1.25	1.92	2.38
	Median	0.49	0.97	1.16	3.15	2.24	3.83	1.58	1.75	2.45	2.48	2.06	3.19
	Quantile (0.85)	0.68	0.65	1.05	3.61	1.72	4.02	2.25	2	3.08	2.26	1	2.65
	Quantile (0.95)	0.72	0.58	1.04	4.22	1.08	4.38	2.47	1.84	3.24	0.95	0.68	1.25
4 Rural	Mean	.	0.56	.	2.07	1.22	3.04	6.19	1.86	4.96	6.2	0.82	6.4
	Median	.	0.51	.	1.2	1.26	2.26	8.46	1.89	7.24	7.26	0.93	7.4
	Quantile (0.85)	.	0.69	.	0.68	1.03	1.76	6.3	2.35	4.42	8.93	0.68	9
	Quantile (0.95)	.	0.83	.	0.85	1.26	2.21	3.88	2.58	2.29	8.12	0.79	8.2
Total	Mean	1.02	0.63	1.17	1.22	1.31	1.62	1.23	2.01	2.03	1.47	1.14	1.63
	Median	0.84	0.62	1.1	1.3	1.61	1.97	1.37	2.66	2.67	2.03	0.95	1.93
	Quantile (0.85)	1.63	0.51	1.72	1.49	1.1	1.37	1.97	2.34	2.46	1.55	0.56	1.72
	Quantile (0.95)	0.74	0.57	0.98	1.46	0.9	1.31	1.66	2.63	2.58	1.38	0.5	1.48

Table C-10c. Standard Deviation of Speed by Road Type by Urbanicity (Urban/Suburban, Suburban, Rural) (Free-Flow)

	FCC ROAD CLASS											
	1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
	Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation		
URBANICITY	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**
1 Urban	12.87	8.55	-4.32	6.73	10.83	4.11	7.6	8.97	1.37	11.64	17.63	6
2 Urban-Suburban	7.47	8.51	1.04	9.08	12.59	3.51	10.38	10.64	0.26	13.98	13.28	-0.71
3 Suburban	8.14	8.35	0.22	11.17	13.7	2.53	9.3	11.17	1.87	14.1	14.85	0.74
4 Rural	7.79	7.4	-0.39	11.09	11.88	0.79	11.41	12.32	0.91	13.62	12.36	-1.25
Total	8.11	8.11	0	10.33	13.04	2.71	10.46	13.12	2.66	14.21	13.92	-0.29

Table C-11a. Speed Estimate of Speed by Road Type by Vehicle Length Class (<20, 20-29, 30-39, 40-49, 50-79, 80-10) (Free-Flow)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
VEH_LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 (<20 ft)	Mean	71.33	71.4	0.07	51.05	55.22	4.16	45.03	48.34	3.31	54.95	62.61	7.67
	Median	71.93	72.01	0.08	51.34	56.07	4.74	44.21	47.44	3.23	53.37	65.78	12.42
	Quantile (0.85)	78.82	78.75	-0.08	60.79	67.84	7.05	55.22	61.34	6.12	72.99	76.59	3.6
	Quantile (0.95)	82.43	82.77	0.34	66.46	74.3	7.84	62.06	69.36	7.3	79	81.09	2.09
2 (20-<30 ft)	Mean	71.8	70.98	-0.82	56.71	60.08	3.37	50.68	53.11	2.43	58.09	62.5	4.42
	Median	72.64	71.79	-0.85	56.96	61	4.05	50.06	52.58	2.52	57.74	64.6	6.86
	Quantile (0.85)	78.88	78.65	-0.23	67.06	72.6	5.54	62	67.04	5.04	73.74	76.2	2.46
	Quantile (0.95)	82.18	82.92	0.74	73.16	80.06	6.91	69.4	75.93	6.53	78.99	81.5	2.5
3 (30-<40 ft)	Mean	67.59	67.06	-0.53	56.34	56.61	0.27	51.37	52.96	1.6	57.73	60.72	2.99
	Median	67.72	67.33	-0.4	56.31	57.99	1.68	50.83	52.67	1.85	58	62.9	4.9
	Quantile (0.85)	75.91	75.29	-0.62	67.6	69.65	2.05	62.92	68.03	5.12	71.23	73.6	2.36
	Quantile (0.95)	79.88	79.68	-0.2	75.05	78.63	3.58	71.3	79.88	8.58	77.29	79.6	2.3
4 (40-<50 ft)	Mean	66.71	67.07	0.36	56.18	55.75	-0.44	51.92	52.82	0.9	58.97	61.39	2.42
	Median	66.74	67.44	0.71	56.76	57.34	0.58	52.14	52.83	0.69	60	63.72	3.72
	Quantile (0.85)	74.46	75.07	0.61	66.1	69.38	3.28	62.25	67.51	5.26	71	73.7	2.7
	Quantile (0.95)	78.31	79.3	0.99	72.61	77.84	5.23	69.08	77.61	8.53	76.04	79	2.96
5 (50-<80 ft)	Mean	65.36	65.62	0.26	55.8	56.17	0.37	52.87	53.15	0.28	63.3	64.01	0.71
	Median	64.95	65.58	0.63	56.79	57.65	0.86	54.28	53.14	-1.13	64	65	1
	Quantile (0.85)	71.58	71.46	-0.12	65.86	69.13	3.26	63.58	68.38	4.8	71	71.3	0.3
	Quantile (0.95)	75.26	74.92	-0.34	72.14	78.06	5.93	69.34	78.68	9.34	75	75.2	0.2
6 (80-<100 ft)	Mean	66.15	68.64	2.49	58.48	57.33	-1.15	55.01	53.27	-1.74	64.93	66.67	1.75
	Median	66.05	69.13	3.08	59.53	59.5	-0.03	56.42	53.61	-2.81	65.96	68.24	2.27
	Quantile (0.85)	72.8	74.65	1.85	66.58	68.57	1.99	63.85	66.05	2.2	72.93	74.37	1.44
	Quantile (0.95)	76.67	77.56	0.89	71.51	74.93	3.42	69.97	77.91	7.95	76.32	77.49	1.18
Total	Mean	70.5	70.38	-0.12	53.28	56.41	3.12	47.01	49.73	2.72	56.39	62.64	6.25
	Median	70.84	70.82	-0.02	53.37	57.34	3.97	46.15	49.04	2.89	56	65.3	9.3
	Quantile (0.85)	77.96	78.06	0.11	63.68	69.27	5.58	57.82	63.23	5.41	72.99	76	3.01
	Quantile (0.95)	81.83	82.21	0.38	70.14	76.22	6.08	65.56	72.14	6.58	78.99	80.8	1.81

Table C-11b. Standard Error of Speed by Road Type by Vehicle Length Class (<20, 20-29, 30-39, 40-49, 50-79, 80-10) (Free-Flow)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
VEH_LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 (<20 ft)	Mean	1.26	0.74	1.4	0.93	1.21	1.43	1.04	2.09	2.11	1.59	1.22	1.78
	Median	1.45	0.71	1.58	0.96	1.53	1.72	1.18	2.55	2.65	1.97	1.2	1.94
	Quantile (0.85)	1.28	0.54	1.39	1.24	1.09	0.99	1.47	2.5	2.55	2.17	0.59	2.14
	Quantile (0.95)	1.08	0.61	1.24	1.31	0.95	0.88	1.66	2.98	2.99	1.26	0.56	1.34
2 (20-<30 ft)	Mean	0.95	0.82	1.17	1.44	1.64	2.05	1.38	2.13	2.25	1.17	1.38	1.72
	Median	1.23	0.78	1.31	1.56	1.87	2.5	1.58	2.77	2.94	1.44	1.26	1.87
	Quantile (0.85)	0.21	0.65	0.72	1.5	0.91	1.49	1.86	2.26	2.52	1.68	0.63	1.77
	Quantile (0.95)	0.49	0.74	0.89	1.25	1.04	1.26	1.48	2	2.14	0.45	0.67	0.74
3 (30-<40 ft)	Mean	1	0.68	1.15	1.21	1.06	1.43	1.24	1.17	1.48	1.04	0.78	1.19
	Median	0.79	0.58	0.96	1.35	0.97	1.49	1.7	1.48	2	1.28	0.72	1.38
	Quantile (0.85)	0.34	0.49	0.62	1.17	1.04	1.64	1.08	1.17	1.46	1.3	0.57	1.47
	Quantile (0.95)	0.63	0.57	0.88	0.85	1.39	1.96	1.04	1.33	1.96	1.49	0.61	1.69
4 (40-<50 ft)	Mean	0.93	0.68	1.06	0.96	1.06	1.23	1.58	1.39	1.74	1.05	0.84	1.27
	Median	0.88	0.61	1.04	1.19	0.98	1.39	1.79	1.73	2.47	1.07	0.77	1.33
	Quantile (0.85)	0.7	0.49	0.87	0.76	1.09	1.37	1.04	1.44	1.45	1.1	0.63	1.36
	Quantile (0.95)	0.56	0.5	0.77	1.03	1.07	1.47	0.81	1.7	1.89	1.55	0.54	1.68
5 (50-<80 ft)	Mean	1.41	0.54	1.4	1.42	1.05	2.05	2.19	1.28	2.35	1.42	0.67	1.39
	Median	1.85	0.43	1.85	1.38	1.04	2.05	2.58	1.79	2.84	1.56	0.52	1.57
	Quantile (0.85)	1.33	0.44	1.51	0.65	1.4	1.83	1.05	1.26	1.73	2.45	0.53	2.53
	Quantile (0.95)	0.92	0.55	1.26	0.7	1.63	1.83	0.63	1.22	1.21	0.92	0.59	1.12
6 (80-<100 ft)	Mean	1.71	0.73	1.84	3.2	0.97	3.47	2.15	1.52	2.87	1.58	0.85	1.75
	Median	1.55	0.56	1.67	2.35	0.82	2.31	1.23	3.95	4.47	1.33	0.89	1.66
	Quantile (0.85)	1.95	0.4	2.11	2.42	1.11	2.82	0.57	1.48	2.13	2.52	0.39	2.67
	Quantile (0.95)	1.56	0.56	1.86	2.78	2.83	6.08	0.32	2.61	3.31	1.6	0.64	2.01
Total	Mean	1.02	0.63	1.17	1.22	1.31	1.62	1.23	2.01	2.03	1.47	1.14	1.63
	Median	0.84	0.62	1.1	1.3	1.61	1.97	1.37	2.66	2.67	2.03	0.95	1.93
	Quantile (0.85)	1.63	0.51	1.72	1.49	1.1	1.37	1.97	2.34	2.46	1.55	0.56	1.72
	Quantile (0.95)	0.74	0.57	0.98	1.46	0.9	1.31	1.66	2.63	2.58	1.38	0.5	1.48

Table C-11c. Standard Deviation of Speed by Road Type by Vehicle Length Class (<20, 20-29, 30-39, 40-49, 50-79, 80-10) (Free-Flow)

	FCC ROAD CLASS											
	1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
	Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation		
VEH_LENGTH	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**
1 (<20 ft)	7.84	7.86	0.02	9.72	12.59	2.87	9.74	12.48	2.73	14.84	14.41	-0.42
2 (20-<30 ft)	7.92	8.71	0.8	10.19	13.14	2.95	10.68	13.54	2.86	13.22	13.96	0.73
3 (30-<40 ft)	9.01	9.02	0.01	10.99	14.38	3.39	11.14	15.41	4.27	12.5	13.93	1.42
4 (40-<50 ft)	8.86	8.89	0.03	10.3	14.41	4.1	10.53	15.01	4.48	11.79	13.47	1.68
5 (50-<80 ft)	7.04	6.3	-0.74	10.67	13.94	3.27	11.08	15.02	3.94	9	8.94	-0.06
6 (80-<100 ft)	7.79	6.9	-0.89	8.94	13.05	4.11	10.08	14.33	4.25	8.62	9.5	0.88
Total	8.11	8.11	0	10.33	13.04	2.71	10.46	13.12	2.66	14.21	13.92	-0.29

Table C-12a. Speed Estimate of Speed by Road Type, Horizontal Curvature Class, and Vertical Curvature Class (Free-Flow)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
HOR_ CURVED CLASS	VER_ CURVED CLASS		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Straight	1 Flat	Mean	70.69	70.36	-0.33	52.96	56.76	3.8	47.85	49.9	2.05	57.01	63.2	6.2
		Median	70.92	70.81	-0.11	52.97	57.67	4.7	47.11	49.13	2.02	56.51	65.79	9.28
		Quantile (0.85)	78.69	78.07	-0.62	63.52	69.46	5.94	58.37	63.38	5	73	76.2	3.2
		Quantile (0.95)	82	82.22	0.22	70.09	76.38	6.29	66.09	72.21	6.11	79	80.9	1.9
	2 Moderate	Mean	.	70.86	.	52.59	53.18	0.59	45.68	53.21	7.53	46.66	56.6	9.95
		Median	.	70.81	.	52.19	53.49	1.3	43.31	53.75	10.44	44.99	56.16	11.16
		Quantile (0.85)	.	76.59	.	57.77	63.7	5.93	58.77	62.5	3.73	58.67	70.03	11.37
		Quantile (0.95)	.	80.57	.	62.62	70.97	8.35	66.45	67.65	1.2	65.62	76.09	10.47
	3 Steep	Mean	68.59	.	.	56.05	.	.	43.68	56.51	12.83	49.13	56.51	7.38
		Median	68.45	.	.	57.39	.	.	43.54	56.43	12.89	46.48	56.43	9.95
		Quantile (0.85)	74.55	.	.	67.6	.	.	49.92	65.56	15.64	62.13	65.56	3.43
		Quantile (0.95)	77.99	.	.	73.33	.	.	54.16	72.26	18.11	69.68	72.26	2.58
	Total	Mean	70.69	70.36	-0.32	52.99	56.65	3.66	47.71	49.93	2.21	56.72	63.14	6.42
		Median	70.92	70.81	-0.11	52.99	57.48	4.49	46.88	49.17	2.29	56.06	65.7	9.64
		Quantile (0.85)	78.69	78.07	-0.62	63.52	69.36	5.84	58.35	63.38	5.02	73	76.2	3.2
		Quantile (0.95)	82	82.22	0.22	70.09	76.3	6.21	66.08	72.2	6.12	78.99	80.9	1.9

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
HOR_ CURVED CLASS	**VER_ CURVED CLASS**		**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**
2 Moderate	**1 Flat**	**Mean**	68.91	72.24	3.33	58.57	51.61	-6.96	40.59	49.63	9.04	53.58	52.48	-1.1
		Median	69.33	72.67	3.34	58.71	53.21	-5.5	39.15	48.93	9.78	54.6	51.38	-3.22
		Quantile (0.85)	76.89	77.5	0.61	65.7	63.8	-1.89	50.9	62.91	12.02	72	69.16	-2.84
		Quantile (0.95)	80.32	80.61	0.29	70.84	71.69	0.86	57.73	72.09	14.36	77.96	76.57	-1.39
	2 Moderate	**Mean**	.	.	.	.	37.39	.	54.22	42.22	-12	54.22	41.37	-12.86
		Median	.	.	.	.	36.97	.	54.6	42.32	-12.28	54.6	40.93	-13.67
		Quantile (0.85)	.	.	.	.	42.02	.	62.31	53.38	-8.93	62.31	51.6	-10.71
		Quantile (0.95)	.	.	.	.	45.39	.	68.18	63.24	-4.94	68.18	61.53	-6.65
	3 Steep	**Mean**	.	.	.	.	37.39	.	54.22	42.22	-12	54.22	41.37	-12.86
		Median	.	.	.	.	36.97	.	54.6	42.32	-12.28	54.6	40.93	-13.67
		Quantile (0.85)	.	.	.	.	42.02	.	62.31	53.38	-8.93	62.31	51.6	-10.71
		Quantile (0.95)	.	.	.	.	45.39	.	68.18	63.24	-4.94	68.18	61.53	-6.65
	Total	**Mean**	68.91	72.24	3.33	58.45	49.43	-9.02	41.92	48.86	6.94	52.87	51.4	-1.47
		Median	69.33	72.67	3.34	58.7	50.22	-8.49	39.81	48.05	8.25	53.55	50.2	-3.35
		Quantile (0.85)	76.89	77.5	0.61	65.7	62.77	-2.93	53.95	62.19	8.24	70.99	68.13	-2.86
		Quantile (0.95)	80.32	80.61	0.29	70.84	70.54	-0.29	60.36	71.76	11.39	76.99	76.2	-0.79

Table C-12a. Speed Estimate of Speed by Road Type, Horizontal Curvature Class, and Vertical Curvature Class (Free-Flow)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor			Total		
			Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
HOR_ CURVED CLASS	VER_ CURVED CLASS		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
3 Sharp	1 Flat	Mean	70.15	.	.	58.19	43.14	-15.05	40.95	36.16	-4.79	52.37	37.79	-14.59
		Median	70.21	.	.	58.2	42.56	-15.64	38.57	33.35	-5.22	52.13	35.85	-16.28
		Quantile (0.85)	76.34	.	.	65.12	49.07	-16.05	52.89	46.63	-6.26	71.99	47.89	-24.1
		Quantile (0.95)	79.46	.	.	69.82	55.19	-14.63	59.55	57.02	-2.53	76.98	56.52	-20.46
	2 Moderate	Mean	66.67	.	.	.	39.38	.	41.87	48.15	6.28	59.07	42.84	-16.23
		Median	65.68	.	.	.	38.57	.	39.9	48.34	8.45	63.95	39.43	-24.51
		Quantile (0.85)	71.81	.	.	.	45.09	.	49.97	62.77	12.8	70.89	56.97	-13.92
		Quantile (0.95)	75.7	.	.	.	52.68	.	58.78	68.67	9.9	74.98	64.02	-10.96
	3 Steep	Mean	.	.	.	.	41.17	.	37.06	.	.	37.06	41.17	4.11
		Median	.	.	.	.	40.1	.	36.32	.	.	36.32	40.1	3.78
		Quantile (0.85)	.	.	.	.	47.93	.	44.24	.	.	44.24	47.93	3.69
		Quantile (0.95)	.	.	.	.	60.46	.	57.04	.	.	57.04	60.46	3.43
	Total	Mean	68.56	.	.	58.19	40.53	-17.67	41.09	39.93	-1.16	54.3	40.18	-14.12
		Median	67.77	.	.	58.2	39.55	-18.65	39.04	35.75	-3.29	57.5	38.13	-19.37
		Quantile (0.85)	74.88	.	.	65.12	46.85	-18.27	52.63	56.25	3.63	71.98	51.81	-20.17
		Quantile (0.95)	78.36	.	.	69.82	53.88	-15.94	59.52	64.27	4.75	76.97	62.08	-14.88

Table C-12a. Speed Estimate of Speed by Road Type, Horizontal Curvature Class, and Vertical Curvature Class (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
HOR_ CURVED CLASS	VER_ CURVED CLASS		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
Total	1 Flat	Mean	70.56	70.38	-0.19	53.26	56.64	3.38	47.13	49.8	2.67	56.69	62.79	6.1
		Median	70.88	70.82	-0.06	53.37	57.51	4.14	46.38	49.07	2.69	56.38	65.4	9.02
		Quantile (0.85)	77.99	78.07	0.08	63.74	69.39	5.64	57.82	63.28	5.46	73	76.09	3.1
		Quantile (0.95)	81.87	82.21	0.34	70.14	76.32	6.18	65.56	72.19	6.63	78.99	80.87	1.88
	2 Moderate	Mean	66.67	70.86	4.19	52.59	50.39	-2.2	46.93	44.96	-1.97	50.72	51.18	0.46
		Median	65.68	70.81	5.13	52.19	50.91	-1.28	44.77	44.37	-0.4	49.82	50.95	1.12
		Quantile (0.85)	71.81	76.59	4.78	57.77	62.1	4.33	59.54	58.29	-1.25	65	66.66	1.67
		Quantile (0.95)	75.7	80.57	4.88	62.62	69.32	6.7	66.45	65.99	-0.46	70.91	74.49	3.58
	3 Steep	Mean	68.59	.	.	55.62	44.1	-11.51	39.73	52.49	12.76	44.53	51.95	7.42
		Median	68.45	.	.	57.02	43.23	-13.79	39.48	54.47	14.99	42.6	53.49	10.89
		Quantile (0.85)	74.55	.	.	67.45	50.59	-16.85	47.63	64.21	16.58	58.37	63.7	5.33
		Quantile (0.95)	77.99	.	.	73.27	57.73	-15.54	52.59	71.29	18.7	67.07	70.85	3.78
	Total	Mean	70.5	70.38	-0.12	53.28	56.41	3.12	47.01	49.73	2.72	56.39	62.64	6.25
		Median	70.84	70.82	-0.02	53.37	57.34	3.97	46.15	49.04	2.89	56	65.3	9.3
		Quantile (0.85)	77.96	78.06	0.11	63.68	69.27	5.58	57.82	63.23	5.41	72.99	76	3.01
		Quantile (0.95)	81.83	82.21	0.38	70.14	76.22	6.08	65.56	72.14	6.58	78.99	80.8	1.81

Table C-12b. Standard Error of Speed by Road Type, Horizontal Curvature Class, and Vertical Curvature Class (Free-Flow)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
HOR_ CURVED	VER_ CURVED		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Straight	1 Flat	Mean	1.01	0.64	1.16	1.22	1.34	1.71	1.17	1.93	1.95	1.55	1.13	1.68
		Median	1.72	0.63	1.86	1.3	1.67	2.07	1.26	2.52	2.59	2.23	0.95	2.04
		Quantile (0.85)	1.56	0.51	1.6	1.65	0.99	1.39	1.93	2.19	2.26	2.47	0.52	2.48
		Quantile (0.95)	0.73	0.57	0.97	1.63	0.94	1.47	1.67	2.39	2.31	1.26	0.54	1.39
	2 Moderate	Mean	.	.	.	.	7.06	.	5.91	4.8	7.65	6.64	3.32	7.46
		Median	.	.	.	.	7.2	.	4.35	4.21	6.06	5.99	3.21	6.75
		Quantile (0.85)	.	.	.	.	9.37	.	11.95	5.53	13.16	11.66	5.45	15.14
		Quantile (0.95)	.	.	.	.	10.74	.	14.42	6.54	15.83	13.69	4.16	15.59
	3 Steep	Mean	.	.	.	11.41	.	.	2.82	1.01	2.86	4.78	1.01	4.82
		Median	.	.	.	12.08	.	.	2.7	0.62	2.66	2.93	0.62	2.91
		Quantile (0.85)	.	.	.	14.34	.	.	3.48	0.57	3.59	10.52	0.57	10.58
		Quantile (0.95)	.	.	.	14.67	.	.	3.73	0.83	3.9	11.84	0.83	11.88
	Total	Mean	1.01	0.63	1.16	1.2	1.29	1.61	1.25	1.92	2.02	1.55	1.11	1.69
		Median	1.72	0.63	1.86	1.31	1.58	1.99	1.39	2.52	2.64	2.19	0.89	2.09
		Quantile (0.85)	1.56	0.51	1.6	1.63	1	1.39	2.05	2.17	2.38	1.65	0.55	1.75
		Quantile (0.95)	0.73	0.56	0.97	1.57	0.9	1.34	1.7	2.4	2.38	1.26	0.51	1.37
2 Moderate	1 Flat	Mean	3.98	0.58	4.11	1.6	4.73	6.4	1.68	3.29	4.07	3.66	2.69	4.67
		Median	4.66	0.31	4.72	2.08	5.84	7.87	1.34	3.83	4.67	5.75	3.6	6.9
		Quantile (0.85)	3.44	0.91	3.63	0.95	2.47	3.69	4.21	4.41	5.61	6.03	3.62	7.03
		Quantile (0.95)	2.85	1.16	3.25	1.1	3.42	4.93	3.08	5.15	6.66	4.79	1.69	5.06
	2 Moderate	Mean	.	.	.	.	.	.	3.51	2.68	4.29	3.51	3.16	4.56
		Median	.	.	.	.	.	.	2.98	1.51	3.36	2.98	2.47	3.75
		Quantile (0.85)	.	.	.	.	.	.	3.65	2.51	4.74	3.65	3	4.81
		Quantile (0.95)	.	.	.	.	.	.	5.37	1.65	5.6	5.37	2.92	6.04

Table C-12b. Standard Error of Speed by Road Type, Horizontal Curvature Class, and Vertical Curvature Class (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
HOR_ CURVED CLASS	VER_ CURVED CLASS		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
2 Moderate	3 Steep	Mean	.	.	.	.	.	.	2.49	.	.	2.39	6.22	6.66
		Median	.	.	.	.	.	.	2.6	.	.	2.52	6.02	6.53
		Quantile (0.85)	.	.	.	.	.	.	5.56	.	.	5.46	5.41	7.69
		Quantile (0.95)	.	.	.	.	.	.	7.45	.	.	7.33	5.65	9.26
	Total	Mean	3.98	0.58	4.11	1.7	4.56	6.01	1.83	3.1	3.8	3.35	2.65	4.4
		Median	4.66	0.31	4.72	2.1	8.18	9.96	1.72	3.56	4.32	4.95	3.61	6.11
		Quantile (0.85)	3.44	0.91	3.63	0.96	2.78	3.89	3.19	4.44	5.51	6	3.73	7.09
		Quantile (0.95)	2.85	1.16	3.25	1.11	3.41	4.87	2.36	4.95	6.26	5.12	1.7	5.35
3 Sharp	1 Flat	Mean	2.09	.	.	.	.	.	1.97	6.12	6.43	4.96	4.63	6.79
		Median	2.62	.	.	.	.	.	1.44	7.53	7.67	10.78	5.98	12.33
		Quantile (0.85)	0.98	.	.	.	.	.	5.68	8.12	9.91	4.13	4.14	5.85
		Quantile (0.95)	0.29	.	.	.	.	.	5.8	6.54	8.74	1.44	3.96	4.22
	2 Moderate	Mean	.	.	.	.	.	.	4.73	12.29	13.17	15.83	5.52	16.76
		Median	.	.	.	.	.	.	5.71	14.57	15.65	21.55	6.66	22.56
		Quantile (0.85)	.	.	.	.	.	.	9.52	16.34	18.91	17.54	11.21	20.82
		Quantile (0.95)	.	.	.	.	.	.	9.98	17.91	20.51	13.77	9.9	16.96
	3 Steep	Mean	.	.	.	.	.	.	0.93	.	.	0.93	.	.
		Median	.	.	.	.	.	.	1.22	.	.	1.22	.	.
		Quantile (0.85)	.	.	.	.	.	.	0.32	.	.	0.32	.	.
		Quantile (0.95)	.	.	.	.	.	.	6.76	.	.	6.76	.	.
	Total	Mean	1.78	.	.	.	2.01	.	1.75	6.23	6.48	5.03	3.02	5.87
		Median	2.57	.	.	.	2.25	.	1.32	7.33	7.45	11.89	2.49	12.14
		Quantile (0.85)	1.86	.	.	.	2.13	.	5.15	10.08	11.32	3.48	6.66	7.51
		Quantile (0.95)	1.34	.	.	.	1.5	.	4.38	6.96	8.22	2.9	6	6.67

Table C-12b. Standard Error of Speed by Road Type, Horizontal Curvature Class, and Vertical Curvature Class (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
HOR_ CURVED CLASS	**VER_ CURVED CLASS**		**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**
Total	**1 Flat**	**Mean**	1.02	0.63	1.17	1.24	1.36	1.73	1.17	2.04	1.99	1.49	1.15	1.65
		Median	1.23	0.62	1.42	1.3	1.67	2.1	1.32	2.69	2.64	2.13	0.96	2.05
		Quantile (0.85)	2.09	0.51	2.11	1.56	1.03	1.38	1.86	2.38	2.4	1.8	0.52	1.88
		Quantile (0.95)	0.72	0.57	0.96	1.54	0.95	1.46	1.65	2.61	2.42	1.26	0.54	1.34
	2 Moderate	**Mean**	.	.	.	.	7.47	.	4.05	2.97	4.69	3.44	4.84	5.37
		Median	.	.	.	.	8.63	.	4.46	3.78	5.63	5.87	6.78	6.27
		Quantile (0.85)	.	.	.	.	9.89	.	5.34	3.7	5.42	4.57	4.95	6.75
		Quantile (0.95)	.	.	.	.	11.02	.	4.75	2.03	4.71	4.02	4.53	6.06
	3 Steep	**Mean**	.	.	.	10.87	2.61	12.92	2.73	6.18	7.9	4.44	5.81	8.44
		Median	.	.	.	11.8	2.82	14.08	3.68	9.69	12.83	3.12	8.35	11.23
		Quantile (0.85)	.	.	.	14.19	1.89	14.41	3.32	3.32	5.35	10.26	3.49	11.15
		Quantile (0.95)	.	.	.	14.6	2.16	13.53	3.79	3.27	5.58	11.97	3.11	12.67
	Total	**Mean**	1.02	0.63	1.17	1.22	1.31	1.62	1.23	2.01	2.03	1.47	1.14	1.63
		Median	0.84	0.62	1.1	1.3	1.61	1.97	1.37	2.66	2.67	2.03	0.95	1.93
		Quantile (0.85)	1.63	0.51	1.72	1.49	1.1	1.37	1.97	2.34	2.46	1.55	0.56	1.72
		Quantile (0.95)	0.74	0.57	0.98	1.46	0.9	1.31	1.66	2.63	2.58	1.38	0.5	1.48

Table C-12c. Standard Deviation of Speed by Road Type, Horizontal Curvature Class, and Vertical Curvature Class (Free-Flow)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation		
HOR_CURVERD CLASS	VER_CURVERD CLASS	2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Straight	1 Flat	8.12	8.13	0.01	10.41	13	2.59	10.3	13.1	2.8	14.02	13.66	-0.35
	2 Moderate	.	5.95	.	5.79	10.77	4.98	11.01	9.98	-1.03	10.71	12.15	1.44
	3 Steep	7.16	.	.	11.38	.	.	6.64	10.01	3.37	11	10.01	-0.99
	Total	8.12	8.13	0.01	10.38	12.95	2.58	10.33	13.09	2.77	14.03	13.66	-0.37
2 Moderate	1 Flat	8.59	5.72	-2.87	7.64	13.26	5.62	9.11	12.95	3.84	15.58	14.32	-1.26
	2 Moderate	.	.	.	.	5.77	.	8.79	12.65	3.86	8.79	11.87	3.08
	3 Steep	.	.	.	5.58	6.32	0.74	5.34	7.8	2.46	5.36	8.51	3.15
	Total	8.59	5.72	-2.87	7.83	13.39	5.55	10.14	13.12	2.98	15.37	14.48	-0.89
3 Sharp	1 Flat	6.68	.	.	7.22	7.42	0.2	9.64	10.95	1.32	16.15	10.66	-5.5
	2 Moderate	5.46	.	.	.	7.59	.	8.29	13.6	5.31	13.13	11.23	-1.9
	3 Steep	.	.	.	.	10.7	.	9.55	.	.	9.55	10.7	1.15
	Total	6.39	.	.	7.22	7.8	0.57	9.42	13.09	3.67	15.64	11.22	-4.42
Total	1 Flat	8.13	8.12	-0.02	10.35	13.03	2.68	10.43	13.11	2.68	14.21	13.85	-0.35
	2 Moderate	5.46	5.95	0.49	5.79	11.67	5.88	11.02	13.07	2.05	12.33	13.96	1.64
	3 Steep	7.16	.	.	11.76	8.67	-3.09	7.54	12.64	5.1	11.67	12.59	0.93
	Total	8.11	8.11	0	10.33	13.04	2.71	10.46	13.12	2.66	14.21	13.92	-0.29

Table C-13a. Speed Estimate of Speed by Road Type, Length Class and Horizontal Curvature Class (Free-Flow)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
HOR_ CURVED	**VEH_ LENGTH**		**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**
1 Straight	**1 (<20 ft)**	**Mean**	71.55	71.4	-0.15	50.8	55.49	4.69	45.77	48.48	2.71	55.42	63.2	7.78
		Median	71.96	72.01	0.04	50.93	56.25	5.33	45.07	47.63	2.56	53.65	66.3	12.65
		Quantile (0.85)	78.89	78.75	-0.14	60.55	67.96	7.41	55.62	61.42	5.8	73	76.7	3.7
		Quantile (0.95)	82.62	82.78	0.16	66.39	74.41	8.02	62.61	69.36	6.75	79	81.2	2.2
	2 (20-<30 ft)	**Mean**	71.96	70.92	-1.04	56.42	60.26	3.84	51.2	53.27	2.07	58.1	62.86	4.75
		Median	72.75	71.73	-1.02	56.51	61.21	4.71	50.52	52.81	2.29	57.63	64.98	7.35
		Quantile (0.85)	78.96	78.68	-0.28	67.01	72.73	5.72	62.48	67.2	4.72	73.51	76.3	2.78
		Quantile (0.95)	82.44	82.98	0.54	73.18	80.15	6.97	69.9	76.16	6.26	79	81.56	2.57
	3 (30-<40 ft)	**Mean**	67.74	67.04	-0.71	56.21	56.72	0.5	51.74	53.48	1.75	57.86	61.15	3.28
		Median	67.81	67.3	-0.51	56.06	58.07	2.01	51.07	53.38	2.3	58.08	63.2	5.12
		Quantile (0.85)	75.96	75.29	-0.68	67.73	69.79	2.06	63.24	68.36	5.12	71.57	73.79	2.22
		Quantile (0.95)	79.99	79.68	-0.31	75.05	78.63	3.58	71.61	80.06	8.45	77.62	79.6	1.98
	4 (40-<50 ft)	**Mean**	66.88	67.04	0.16	56.08	55.84	-0.23	52.25	53.5	1.25	59.08	61.81	2.73
		Median	66.9	67.41	0.51	56.68	57.38	0.7	52.28	53.56	1.28	60	64	4
		Quantile (0.85)	74.62	75.07	0.44	66.32	69.4	3.09	62.65	68.2	5.55	71.59	73.8	2.21
		Quantile (0.95)	78.46	79.32	0.86	72.81	77.87	5.06	69.6	78.16	8.56	76.8	79.08	2.28
	5 (50-<80 ft)	**Mean**	65.71	65.61	-0.1	55.63	56.3	0.66	53.31	53.77	0.46	63.64	64.17	0.52
		Median	65.74	65.57	-0.17	56.5	57.88	1.38	54.64	53.93	-0.71	65	65.09	0.09
		Quantile (0.85)	71.77	71.45	-0.32	66.29	69.3	3.02	63.87	68.99	5.13	72	71.4	-0.6
		Quantile (0.95)	75.41	74.91	-0.5	72.2	78.1	5.89	69.63	79.16	9.52	75.8	75.2	-0.6
	6 (80-<100 ft)	**Mean**	66.57	68.65	2.08	58.26	57.45	-0.82	54.92	53.94	-0.98	65.27	66.82	1.55
		Median	66.35	69.17	2.81	59.35	59.58	0.23	56.31	54.75	-1.56	65.98	68.4	2.42
		Quantile (0.85)	73.07	74.68	1.6	66.65	68.61	1.96	63.76	67.06	3.3	72.96	74.41	1.45
		Quantile (0.95)	76.84	77.6	0.75	71.59	75.03	3.45	69.96	78.69	8.73	76.53	77.53	1.01
	Total	**Mean**	70.69	70.36	-0.32	52.99	56.65	3.66	47.71	49.93	2.21	56.72	63.14	6.42
		Median	70.92	70.81	-0.11	52.99	57.48	4.49	46.88	49.17	2.29	56.06	65.7	9.64
		Quantile (0.85)	78.69	78.07	-0.62	63.52	69.36	5.84	58.35	63.38	5.02	73	76.2	3.2
		Quantile (0.95)	82	82.22	0.22	70.09	76.3	6.21	66.08	72.2	6.12	78.99	80.9	1.9

Table C-13a. Speed Estimate of Speed by Road Type, Length Class and Horizontal Curvature Class (Free-Flow) (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
HOR_ CURVED	**VEH_ LENGTH**		**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**
2 Moderate	**1 (<20 ft)**	**Mean**	69.5	72.38	2.88	56.74	48.07	-8.67	39.95	47.97	8.02	49.45	49.58	0.13
		Median	69.64	72.7	3.07	57.08	48.06	-9.02	37.96	47.03	9.07	46.47	48.28	1.81
		Quantile (0.85)	77.14	77.66	0.52	64.13	61.53	-2.6	50.81	61.11	10.3	68.97	64.92	-4.05
		Quantile (0.95)	80.67	80.92	0.24	68.28	68.06	-0.21	57.85	70.07	12.23	76.89	74.29	-2.59
	2 (20-<30 ft)	**Mean**	71.6	73.13	1.53	60.61	52.87	-7.75	46.34	51.92	5.59	58.12	56.55	-1.57
		Median	72.15	73.52	1.36	60.75	54.4	-6.36	44.95	51.16	6.21	59.47	56.19	-3.27
		Quantile (0.85)	77.77	77.84	0.07	67.85	66.7	-1.15	57.74	65.52	7.78	74	73.8	-0.2
		Quantile (0.95)	80.79	80.68	-0.11	73.06	75.08	2.02	63.95	75.42	11.47	78.98	78.7	-0.28
	3 (30-<40 ft)	**Mean**	65.8	69.96	4.15	58.57	53.98	-4.59	47.83	49.69	1.86	56.18	52.24	-3.94
		Median	65.4	70.09	4.68	58.3	55.14	-3.16	48.04	48.93	0.89	57.05	51.3	-5.75
		Quantile (0.85)	75.09	75.98	0.89	65.77	66.61	0.84	58.53	64.06	5.53	68.99	68.79	-0.2
		Quantile (0.95)	79.17	80.37	1.21	74.6	79.82	5.22	65.36	78.19	12.83	76.29	79.02	2.73
	4 (40-<50 ft)	**Mean**	64.42	69.62	5.2	57.74	51.94	-5.8	48.14	48.69	0.55	57.46	52.14	-5.33
		Median	64.02	69.53	5.52	57.67	52.32	-5.35	49.15	48.58	-0.57	58.57	51.63	-6.95
		Quantile (0.85)	72.29	75.17	2.88	64.54	66.5	1.95	58.21	61.34	3.12	68	68.63	0.63
		Quantile (0.95)	76.77	78.68	1.91	69.4	76.05	6.65	63.47	72.56	9.1	74	76.13	2.13
	5 (50-<80 ft)	**Mean**	60.08	67.48	7.4	57.91	52.53	-5.38	48.41	49.55	1.13	58.7	53.69	-5
		Median	61.01	67.56	6.56	58.08	53.23	-4.85	50.32	49.05	-1.27	60	53.97	-6.03
		Quantile (0.85)	67.07	73.16	6.09	63.86	63.73	-0.13	58.08	63.19	5.1	66.95	68.99	2.04
		Quantile (0.95)	71.45	76.13	4.68	67.03	74	6.97	62.65	75.19	12.53	71	75.7	4.7
	6 (80-<100 ft)	**Mean**	60.45	67.72	7.27	60.1	46.74	-13.36	56.86	49.9	-6.95	60.29	59.47	-0.82
		Median	62.28	67.24	4.96	59.53	42.72	-16.81	60.86	51.56	-9.31	61.77	63.83	2.06
		Quantile (0.85)	67.71	71.14	3.44	64.88	59.97	-4.91	65.63	60.51	-5.12	67.65	69.32	1.67
		Quantile (0.95)	70.98	73.73	2.75	67.88	61.53	-6.34	70.58	63.02	-7.56	70.56	72.35	1.79
	Total	**Mean**	68.91	72.24	3.33	58.45	49.43	-9.02	41.92	48.86	6.94	52.87	51.4	-1.47
		Median	69.33	72.67	3.34	58.7	50.22	-8.49	39.81	48.05	8.25	53.55	50.2	-3.35
		Quantile (0.85)	76.89	77.5	0.61	65.7	62.77	-2.93	53.95	62.19	8.24	70.99	68.13	-2.86
		Quantile (0.95)	80.32	80.61	0.29	70.84	70.54	-0.29	60.36	71.76	11.39	76.99	76.2	-0.79

Table C-13a. Speed Estimate of Speed by Road Type, Length Class and Horizontal Curvature Class (Free-Flow) (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
HOR_ CURVED	VEH_ LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
3 Sharp	1 (<20 ft)	Mean	68.66	.	.	56.83	40.04	-16.79	39.63	36.95	-2.68	52.89	38.31	-14.58
		Median	67.83	.	.	57.03	39.42	-17.61	38.02	33.94	-4.08	54.58	37.01	-17.57
		Quantile (0.85)	74.95	.	.	63.28	45.83	-17.45	49.17	49.36	0.19	71	46.83	-24.16
		Quantile (0.95)	78.42	.	.	67.47	51.89	-15.58	57.1	60.35	3.25	75.99	57.52	-18.47
	2 (20-<30 ft)	Mean	69.01	.	.	60.79	42.76	-18.02	44.95	49.76	4.81	57.34	47.46	-9.88
		Median	68.49	.	.	60.55	41.72	-18.83	43.33	50.59	7.26	60.48	45.41	-15.07
		Quantile (0.85)	75.27	.	.	66.91	51.68	-15.23	56.78	64.26	7.49	72.38	62.54	-9.84
		Quantile (0.95)	78.65	.	.	71.92	59.49	-12.43	62.46	70.35	7.89	76.87	69.37	-7.49
	3 (30-<40 ft)	Mean	66.79	.	.	55.45	41.36	-14.09	46.68	44.15	-2.53	56.77	43.18	-13.58
		Median	65.79	.	.	55.22	39.59	-15.63	45.83	42.24	-3.59	59.56	40.55	-19.01
		Quantile (0.85)	72.89	.	.	64.93	50.72	-14.22	58.79	61.16	2.36	69.96	57.79	-12.17
		Quantile (0.95)	76.7	.	.	71.68	60.43	-11.25	64.46	74.08	9.62	74.98	71.28	-3.7
	4 (40-<50 ft)	Mean	66.59	.	.	54.81	47.1	-7.71	47.96	45.97	-1.99	59.15	46.26	-12.89
		Median	66.03	.	.	55.22	42.97	-12.25	48.9	44.49	-4.4	61.73	43.81	-17.93
		Quantile (0.85)	72.05	.	.	62.43	64.72	2.29	59.9	59.69	-0.21	69.97	59.8	-10.18
		Quantile (0.95)	75.05	.	.	65.55	80.17	14.62	65.08	74.22	9.14	73.89	79.87	5.98
	5 (50-<80 ft)	Mean	64.34	.	.	52.61	42.7	-9.91	45.85	46.24	0.39	60.7	45.15	-15.54
		Median	63.09	.	.	52.14	40.4	-11.74	44.97	43.81	-1.16	61.99	42.23	-19.76
		Quantile (0.85)	69.43	.	.	60.59	51.92	-8.66	60.95	62	1.05	68.49	60.39	-8.1
		Quantile (0.95)	73.58	.	.	69.69	68.91	-0.77	65.14	77.22	12.08	73.65	76.39	2.74
	6 (80-<100 ft)	Mean	65.43	.	.	60.47	45.34	-15.13	46.75	42.29	-4.47	65.12	42.39	-22.73
		Median	64.29	.	.	60.47	45.34	-15.13	43.27	37.36	-5.9	63.97	38.47	-25.5
		Quantile (0.85)	70.29	.	.	60.47	45.34	-15.13	52.99	53.56	0.57	70.09	53.1	-16.99
		Quantile (0.95)	73.76	.	.	60.47	45.34	-15.13	53.48	58.51	5.02	73.42	57.73	-15.69
	Total	Mean	68.56	.	.	58.19	40.53	-17.67	41.09	39.93	-1.16	54.3	40.18	-14.12
		Median	67.77	.	.	58.2	39.55	-18.65	39.04	35.75	-3.29	57.5	38.13	-19.37
		Quantile (0.85)	74.88	.	.	65.12	46.85	-18.27	52.63	56.25	3.63	71.98	51.81	-20.17
		Quantile (0.95)	78.36	.	.	69.82	53.88	-15.94	59.52	64.27	4.75	76.97	62.08	-14.88

Table C-13a. Speed Estimate of Speed by Road Type, Length Class and Horizontal Curvature Class (Free-Flow) (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
HOR_ CURVED	VEH_ LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
Total	1 (<20 ft)	Mean	71.33	71.4	0.07	51.05	55.22	4.16	45.03	48.34	3.31	54.95	62.61	7.67
		Median	71.93	72.01	0.08	51.34	56.07	4.74	44.21	47.44	3.23	53.37	65.78	12.42
		Quantile (0.85)	78.82	78.75	-0.08	60.79	67.84	7.05	55.22	61.34	6.12	72.99	76.59	3.6
		Quantile (0.95)	82.43	82.77	0.34	66.46	74.3	7.84	62.06	69.36	7.3	79	81.09	2.09
	2 (20-<30 ft)	Mean	71.8	70.98	-0.82	56.71	60.08	3.37	50.68	53.11	2.43	58.09	62.5	4.42
		Median	72.64	71.79	-0.85	56.96	61	4.05	50.06	52.58	2.52	57.74	64.6	6.86
		Quantile (0.85)	78.88	78.65	-0.23	67.06	72.6	5.54	62	67.04	5.04	73.74	76.2	2.46
		Quantile (0.95)	82.18	82.92	0.74	73.16	80.06	6.91	69.4	75.93	6.53	78.99	81.5	2.5
	3 (30-<40 ft)	Mean	67.59	67.06	-0.53	56.34	56.61	0.27	51.37	52.96	1.6	57.73	60.72	2.99
		Median	67.72	67.33	-0.4	56.31	57.99	1.68	50.83	52.67	1.85	58	62.9	4.9
		Quantile (0.85)	75.91	75.29	-0.62	67.6	69.65	2.05	62.92	68.03	5.12	71.23	73.6	2.36
		Quantile (0.95)	79.88	79.68	-0.2	75.05	78.63	3.58	71.3	79.88	8.58	77.29	79.6	2.3
	4 (40-<50 ft)	Mean	66.71	67.07	0.36	56.18	55.75	-0.44	51.92	52.82	0.9	58.97	61.39	2.42
		Median	66.74	67.44	0.71	56.76	57.34	0.58	52.14	52.83	0.69	60	63.72	3.72
		Quantile (0.85)	74.46	75.07	0.61	66.1	69.38	3.28	62.25	67.51	5.26	71	73.7	2.7
		Quantile (0.95)	78.31	79.3	0.99	72.61	77.84	5.23	69.08	77.61	8.53	76.04	79	2.96
	5 (50-<80 ft)	Mean	65.36	65.62	0.26	55.8	56.17	0.37	52.87	53.15	0.28	63.3	64.01	0.71
		Median	64.95	65.58	0.63	56.79	57.65	0.86	54.28	53.14	-1.13	64	65	1
		Quantile (0.85)	71.58	71.46	-0.12	65.86	69.13	3.26	63.58	68.38	4.8	71	71.3	0.3
		Quantile (0.95)	75.26	74.92	-0.34	72.14	78.06	5.93	69.34	78.68	9.34	75	75.2	0.2
	6 (80-<100 ft)	Mean	66.15	68.64	2.49	58.48	57.33	-1.15	55.01	53.27	-1.74	64.93	66.67	1.75
		Median	66.05	69.13	3.08	59.53	59.5	-0.03	56.42	53.61	-2.81	65.96	68.24	2.27
		Quantile (0.85)	72.8	74.65	1.85	66.58	68.57	1.99	63.85	66.05	2.2	72.93	74.37	1.44
		Quantile (0.95)	76.67	77.56	0.89	71.51	74.93	3.42	69.97	77.91	7.95	76.32	77.49	1.18
	Total	Mean	70.5	70.38	-0.12	53.28	56.41	3.12	47.01	49.73	2.72	56.39	62.64	6.25
		Median	70.84	70.82	-0.02	53.37	57.34	3.97	46.15	49.04	2.89	56	65.3	9.3
		Quantile (0.85)	77.96	78.06	0.11	63.68	69.27	5.58	57.82	63.23	5.41	72.99	76	3.01
		Quantile (0.95)	81.83	82.21	0.38	70.14	76.22	6.08	65.56	72.14	6.58	78.99	80.8	1.81

Table C-13b. Standard Error of Speed by Road Type, Length Class and Horizontal Curvature Class (Free-Flow)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
HOR_ CURVED	VEH_ LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Straight	1 (<20 ft)	Mean	1.29	0.74	1.41	0.92	1.19	1.44	1.07	1.99	2.05	1.69	1.2	1.87
		Median	1.29	0.71	1.43	0.89	1.47	1.7	1.17	2.48	2.56	2.05	1.16	2.01
		Quantile (0.85)	0.95	0.54	1.1	1.37	1.03	1.01	1.48	2.23	2.28	2.98	0.58	2.95
		Quantile (0.95)	1.08	0.61	1.25	1.29	0.9	0.87	1.81	2.74	2.81	1.79	0.61	1.85
	2 (20<30ft)	Mean	0.97	0.85	1.16	1.46	1.63	2.06	1.4	2.07	2.25	1.19	1.35	1.7
		Median	1.02	0.81	1.08	1.64	1.88	2.52	1.64	2.7	2.98	1.59	1.22	1.92
		Quantile (0.85)	0.18	0.67	0.73	1.61	0.91	1.52	1.89	2.19	2.52	1.8	0.61	1.89
		Quantile (0.95)	0.47	0.74	0.9	1.3	1.04	1.21	1.4	2	2.14	0.31	0.61	0.63
	3 (30<40ft)	Mean	1.05	0.69	1.18	1.24	1.05	1.43	1.25	1.19	1.59	1.07	0.76	1.23
		Median	0.9	0.58	1.04	1.3	0.93	1.4	1.76	1.52	2.11	1.27	0.65	1.37
		Quantile (0.85)	0.45	0.5	0.68	1.34	1.05	1.8	1.09	1.28	1.61	1.59	0.56	1.7
		Quantile (0.95)	0.7	0.58	0.94	0.96	1.4	2.04	1.08	1.52	1.99	1.51	0.64	1.73
	4 (40<50ft)	Mean	0.96	0.69	1.08	0.97	1.05	1.15	1.59	1.39	1.9	1.08	0.81	1.29
		Median	1.33	0.61	1.43	1.16	0.97	1.24	1.92	1.86	2.89	1.09	0.77	1.37
		Quantile (0.85)	0.68	0.5	0.85	0.7	1.11	1.29	0.91	1.47	1.52	1.56	0.64	1.7
		Quantile (0.95)	0.56	0.5	0.76	1.06	1.12	1.49	0.92	1.81	2.03	1.51	0.58	1.63
	5 (50<80ft)	Mean	1.28	0.55	1.27	1.31	1.07	1.92	2.18	1.36	2.43	1.37	0.66	1.35
		Median	1.48	0.44	1.47	1.26	1.06	1.81	2.47	1.92	3	1.28	0.49	1.24
		Quantile (0.85)	1.24	0.45	1.42	0.81	1.45	1.86	0.73	1.17	1.45	1.28	0.49	1.43
		Quantile (0.95)	0.86	0.55	1.2	0.44	1.68	1.79	0.72	1.35	1.44	1.93	0.59	2.1
	6 (80<100ft)	Mean	1.67	0.74	1.81	3.13	0.96	3.41	2.08	1.47	2.87	1.56	0.85	1.74
		Median	1.57	0.57	1.7	2.29	0.86	2.29	1.19	4.18	4.67	1.73	0.9	1.95
		Quantile (0.85)	1.88	0.42	2.05	2.35	0.93	2.67	0.83	2.55	3.3	1.92	0.44	2.15
		Quantile (0.95)	1.39	0.57	1.71	2.07	2.76	5.32	0.46	1.95	2.45	1.48	0.64	1.88
	Total	Mean	1.01	0.63	1.16	1.2	1.29	1.61	1.25	1.92	2.02	1.55	1.11	1.69
		Median	1.72	0.63	1.86	1.31	1.58	1.99	1.39	2.52	2.64	2.19	0.89	2.09
		Quantile (0.85)	1.56	0.51	1.6	1.63	1	1.39	2.05	2.17	2.38	1.65	0.55	1.75
		Quantile (0.95)	0.73	0.56	0.97	1.57	0.9	1.34	1.7	2.4	2.38	1.26	0.51	1.37

Table C-13b. Standard Error of Speed by Road Type, Length Class and Horizontal Curvature Class (Free-Flow) (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
HOR_ CURVED	VEH_ LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
2 Moderate	1 (<20 ft)	Mean	3.82	0.79	4.07	1.75	4.76	6.36	1.63	3.37	4.2	2.96	2.7	4.38
		Median	4.64	0.47	4.78	1.92	9.14	11	1.44	3.78	4.78	5.7	3.71	6.64
		Quantile (0.85)	3.68	1.04	3.98	1.73	3.31	4.85	4.17	5.03	6.17	5.82	3.68	7.43
		Quantile (0.95)	3.34	1.27	3.83	1.19	3.71	5.31	2.42	6.11	7.78	5.66	1.79	5.97
	2 (20<30 ft)	Mean	3.69	0.28	3.73	1.54	4.51	5.34	2.08	2.87	3.42	4.26	3.41	5.45
		Median	4.33	0.08	4.34	2.05	6.09	7.06	2.57	3.5	4.1	4.59	5.03	6.9
		Quantile (0.85)	2.21	0.86	2.44	1.39	2.35	3.39	2.45	3.72	4.45	6.76	4.14	7.91
		Quantile (0.95)	1.69	1.07	2.13	1.43	3.38	4.8	2.44	3.41	4.38	4.52	1.17	4.66
	3 (30<40 ft)	Mean	3.86	0.28	3.9	1.52	2.63	3.49	1.79	1.5	2.04	2.41	1.67	2.9
		Median	3.53	0.27	3.56	1.97	3.08	4.38	2.44	2.06	2.76	2.47	1.83	3.13
		Quantile (0.85)	4.42	1.42	4.82	1.59	1.67	2.5	1.63	0.87	1.88	4.22	3.1	5.08
		Quantile (0.95)	3.98	0.59	4.12	1.41	2.84	3.16	2.09	1.79	3.12	3.59	1.15	3.77
	4 (40<50 ft)	Mean	3.02	0.48	3.01	2.57	3.65	5.59	1.97	2.03	2.4	2.29	2.5	3.5
		Median	2.27	0.78	2.36	3.31	3.78	6.48	1.98	2.38	2.76	2.89	2.57	4.23
		Quantile (0.85)	2.36	0.43	2.45	2.68	4.05	5.6	1.26	1.99	2.7	3.86	4.27	5.74
		Quantile (0.95)	3.03	0.31	3.06	1.84	1.66	3	0.59	1.12	1.29	3.82	1.7	4.19
	5 (50<80 ft)	Mean	3.21	0.25	3.26	3.08	3.02	4.88	2.46	1.45	2.36	2.47	2.55	3.51
		Median	3.29	0.06	3.29	3.2	3.28	5.12	2.32	1.77	2.21	3.57	3.44	4.97
		Quantile (0.85)	2.64	0.02	2.65	1.55	1.89	2.75	1.02	1.25	1.56	2.57	3.11	4.01
		Quantile (0.95)	2.34	0.34	2.41	0.64	4.15	4.81	2	2.37	2.42	2.62	0.85	2.76
	6 (80<100 ft)	Mean	4.02	0.59	4.06	4.04	9.31	10.37	5.85	2.43	5.25	3.25	7.11	7.66
		Median	4.4	1.04	4.51	4.76	10.63	12.26	11.26	2.43	9.26	3.83	8.95	9.8
		Quantile (0.85)	1.29	2.41	2.73	4.95	12.99	13.93	1.05	0.71	1.03	1.35	5.84	5.99
		Quantile (0.95)	2.09	2.17	2.98	5.35	12.2	13.36	4.62	2.66	5.12	1.59	4.68	4.93
	Total	Mean	3.98	0.58	4.11	1.7	4.56	6.01	1.83	3.1	3.8	3.35	2.65	4.4
		Median	4.66	0.31	4.72	2.1	8.18	9.96	1.72	3.56	4.32	4.95	3.61	6.11
		Quantile (0.85)	3.44	0.91	3.63	0.96	2.78	3.89	3.19	4.44	5.51	6	3.73	7.09
		Quantile (0.95)	2.85	1.16	3.25	1.11	3.41	4.87	2.36	4.95	6.26	5.12	1.7	5.35

Table C-13b. Standard Error of Speed by Road Type, Length Class and Horizontal Curvature Class (Free-Flow) (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
HOR_ CURVED	VEH_ LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
3 Sharp	1 (<20 ft)	Mean	1.62	.	.	.	2.16	.	1.41	5.35	5.53	5.56	2.63	6.15
		Median	2.34	.	.	.	2.39	.	0.82	4	4.08	15.71	2.66	15.94
		Quantile (0.85)	1.67	.	.	.	2.58	.	5.59	11.31	12.61	2.81	4.61	5.4
		Quantile (0.95)	1.14	.	.	.	1.93	.	5.32	7.89	9.51	2.47	5.84	6.35
	2 (20<30 ft)	Mean	2.29	.	.	.	0.93	.	2.52	7.08	7.51	4.17	4.76	6.34
		Median	3.26	.	.	.	1.01	.	2.89	10.1	10.5	6.3	5.99	8.69
		Quantile (0.85)	2.38	.	.	.	1.64	.	4.5	7.73	8.94	3.1	7.2	7.83
		Quantile (0.95)	1.85	.	.	.	1.88	.	3.85	4.87	6.21	1.89	5.24	5.57
	3 (30<40 ft)	Mean	1.36	.	.	.	3.19	.	3.49	6.14	7.06	4.18	3.16	5.24
		Median	1.94	.	.	.	2.23	.	6.23	8.7	10.7	5.19	2.96	6
		Quantile (0.85)	1.59	.	.	.	5.21	.	2.86	6.83	7.41	2.19	5.23	5.68
		Quantile (0.95)	1.34	.	.	.	8.95	.	2.94	3.37	4.47	0.97	6.16	6.23
	4 (40<50 ft)	Mean	1.22	.	.	.	3.49	.	5.13	3.33	6.11	3.61	2.38	4.28
		Median	1.83	.	.	.	1.81	.	8.77	8.46	12.18	4.44	5.85	7.33
		Quantile (0.85)	1.11	.	.	.	12.15	.	4.67	0.98	4.77	2.54	1.42	2.86
		Quantile (0.95)	1.15	.	.	.	9.68	.	5.05	9.88	11.09	1.41	10.98	11.08
	5 (50<80 ft)	Mean	2.38	.	.	.	0.65	.	2.64	0.92	2.8	2.43	0.96	2.61
		Median	2.44	.	.	.	1.1	.	6.27	3.98	7.43	1.37	1.66	2.15
		Quantile (0.85)	3.91	.	.	.	1.37	.	1.99	4.31	4.75	3.55	2.13	4.14
		Quantile (0.95)	3.22	.	.	.	2.12	.	3.11	8.32	8.88	2.6	6.22	6.74
	6 (80<100 ft)	Mean	3.93	.	.	.	.	.	.	9.51	.	2.53	8.93	9.28
		Median	4.35	.	.	0	0	0	.	10.92	.	2.88	10.27	10.66
		Quantile (0.85)	4.65	.	.	0	0	0	.	10.26	.	4.17	9.59	10.46
		Quantile (0.95)	5	.	.	0	0	0	.	12.79	.	4.65	12.79	13.61
	Total	Mean	1.78	.	.	.	2.01	.	1.75	6.23	6.48	5.03	3.02	5.87
		Median	2.57	.	.	.	2.25	.	1.32	7.33	7.45	11.89	2.49	12.14
		Quantile (0.85)	1.86	.	.	.	2.13	.	5.15	10.08	11.32	3.48	6.66	7.51
		Quantile (0.95)	1.34	.	.	.	1.5	.	4.38	6.96	8.22	2.9	6	6.67

Table C-13b. Standard Error of Speed by Road Type, Length Class and Horizontal Curvature Class (Free-Flow) (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
HOR_ CURVED	VEH_ LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
Total	1 (<20 ft)	Mean	1.26	0.74	1.4	0.93	1.21	1.43	1.04	2.09	2.11	1.59	1.22	1.78
		Median	1.45	0.71	1.58	0.96	1.53	1.72	1.18	2.55	2.65	1.97	1.2	1.94
		Quantile (0.85)	1.28	0.54	1.39	1.24	1.09	0.99	1.47	2.5	2.55	2.17	0.59	2.14
		Quantile (0.95)	1.08	0.61	1.24	1.31	0.95	0.88	1.66	2.98	2.99	1.26	0.56	1.34
	2 (20<30 ft)	Mean	0.95	0.82	1.17	1.44	1.64	2.05	1.38	2.13	2.25	1.17	1.38	1.72
		Median	1.23	0.78	1.31	1.56	1.87	2.5	1.58	2.77	2.94	1.44	1.26	1.87
		Quantile (0.85)	0.21	0.65	0.72	1.5	0.91	1.49	1.86	2.26	2.52	1.68	0.63	1.77
		Quantile (0.95)	0.49	0.74	0.89	1.25	1.04	1.26	1.48	2	2.14	0.45	0.67	0.74
	3 (30<40 ft)	Mean	1	0.68	1.15	1.21	1.06	1.43	1.24	1.17	1.48	1.04	0.78	1.19
		Median	0.79	0.58	0.96	1.35	0.97	1.49	1.7	1.48	2	1.28	0.72	1.38
		Quantile (0.85)	0.34	0.49	0.62	1.17	1.04	1.64	1.08	1.17	1.46	1.3	0.57	1.47
		Quantile (0.95)	0.63	0.57	0.88	0.85	1.39	1.96	1.04	1.33	1.96	1.49	0.61	1.69
	4 (40<50 ft)	Mean	0.93	0.68	1.06	0.96	1.06	1.23	1.58	1.39	1.74	1.05	0.84	1.27
		Median	0.88	0.61	1.04	1.19	0.98	1.39	1.79	1.73	2.47	1.07	0.77	1.33
		Quantile (0.85)	0.7	0.49	0.87	0.76	1.09	1.37	1.04	1.44	1.45	1.1	0.63	1.36
		Quantile (0.95)	0.56	0.5	0.77	1.03	1.07	1.47	0.81	1.7	1.89	1.55	0.54	1.68
	5 (50<80 ft)	Mean	1.41	0.54	1.4	1.42	1.05	2.05	2.19	1.28	2.35	1.42	0.67	1.39
		Median	1.85	0.43	1.85	1.38	1.04	2.05	2.58	1.79	2.84	1.56	0.52	1.57
		Quantile (0.85)	1.33	0.44	1.51	0.65	1.4	1.83	1.05	1.26	1.73	2.45	0.53	2.53
		Quantile (0.95)	0.92	0.55	1.26	0.7	1.63	1.83	0.63	1.22	1.21	0.92	0.59	1.12
	6 (80<100 ft)	Mean	1.71	0.73	1.84	3.2	0.97	3.47	2.15	1.52	2.87	1.58	0.85	1.75
		Median	1.55	0.56	1.67	2.35	0.82	2.31	1.23	3.95	4.47	1.33	0.89	1.66
		Quantile (0.85)	1.95	0.4	2.11	2.42	1.11	2.82	0.57	1.48	2.13	2.52	0.39	2.67
		Quantile (0.95)	1.56	0.56	1.86	2.78	2.83	6.08	0.32	2.61	3.31	1.6	0.64	2.01
	Total	Mean	1.02	0.63	1.17	1.22	1.31	1.62	1.23	2.01	2.03	1.47	1.14	1.63
		Median	0.84	0.62	1.1	1.3	1.61	1.97	1.37	2.66	2.67	2.03	0.95	1.93
		Quantile (0.85)	1.63	0.51	1.72	1.49	1.1	1.37	1.97	2.34	2.46	1.55	0.56	1.72
		Quantile (0.95)	0.74	0.57	0.98	1.46	0.9	1.31	1.66	2.63	2.58	1.38	0.5	1.48

Table C-13c. Standard Deviation of Speed by Road Type, Length Class and Horizontal Curvature Class (Free-Flow)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation		
HOR_CURVED	VEH_LENGTH	2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Straight	1 (<20 ft)	7.86	7.87	0.01	9.73	12.51	2.78	9.6	12.41	2.82	14.65	14.14	-0.5
	2 (20<30 ft)	8.04	8.78	0.73	10.31	13.05	2.74	10.59	13.53	2.94	13.1	13.8	0.71
	3 (30<40 ft)	9.05	9.03	-0.02	11.13	14.34	3.21	11.08	15.35	4.27	12.48	13.68	1.2
	4 (40<50 ft)	8.94	8.91	-0.03	10.53	14.37	3.85	10.48	15.06	4.58	11.84	13.24	1.39
	5 (50<80 ft)	6.82	6.3	-0.52	10.94	13.93	3	11	15.05	4.06	8.9	8.73	-0.17
	6 (80<100 ft)	7.56	6.92	-0.64	9.32	13.01	3.69	9.98	14.47	4.49	8.55	9.36	0.81
	Total	8.12	8.13	0.01	10.38	12.95	2.58	10.33	13.09	2.77	14.03	13.66	-0.37
2 Moderate	1 (<20 ft)	8.08	5.65	-2.43	7.74	12.73	4.99	9.35	12.7	3.35	15.58	13.76	-1.82
	2 (20<30 ft)	7.05	5.17	-1.88	7.46	14.49	7.03	10.33	13.52	3.19	14.28	15.06	0.78
	3 (30<40 ft)	9.28	7.21	-2.07	8.45	15.04	6.59	10.87	15.26	4.39	12.47	15.85	3.38
	4 (40<50 ft)	8.44	6.27	-2.17	7.27	14.71	7.44	10.25	13.87	3.62	11.06	15.04	3.99
	5 (50<80 ft)	8.39	5.73	-2.66	6.91	12.94	6.03	10.25	14.08	3.83	9.05	14.5	5.44
	6 (80<100 ft)	8.78	3.77	-5.02	5.01	12	6.99	11.95	12.42	0.47	8.52	12.65	4.12
	Total	8.59	5.72	-2.87	7.83	13.39	5.55	10.14	13.12	2.98	15.37	14.48	-0.89
3 Sharp	1 (<20 ft)	6.3	.	.	6.65	6.79	0.14	8.63	10.83	2.2	16.13	9.4	-6.73
	2 (20<30 ft)	6.58	.	.	6.47	10.06	3.6	10.06	14.27	4.21	14.25	13.45	-0.81
	3 (30<40 ft)	6.09	.	.	9.28	10.48	1.2	11.58	16.35	4.76	13.22	14.65	1.43
	4 (40<50 ft)	5.91	.	.	7.61	17.25	9.64	11	15.77	4.77	11.59	16.17	4.57
	5 (50<80 ft)	5.3	.	.	9.27	13.66	4.4	13.19	16.77	3.58	10.04	15.96	5.92
	6 (80<100 ft)	4.96	.	.	0	0	0	8.72	13.14	4.42	4.99	12.93	7.94
	Total	6.39	.	.	7.22	7.8	0.57	9.42	13.09	3.67	15.64	11.22	-4.42
Total	1 (<20 ft)	7.84	7.86	0.02	9.72	12.59	2.87	9.74	12.48	2.73	14.84	14.41	-0.42
	2 (20<30 ft)	7.92	8.71	0.8	10.19	13.14	2.95	10.68	13.54	2.86	13.22	13.96	0.73
	3 (30<40 ft)	9.01	9.02	0.01	10.99	14.38	3.39	11.14	15.41	4.27	12.5	13.93	1.42
	4 (40<50 ft)	8.86	8.89	0.03	10.3	14.41	4.1	10.53	15.01	4.48	11.79	13.47	1.68
	5 (50<80 ft)	7.04	6.3	-0.74	10.67	13.94	3.27	11.08	15.02	3.94	9	8.94	-0.06
	6 (80<100 ft)	7.79	6.9	-0.89	8.94	13.05	4.11	10.08	14.33	4.25	8.62	9.5	0.88
	Total	8.11	8.11	0	10.33	13.04	2.71	10.46	13.12	2.66	14.21	13.92	-0.29

Table C-14a. Speed Estimate of Speed by Road Type, Length Class and Vertical Curvature Class (Free-Flow)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
VER_ CURVED	VEH_ LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Flat	1 (<20 ft)	Mean	71.41	71.4	-0.01	51.02	55.49	4.47	45.17	48.43	3.25	55.31	62.8	7.49
		Median	71.94	72.01	0.07	51.3	56.37	5.06	44.45	47.5	3.05	53.88	66	12.12
		Quantile (0.85)	78.84	78.75	-0.1	60.77	68.07	7.3	55.26	61.42	6.16	73	76.6	3.6
		Quantile (0.95)	82.48	82.78	0.29	66.46	74.49	8.03	62.13	69.45	7.32	79	81.18	2.18
	2 (20<30 ft)	Mean	71.9	70.98	-0.92	56.72	60.19	3.47	50.72	53.14	2.42	58.29	62.6	4.31
		Median	72.71	71.79	-0.92	57.01	61.17	4.16	50.1	52.6	2.5	58	64.71	6.71
		Quantile (0.85)	78.9	78.65	-0.25	67.1	72.72	5.62	62	67.08	5.08	74	76.2	2.2
		Quantile (0.95)	82.24	82.92	0.69	73.22	80.15	6.93	69.4	76.12	6.72	79	81.5	2.5
	3 (30<40 ft)	Mean	67.62	67.06	-0.56	56.33	56.7	0.37	51.36	53.06	1.7	57.86	60.84	2.98
		Median	67.75	67.33	-0.42	56.3	58.07	1.77	50.78	52.73	1.95	58.11	63	4.89
		Quantile (0.85)	75.93	75.3	-0.63	67.61	69.77	2.16	62.73	68.07	5.34	71.56	73.7	2.14
		Quantile (0.95)	79.92	79.69	-0.22	75.05	78.63	3.58	71.25	79.93	8.68	77.62	79.62	2
	4 (40<50 ft)	Mean	66.73	67.06	0.34	56.17	55.79	-0.39	51.86	52.91	1.05	59.1	61.48	2.38
		Median	66.76	67.44	0.68	56.76	57.38	0.61	52.07	52.93	0.86	60	63.8	3.8
		Quantile (0.85)	74.49	75.07	0.58	66.1	69.4	3.3	62.14	67.59	5.45	71.17	73.7	2.53
		Quantile (0.95)	78.34	79.31	0.97	72.57	77.84	5.27	68.88	77.72	8.84	76.48	79	2.52
	5 (50<80 ft)	Mean	65.37	65.62	0.24	55.77	56.22	0.45	52.51	53.18	0.67	63.36	64.04	0.68
		Median	64.96	65.58	0.62	56.73	57.78	1.05	53.98	53.19	-0.78	64	65	1
		Quantile (0.85)	71.6	71.47	-0.14	65.83	69.15	3.32	62.92	68.45	5.54	71	71.37	0.37
		Quantile (0.95)	75.27	74.92	-0.35	72.13	78.07	5.93	69.01	78.86	9.84	75	75.2	0.2
	6 (80<100 ft)	Mean	66.17	68.64	2.48	58.48	57.29	-1.19	54.86	53.31	-1.55	64.98	66.69	1.71
		Median	66.07	69.13	3.06	59.53	59.46	-0.08	56.31	53.64	-2.68	65.96	68.25	2.29
		Quantile (0.85)	72.82	74.65	1.83	66.63	68.61	1.98	63.29	66.13	2.85	72.93	74.37	1.44
		Quantile (0.95)	76.69	77.56	0.87	71.52	75.03	3.51	69.14	77.87	8.73	76.35	77.49	1.14
	Total	Mean	70.56	70.38	-0.19	53.26	56.64	3.38	47.13	49.8	2.67	56.69	62.79	6.1
		Median	70.88	70.82	-0.06	53.37	57.51	4.14	46.38	49.07	2.69	56.38	65.4	9.02
		Quantile (0.85)	77.99	78.07	0.08	63.74	69.39	5.64	57.82	63.28	5.46	73	76.09	3.1
		Quantile (0.95)	81.87	82.21	0.34	70.14	76.32	6.18	65.56	72.19	6.63	78.99	80.87	1.88

Table C-14a. Speed Estimate of Speed by Road Type, Length Class and Vertical Curvature Class (Free-Flow) (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
VER_ CURVED	VEH_ LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
2 Moderate	1 (<20 ft)	Mean	66.84	71.68	4.85	51.53	49.25	-2.27	44.44	42.38	-2.06	48.67	49.85	1.18
		Median	65.8	71.59	5.8	51.48	49.22	-2.26	42.53	42.35	-0.18	46.28	48.77	2.49
		Quantile (0.85)	71.98	77.25	5.27	56.3	60.58	4.28	56.09	54.76	-1.33	63.85	64.98	1.13
		Quantile (0.95)	75.9	81.12	5.21	60.33	66.97	6.64	62.52	61.94	-0.58	69.96	73.7	3.74
	2 (20<30 ft)	Mean	66.96	71.79	4.83	54.48	55.94	1.46	51.67	50.28	-1.39	54.48	55.26	0.77
		Median	66.08	71.83	5.75	53.8	56.82	3.01	51.15	50.39	-0.76	55	55.91	0.91
		Quantile (0.85)	72.03	77.22	5.19	59.83	67.85	8.02	63.86	63.08	-0.79	66.97	69.57	2.59
		Quantile (0.95)	75.68	81.51	5.83	65.22	76.2	10.97	70.53	70.73	0.2	72.5	76.56	4.06
	3 (30<40 ft)	Mean	65.6	67.19	1.59	52	52.18	0.18	52.95	49.83	-3.12	54.82	52.66	-2.16
		Median	64.56	66.78	2.22	50.7	52.87	2.18	53.35	49.14	-4.21	55.83	52.92	-2.92
		Quantile (0.85)	70.51	71.97	1.47	57.97	64.71	6.75	65.04	63.98	-1.06	66.95	67.87	0.92
		Quantile (0.95)	74.78	75.63	0.85	64.32	77.35	13.04	73.36	76.37	3	73.62	76.36	2.74
	4 (40<50 ft)	Mean	65.25	68.13	2.88	50.68	54.05	3.37	53.97	48.95	-5.02	55.59	54.07	-1.51
		Median	64.43	67.47	3.04	49.9	54.72	4.81	55.27	50.17	-5.1	57	54.82	-2.17
		Quantile (0.85)	70.03	73.86	3.83	54.05	67.07	13.02	64.92	61.4	-3.52	66.96	68.81	1.84
		Quantile (0.95)	73.89	76.33	2.44	58.12	79.27	21.15	72.21	71.52	-0.69	72.49	76.31	3.82
	5 (50<80 ft)	Mean	62.89	66.17	3.28	51.5	51.84	0.34	57.91	52.23	-5.68	59.5	58.32	-1.19
		Median	62.21	65.81	3.6	51.49	51.68	0.19	60.38	50.77	-9.61	61.45	62.41	0.96
		Quantile (0.85)	66.16	70.36	4.2	54.36	66.28	11.92	67.23	65.78	-1.45	66.86	69.44	2.57
		Quantile (0.95)	69.32	73.19	3.87	59	76.43	17.42	71.78	75.84	4.06	70.78	74.61	3.84
	6 (80<100 ft)	Mean	64.16	70.28	6.12	.	61.21	.	58.83	53.66	-5.17	61.58	61.82	0.24
		Median	63.36	69	5.64	.	58.74	.	63.41	54.18	-9.23	63.57	60.26	-3.31
		Quantile (0.85)	68.28	73.65	5.37	.	63.75	.	69.95	57.02	-12.93	69.91	70.87	0.96
		Quantile (0.95)	70.65	76.3	5.65	.	65.32	.	70.05	69.48	-0.57	70.4	76.24	5.84
	Total	Mean	66.67	70.86	4.19	52.59	50.39	-2.2	46.93	44.96	-1.97	50.72	51.18	0.46
		Median	65.68	70.81	5.13	52.19	50.91	-1.28	44.77	44.37	-0.4	49.82	50.95	1.12
		Quantile (0.85)	71.81	76.59	4.78	57.77	62.1	4.33	59.54	58.29	-1.25	65	66.66	1.67
		Quantile (0.95)	75.7	80.57	4.88	62.62	69.32	6.7	66.45	65.99	-0.46	70.91	74.49	3.58

Table C-14a. Speed Estimate of Speed by Road Type, Length Class and Vertical Curvature Class (Free-Flow) (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
VER_ CURVED	VEH_ LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
3 Steep	1 (<20 ft)	Mean	68.96	.	.	53.49	44.09	-9.39	38.75	51.1	12.36	42.53	50.66	8.13
		Median	68.62	.	.	54.84	43.2	-11.64	38.44	53.41	14.97	41.02	52.5	11.48
		Quantile (0.85)	74.52	.	.	65.33	50.2	-15.13	46.19	62.38	16.19	53.44	62.35	8.91
		Quantile (0.95)	77.73	.	.	71.6	57.53	-14.08	50.29	68.45	18.17	64.45	68.31	3.86
	2 (20<30 ft)	Mean	68.99	.	.	58.29	44.27	-14.03	42.84	57.09	14.25	48.48	56.12	7.64
		Median	68.96	.	.	59.01	44.01	-14.99	42.96	57.46	14.51	46.8	56.89	10.09
		Quantile (0.85)	75.18	.	.	69.69	51.56	-18.13	50.9	67.53	16.63	62.17	66.85	4.68
		Quantile (0.95)	79.4	.	.	75	58.09	-16.91	55.84	75.23	19.39	70.13	74.91	4.77
	3 (30<40 ft)	Mean	65.15	.	.	59.72	49.18	-10.53	42.06	49.4	7.33	52.13	49.39	-2.74
		Median	66.15	.	.	59.89	42.54	-17.35	41.36	51.44	10.08	53.85	51.24	-2.61
		Quantile (0.85)	73.11	.	.	68.9	62.98	-5.92	52.72	59.34	6.62	65.32	59.36	-5.96
		Quantile (0.95)	76.16	.	.	75.61	70.98	-4.63	60.24	67.09	6.85	72.89	70.37	-2.51
	4 (40<50 ft)	Mean	65.54	.	.	59.29	37.18	-22.11	38.29	52.97	14.69	52.76	52.01	-0.76
		Median	65.54	.	.	59.46	32.18	-27.28	37.45	52.43	14.98	56.09	51.51	-4.58
		Quantile (0.85)	73.26	.	.	68.22	45.77	-22.45	45.58	67.63	22.06	65.67	65.05	-0.63
		Quantile (0.95)	77.45	.	.	75.27	46.47	-28.81	54.6	72.35	17.75	72.74	72.33	-0.41
	5 (50<80 ft)	Mean	61.4	.	.	59.91	38.74	-21.17	36.03	50.6	14.57	55.16	50.46	-4.7
		Median	62.83	.	.	60.7	39.15	-21.55	32.78	51.07	18.29	58.37	50.52	-7.86
		Quantile (0.85)	70.5	.	.	68.09	41.67	-26.42	46.21	61.73	15.52	67.49	61.61	-5.88
		Quantile (0.95)	75.33	.	.	73.03	45.66	-27.37	52.98	75.99	23.01	72.34	75.77	3.43
	6 (80<100 ft)	Mean	53.25	.	.	58.14	33.08	-25.06	38.86	43.45	4.59	49.75	42.77	-6.98
		Median	58	.	.	50.08	33.08	-17	33.64	42.87	9.23	45.49	38.17	-7.32
		Quantile (0.85)	67.2	.	.	61.36	33.08	-28.28	40.95	42.87	1.92	65.04	42.28	-22.76
		Quantile (0.95)	72.8	.	.	64.59	33.08	-31.51	43.05	45.78	2.74	65.83	45.6	-20.23
	Total	Mean	68.59	.	.	55.62	44.1	-11.51	39.73	52.49	12.76	44.53	51.95	7.42
		Median	68.45	.	.	57.02	43.23	-13.79	39.48	54.47	14.99	42.6	53.49	10.89
		Quantile (0.85)	74.55	.	.	67.45	50.59	-16.85	47.63	64.21	16.58	58.37	63.7	5.33
		Quantile (0.95)	77.99	.	.	73.27	57.73	-15.54	52.59	71.29	18.7	67.07	70.85	3.78

Table C-14a. Speed Estimate of Speed by Road Type, Length Class and Vertical Curvature Class (Free-Flow) (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
VER_ CURVED	VEH_ LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
Total	1 (<20 ft)	Mean	71.33	71.4	0.07	51.05	55.22	4.16	45.03	48.34	3.31	54.95	62.61	7.67
		Median	71.93	72.01	0.08	51.34	56.07	4.74	44.21	47.44	3.23	53.37	65.78	12.42
		Quantile (0.85)	78.82	78.75	-0.08	60.79	67.84	7.05	55.22	61.34	6.12	72.99	76.59	3.6
		Quantile (0.95)	82.43	82.77	0.34	66.46	74.3	7.84	62.06	69.36	7.3	79	81.09	2.09
	2 (20<30 ft)	Mean	71.8	70.98	-0.82	56.71	60.08	3.37	50.68	53.11	2.43	58.09	62.5	4.42
		Median	72.64	71.79	-0.85	56.96	61	4.05	50.06	52.58	2.52	57.74	64.6	6.86
		Quantile (0.85)	78.88	78.65	-0.23	67.06	72.6	5.54	62	67.04	5.04	73.74	76.2	2.46
		Quantile (0.95)	82.18	82.92	0.74	73.16	80.06	6.91	69.4	75.93	6.53	78.99	81.5	2.5
	3 (30<40 ft)	Mean	67.59	67.06	-0.53	56.34	56.61	0.27	51.37	52.96	1.6	57.73	60.72	2.99
		Median	67.72	67.33	-0.4	56.31	57.99	1.68	50.83	52.67	1.85	58	62.9	4.9
		Quantile (0.85)	75.91	75.29	-0.62	67.6	69.65	2.05	62.92	68.03	5.12	71.23	73.6	2.36
		Quantile (0.95)	79.88	79.68	-0.2	75.05	78.63	3.58	71.3	79.88	8.58	77.29	79.6	2.3
	4 (40<50 ft)	Mean	66.71	67.07	0.36	56.18	55.75	-0.44	51.92	52.82	0.9	58.97	61.39	2.42
		Median	66.74	67.44	0.71	56.76	57.34	0.58	52.14	52.83	0.69	60	63.72	3.72
		Quantile (0.85)	74.46	75.07	0.61	66.1	69.38	3.28	62.25	67.51	5.26	71	73.7	2.7
		Quantile (0.95)	78.31	79.3	0.99	72.61	77.84	5.23	69.08	77.61	8.53	76.04	79	2.96
	5 (50<80 ft)	Mean	65.36	65.62	0.26	55.8	56.17	0.37	52.87	53.15	0.28	63.3	64.01	0.71
		Median	64.95	65.58	0.63	56.79	57.65	0.86	54.28	53.14	-1.13	64	65	1
		Quantile (0.85)	71.58	71.46	-0.12	65.86	69.13	3.26	63.58	68.38	4.8	71	71.3	0.3
		Quantile (0.95)	75.26	74.92	-0.34	72.14	78.06	5.93	69.34	78.68	9.34	75	75.2	0.2
	6 (80<100 ft)	Mean	66.15	68.64	2.49	58.48	57.33	-1.15	55.01	53.27	-1.74	64.93	66.67	1.75
		Median	66.05	69.13	3.08	59.53	59.5	-0.03	56.42	53.61	-2.81	65.96	68.24	2.27
		Quantile (0.85)	72.8	74.65	1.85	66.58	68.57	1.99	63.85	66.05	2.2	72.93	74.37	1.44
		Quantile (0.95)	76.67	77.56	0.89	71.51	74.93	3.42	69.97	77.91	7.95	76.32	77.49	1.18
	Total	Mean	70.5	70.38	-0.12	53.28	56.41	3.12	47.01	49.73	2.72	56.39	62.64	6.25
		Median	70.84	70.82	-0.02	53.37	57.34	3.97	46.15	49.04	2.89	56	65.3	9.3
		Quantile (0.85)	77.96	78.06	0.11	63.68	69.27	5.58	57.82	63.23	5.41	72.99	76	3.01
		Quantile (0.95)	81.83	82.21	0.38	70.14	76.22	6.08	65.56	72.14	6.58	78.99	80.8	1.81

Table C-14b. Standard Error of Speed by Road Type, Length Class and Vertical Curvature Class (Free-Flow)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
VER_ CURVED	VEH_ LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Flat	1 (<20 ft)	Mean	1.26	0.74	1.39	0.93	1.28	1.55	1	2.12	2.08	1.62	1.24	1.82
		Median	1.39	0.71	1.52	0.94	1.55	1.72	1.1	2.64	2.64	2.05	1.25	1.94
		Quantile (0.85)	1.24	0.54	1.36	1.27	1.17	1.06	1.41	2.58	2.55	3.1	0.59	3.07
		Quantile (0.95)	1.07	0.61	1.23	1.31	1.01	0.88	1.65	3.02	2.92	1.79	0.58	1.88
	2 (20<30 ft)	Mean	0.94	0.82	1.16	1.48	1.66	2.12	1.32	2.15	2.19	1.18	1.37	1.72
		Median	0.98	0.78	1.05	1.61	1.9	2.56	1.56	2.8	2.96	1.5	1.24	1.87
		Quantile (0.85)	0.19	0.65	0.72	1.54	0.93	1.51	1.84	2.32	2.48	1.8	0.57	1.76
		Quantile (0.95)	0.48	0.74	0.88	1.36	1.05	1.34	1.45	2.07	2.02	0.01	0.62	0.68
	3 (30<40 ft)	Mean	1.01	0.69	1.16	1.27	1.07	1.53	1.14	1.2	1.39	1.05	0.76	1.2
		Median	0.81	0.58	0.97	1.41	0.94	1.54	1.61	1.52	1.98	1.34	0.65	1.43
		Quantile (0.85)	0.36	0.49	0.63	1.23	1.01	1.75	0.98	1.15	1.17	1.59	0.51	1.72
		Quantile (0.95)	0.63	0.57	0.88	0.9	1.4	2.08	1.06	1.31	1.81	1.49	0.63	1.72
	4 (40<50 ft)	Mean	0.93	0.68	1.07	1	1.08	1.34	1.44	1.43	1.59	1.06	0.82	1.29
		Median	1	0.61	1.14	1.25	0.98	1.49	1.76	1.81	2.41	1.08	0.77	1.33
		Quantile (0.85)	0.7	0.49	0.86	0.77	1.13	1.47	0.79	1.39	1.21	1.67	0.65	1.8
		Quantile (0.95)	0.56	0.5	0.76	1.01	1.14	1.55	0.77	1.68	1.74	1.56	0.55	1.73
	5 (50<80 ft)	Mean	1.41	0.55	1.4	1.49	1.06	2.16	1.85	1.3	1.94	1.43	0.66	1.4
		Median	1.97	0.43	1.97	1.48	1.06	2.12	2.16	1.78	2.52	1.75	0.53	1.79
		Quantile (0.85)	1.32	0.44	1.5	0.6	1.41	1.83	0.96	1.21	1.26	2.95	0.51	3.03
		Quantile (0.95)	0.91	0.55	1.25	0.7	1.64	1.86	0.9	1.29	1.32	1.47	0.59	1.59
	6 (80<100 ft)	Mean	1.72	0.73	1.85	3.25	0.98	3.55	1.96	1.53	2.62	1.59	0.85	1.76
		Median	1.55	0.56	1.67	2.35	0.87	2.39	1.06	4.12	4.56	1.32	0.88	1.67
		Quantile (0.85)	1.95	0.4	2.1	2.53	0.98	2.82	1.19	1.45	1.63	2.13	0.39	2.31
		Quantile (0.95)	1.54	0.56	1.85	2.3	2.75	5.53	1.51	2.6	3.03	1.62	0.63	2.02
	Total	Mean	1.02	0.63	1.17	1.24	1.36	1.73	1.17	2.04	1.99	1.49	1.15	1.65
		Median	1.23	0.62	1.42	1.3	1.67	2.1	1.32	2.69	2.64	2.13	0.96	2.05
		Quantile (0.85)	2.09	0.51	2.11	1.56	1.03	1.38	1.86	2.38	2.4	1.8	0.52	1.88
		Quantile (0.95)	0.72	0.57	0.96	1.54	0.95	1.46	1.65	2.61	2.42	1.26	0.54	1.34

Table C-14b. Standard Error of Speed by Road Type, Length Class and Vertical Curvature Class (Free-Flow) (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
VER_ CURVED	VEH_ LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
2 Moderate	1 (<20 ft)	Mean	.	.	.	.	6.86	.	3.22	3.04	4.3	3.54	5.18	6.03
		Median	.	.	.	.	7.94	.	3.26	2.83	4.24	4.74	7.11	7.34
		Quantile (0.85)	.	.	.	.	9.16	.	5.16	4.64	5.81	6.55	5.93	8.99
		Quantile (0.95)	.	.	.	.	9.96	.	3.77	3.52	4.43	6.51	5.91	8.77
	2 (20<30 ft)	Mean	.	.	.	.	10.25	.	4.6	2.64	4.96	3.08	3.7	3.84
		Median	.	.	.	.	11.77	.	6.32	3.67	7.01	4.86	4.4	3.93
		Quantile (0.85)	.	.	.	.	10.94	.	5.21	2.39	5.89	2.83	3	4.12
		Quantile (0.95)	.	.	.	.	9.61	.	4.99	2.06	6.52	2.5	1.82	3.09
	3 (30<40 ft)	Mean	.	.	.	.	9.02	.	5.32	2.47	5.03	3.02	3.2	3.46
		Median	.	.	.	.	10.67	.	6.46	3.2	5.85	4.04	4.07	4.23
		Quantile (0.85)	.	.	.	.	9.17	.	6.21	2.78	7.28	2.16	2.3	3.17
		Quantile (0.95)	.	.	.	.	8.49	.	6.09	3.85	9.45	1.74	0.9	2.35
	4 (40<50 ft)	Mean	.	.	.	.	5.5	.	6.63	2.87	6.53	2.96	3.44	3.59
		Median	.	.	.	.	8.3	.	8.43	3.39	7.71	2.89	3.02	3.49
		Quantile (0.85)	.	.	.	.	4.51	.	5.9	1.88	5.53	2.61	4.66	5.26
		Quantile (0.95)	.	.	.	.	4.94	.	7.8	5.95	9.19	1.62	2.21	2.27
	5 (50<80 ft)	Mean	.	.	.	.	7.19	.	8.94	2.4	9.91	1.75	4.39	4.68
		Median	.	.	.	.	9.23	.	10.31	3.8	11.39	1.71	6.99	7.2
		Quantile (0.85)	.	.	.	.	7.45	.	6.4	3.65	9.5	1.14	1.99	2.45
		Quantile (0.95)	.	.	.	.	1.82	.	3.51	7.21	10.32	1.29	1.79	2.41
	6 (80<100 ft)	Mean	.	.	.	.	2.92	.	1.97	3.88	5.34	2.79	3.25	4.4
		Median	.	.	.	.	4.73	.	9.98	3	10.63	0.39	4.67	4.76
		Quantile (0.85)	.	.	.	.	3.71	.	1.35	3.35	5	0.94	5.66	6.41
		Quantile (0.95)	.	.	.	.	2.1	.	2.37	9.73	11.66	0.84	4.27	4.42
	Total	Mean	.	.	.	.	7.47	.	4.05	2.97	4.69	3.44	4.84	5.37
		Median	.	.	.	.	8.63	.	4.46	3.78	5.63	5.87	6.78	6.27
		Quantile (0.85)	.	.	.	.	9.89	.	5.34	3.7	5.42	4.57	4.95	6.75
		Quantile (0.95)	.	.	.	.	11.02	.	4.75	2.03	4.71	4.02	4.53	6.06

Table C-14b. Standard Error of Speed by Road Type, Length Class and Vertical Curvature Class (Free-Flow) (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
VER_ CURVED	VEH_ LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
3 Steep	1 (<20 ft)	Mean	.	.	.	11.37	1.86	12.66	2.61	8.15	10.2	3.83	7.4	9.83
		Median	.	.	.	11.59	2.66	13.54	3.83	11.42	14.79	2.93	10.13	13.26
		Quantile (0.85)	.	.	.	15.5	1.02	15.24	2.75	5.03	6.89	9.56	5.49	12.03
		Quantile (0.95)	.	.	.	17.62	3.65	14.83	3.41	4.37	6.88	12.03	4.34	13.19
	2 (20<30 ft)	Mean	.	.	.	9.93	5.16	14.32	2.98	2.15	3.87	4.61	2.57	5.96
		Median	.	.	.	10.53	5.03	13.72	3.16	1.01	3.41	3.01	1.43	3.69
		Quantile (0.85)	.	.	.	12.95	5.87	16.53	4.06	1.98	4.8	9.8	2.15	10.51
		Quantile (0.95)	.	.	.	13.95	6.33	20	4.06	2.53	5.14	11.35	3.1	12.2
	3 (30<40 ft)	Mean	.	.	.	7.76	0.21	7.51	2.05	5.72	6.99	7.56	4.74	9.5
		Median	.	.	.	7.55	2.69	10.89	2.09	8.99	11.49	10.13	6.51	13.13
		Quantile (0.85)	.	.	.	7.93	7.81	5.26	2.98	1.09	3.46	7.7	2.22	8.18
		Quantile (0.95)	.	.	.	10.12	3.47	7.45	3.27	7.41	9.5	8.96	5.57	8.65
	4 (40<50 ft)	Mean	.	.	.	15.55	2.18	18.26	4.86	8.46	11.51	12.33	8.52	16.79
		Median	.	.	.	15.93	5.25	22.55	7.38	9.32	12.82	15.11	10.2	20.47
		Quantile (0.85)	.	.	.	19.57	4.8	16.17	4.95	8.22	11.58	17.14	8.54	21.67
		Quantile (0.95)	.	.	.	24.44	2.33	21.97	10.95	4.26	12.2	9.71	7.75	13.8
	5 (50<80 ft)	Mean	.	.	.	14.14	.	.	1.68	3.76	4.94	13.77	3.88	14.53
		Median	.	.	.	16.49	.	.	2.07	5.84	7.55	16.79	6.11	18.44
		Quantile (0.85)	.	.	.	15.72	.	.	11.35	4.27	12.4	14.76	4.31	15.57
		Quantile (0.95)	.	.	.	17.7	.	.	9.19	5.03	11.15	9.43	5.44	11.61
	6 (80<100 ft)	Mean	.	.	.	.	.	.	6.4	3.5	7.83	10.03	0.92	10.07
		Median	.	.	.	.	0	.	4.53	1.94	5.15	11.27	1.9	11.49
		Quantile (0.85)	.	.	.	.	0	.	6.48	3.4	7.78	21.9	2.07	22.05
		Quantile (0.95)	.	.	.	.	0	.	8.16	3.02	8.85	19.92	2.97	20.24
	Total	Mean	.	.	.	10.87	2.61	12.92	2.73	6.18	7.9	4.44	5.81	8.44
		Median	.	.	.	11.8	2.82	14.08	3.68	9.69	12.83	3.12	8.35	11.23
		Quantile (0.85)	.	.	.	14.19	1.89	14.41	3.32	3.32	5.35	10.26	3.49	11.15
		Quantile (0.95)	.	.	.	14.6	2.16	13.53	3.79	3.27	5.58	11.97	3.11	12.67

Table C-14b. Standard Error of Speed by Road Type, Length Class and Vertical Curvature Class (Free-Flow) (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
VER_ CURVED	VEH_ LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
Total	1 (<20 ft)	Mean	1.26	0.74	1.4	0.93	1.21	1.43	1.04	2.09	2.11	1.59	1.22	1.78
		Median	1.45	0.71	1.58	0.96	1.53	1.72	1.18	2.55	2.65	1.97	1.2	1.94
		Quantile (0.85)	1.28	0.54	1.39	1.24	1.09	0.99	1.47	2.5	2.55	2.17	0.59	2.14
		Quantile (0.95)	1.08	0.61	1.24	1.31	0.95	0.88	1.66	2.98	2.99	1.26	0.56	1.34
	2 (20<30 ft)	Mean	0.95	0.82	1.17	1.44	1.64	2.05	1.38	2.13	2.25	1.17	1.38	1.72
		Median	1.23	0.78	1.31	1.56	1.87	2.5	1.58	2.77	2.94	1.44	1.26	1.87
		Quantile (0.85)	0.21	0.65	0.72	1.5	0.91	1.49	1.86	2.26	2.52	1.68	0.63	1.77
		Quantile (0.95)	0.49	0.74	0.89	1.25	1.04	1.26	1.48	2	2.14	0.45	0.67	0.74
	3 (30<40 ft)	Mean	1	0.68	1.15	1.21	1.06	1.43	1.24	1.17	1.48	1.04	0.78	1.19
		Median	0.79	0.58	0.96	1.35	0.97	1.49	1.7	1.48	2	1.28	0.72	1.38
		Quantile (0.85)	0.34	0.49	0.62	1.17	1.04	1.64	1.08	1.17	1.46	1.3	0.57	1.47
		Quantile (0.95)	0.63	0.57	0.88	0.85	1.39	1.96	1.04	1.33	1.96	1.49	0.61	1.69
	4 (40<50 ft)	Mean	0.93	0.68	1.06	0.96	1.06	1.23	1.58	1.39	1.74	1.05	0.84	1.27
		Median	0.88	0.61	1.04	1.19	0.98	1.39	1.79	1.73	2.47	1.07	0.77	1.33
		Quantile (0.85)	0.7	0.49	0.87	0.76	1.09	1.37	1.04	1.44	1.45	1.1	0.63	1.36
		Quantile (0.95)	0.56	0.5	0.77	1.03	1.07	1.47	0.81	1.7	1.89	1.55	0.54	1.68
	5 (50<80 ft)	Mean	1.41	0.54	1.4	1.42	1.05	2.05	2.19	1.28	2.35	1.42	0.67	1.39
		Median	1.85	0.43	1.85	1.38	1.04	2.05	2.58	1.79	2.84	1.56	0.52	1.57
		Quantile (0.85)	1.33	0.44	1.51	0.65	1.4	1.83	1.05	1.26	1.73	2.45	0.53	2.53
		Quantile (0.95)	0.92	0.55	1.26	0.7	1.63	1.83	0.63	1.22	1.21	0.92	0.59	1.12
	6 (80<100 ft)	Mean	1.71	0.73	1.84	3.2	0.97	3.47	2.15	1.52	2.87	1.58	0.85	1.75
		Median	1.55	0.56	1.67	2.35	0.82	2.31	1.23	3.95	4.47	1.33	0.89	1.66
		Quantile (0.85)	1.95	0.4	2.11	2.42	1.11	2.82	0.57	1.48	2.13	2.52	0.39	2.67
		Quantile (0.95)	1.56	0.56	1.86	2.78	2.83	6.08	0.32	2.61	3.31	1.6	0.64	2.01
	Total	Mean	1.02	0.63	1.17	1.22	1.31	1.62	1.23	2.01	2.03	1.47	1.14	1.63
		Median	0.84	0.62	1.1	1.3	1.61	1.97	1.37	2.66	2.67	2.03	0.95	1.93
		Quantile (0.85)	1.63	0.51	1.72	1.49	1.1	1.37	1.97	2.34	2.46	1.55	0.56	1.72
		Quantile (0.95)	0.74	0.57	0.98	1.46	0.9	1.31	1.66	2.63	2.58	1.38	0.5	1.48

Table C-14c. Standard Deviation of Speed by Road Type, Length Class and Vertical Curvature Class (Free-Flow)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation		
VER_CURVED	**VEH_LENGTH**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**
1 Flat	**1 (<20 ft)**	7.86	7.87	0.01	9.73	12.59	2.86	9.74	12.46	2.73	14.85	14.34	-0.51
	2 (20<30 ft)	7.93	8.72	0.79	10.23	13.13	2.9	10.64	13.55	2.91	13.25	13.94	0.69
	3 (30<40 ft)	9.05	9.03	-0.02	11.02	14.36	3.35	11.05	15.42	4.38	12.49	13.88	1.39
	4 (40<50 ft)	8.89	8.89	0	10.31	14.4	4.09	10.42	15.03	4.61	11.77	13.43	1.66
	5 (50<80 ft)	7.05	6.31	-0.75	10.69	13.92	3.23	10.95	15.04	4.09	8.98	8.9	-0.08
	6 (80<100 ft)	7.8	6.9	-0.9	8.95	13.1	4.15	9.71	14.39	4.68	8.59	9.49	0.9
	Total	8.13	8.12	-0.02	10.35	13.03	2.68	10.43	13.11	2.68	14.21	13.85	-0.35
2 Moderate	**1 (<20 ft)**	5.48	5.8	0.32	5.35	10.95	5.6	9.9	11.98	2.08	12.23	13.68	1.45
	2 (20-<30 ft)	5.37	5.89	0.52	5.96	12.8	6.84	11.26	13.05	1.79	11.47	13.83	2.36
	3 (30-<40 ft)	5.43	4.92	-0.51	7.15	14.36	7.21	12.18	14.75	2.57	11.96	14.82	2.87
	4 (40-<50 ft)	5.18	5.53	0.35	4.15	14.37	10.21	11.36	14.36	2.99	11.13	14.9	3.77
	5 (50-<80 ft)	4.1	4.36	0.26	4.52	14.77	10.25	10.82	14.24	3.41	9.27	13.18	3.91
	6 (80-<100 ft)	3.89	3.94	0.05	.	4.6	.	11.71	11.03	-0.68	9.02	9.69	0.67
	Total	5.46	5.95	0.49	5.79	11.67	5.88	11.02	13.07	2.05	12.33	13.96	1.64
3 Steep	**1 (<20 ft)**	6.12	.	.	12.03	7.89	-4.15	7.06	12.45	5.39	10.83	12.33	1.5
	2 (20-<30 ft)	7.86	.	.	10.84	9.16	-1.67	7.89	11.69	3.8	11.78	12	0.22
	3 (30-<40 ft)	10.52	.	.	10.19	13.92	3.73	9.87	12.64	2.76	13.37	12.7	-0.67
	4 (40-<50 ft)	9.32	.	.	10.47	6.86	-3.61	9.1	12.94	3.84	14.05	13.2	-0.84
	5 (50-<80 ft)	12.79	.	.	9.24	5.74	-3.5	9.8	14.22	4.42	13.41	14.21	0.79
	6 (80-<100 ft)	19.51	.	.	8.06	0	-8.06	5.22	1.69	-3.53	11.98	3.05	-8.93
	Total	7.16	.	.	11.76	8.67	-3.09	7.54	12.64	5.1	11.67	12.59	0.93
Total	**1 (<20 ft)**	7.84	7.86	0.02	9.72	12.59	2.87	9.74	12.48	2.73	14.84	14.41	-0.42
	2 (20-<30 ft)	7.92	8.71	0.8	10.19	13.14	2.95	10.68	13.54	2.86	13.22	13.96	0.73
	3 (30-<40 ft)	9.01	9.02	0.01	10.99	14.38	3.39	11.14	15.41	4.27	12.5	13.93	1.42
	4 (40-<50 ft)	8.86	8.89	0.03	10.3	14.41	4.1	10.53	15.01	4.48	11.79	13.47	1.68
	5 (50-<80 ft)	7.04	6.3	-0.74	10.67	13.94	3.27	11.08	15.02	3.94	9	8.94	-0.06
	6 (80-<100 ft)	7.79	6.9	-0.89	8.94	13.05	4.11	10.08	14.33	4.25	8.62	9.5	0.88
	Total	8.11	8.11	0	10.33	13.04	2.71	10.46	13.12	2.66	14.21	13.92	-0.29

Table C-15a. Speed Estimate of Speed by Road Type, Horizontal Curvature and Light Condition (Free-Flow)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
LIGHT CONDITION	**HOR_ CURVERD**		**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**
1 Day (0600-2059)	**1 Straight**	**Mean**	71.17	70.82	-0.35	53.1	56.77	3.66	47.7	50.07	2.37	56.4	63.05	6.65
		Median	71.92	71.34	-0.58	53.23	57.64	4.41	46.86	49.34	2.47	55.54	65.7	10.16
		Quantile (0.85)	78.82	78.44	-0.38	63.63	69.4	5.77	58.36	63.59	5.23	73	76.4	3.4
		Quantile (0.95)	82.36	82.55	0.19	70.16	76.34	6.19	66.09	72.33	6.23	79	81.14	2.14
	2 Moderate	**Mean**	69.26	72.48	3.21	58.7	49.75	-8.95	41.9	48.94	7.04	52.57	51.39	-1.18
		Median	69.72	72.86	3.14	58.92	50.45	-8.47	39.8	48.21	8.41	53	50.22	-2.78
		Quantile (0.85)	77.05	77.67	0.63	65.88	62.93	-2.95	53.99	62.19	8.21	70.99	68.07	-2.92
		Quantile (0.95)	80.45	80.76	0.31	71.16	70.53	-0.63	60.39	71.78	11.39	76.98	76.2	-0.78
	3 Sharp	**Mean**	69.05	.	.	58.48	40.49	-17.99	41.05	39.92	-1.13	53.31	40.16	-13.15
		Median	68.42	.	.	58.34	39.53	-18.81	39.03	35.84	-3.2	55	38.14	-16.86
		Quantile (0.85)	75.28	.	.	65.32	46.82	-18.5	52.63	56.25	3.62	71	51.57	-19.43
		Quantile (0.95)	78.59	.	.	70.05	53.56	-16.49	59.56	64.27	4.71	76.8	62.08	-14.72
	Total	**Mean**	70.98	70.83	-0.14	53.41	56.51	3.11	47	49.86	2.86	56.06	62.5	6.45
		Median	71.89	71.36	-0.53	53.51	57.41	3.91	46.14	49.16	3.01	55.35	65.2	9.85
		Quantile (0.85)	78.76	78.43	-0.33	63.85	69.33	5.47	57.85	63.38	5.53	72.99	76.2	3.21
		Quantile (0.95)	82.15	82.54	0.39	70.25	76.29	6.04	65.58	72.23	6.64	78.99	81	2.01
2 Night (2100-0559)	**1 Straight**	**Mean**	69.07	68.82	-0.25	52.41	56.03	3.62	47.79	49.06	1.27	58.21	63.52	5.31
		Median	68.92	68.95	0.03	52.03	56.66	4.63	47	48.14	1.15	59.01	65.78	6.77
		Quantile (0.85)	76.58	76.5	-0.08	62.92	68.81	5.89	58.3	62.3	3.99	72.99	75.2	2.2
		Quantile (0.95)	80.61	80.72	0.11	69.82	75.88	6.07	65.7	71.21	5.5	78	79.9	1.9
	2 Moderate	**Mean**	67.58	71.08	3.5	56.98	47.33	-9.65	42.04	48.24	6.2	54.4	51.49	-2.9
		Median	67.59	71.5	3.91	57	45.94	-11.06	40.4	46.92	6.52	55.27	50.09	-5.18
		Quantile (0.85)	76.19	76.65	0.46	64.24	61.7	-2.54	53.4	62	8.6	71.99	69.2	-2.79
		Quantile (0.95)	79.75	79.54	-0.21	70.11	71.26	1.15	59.53	71.7	12.17	77.95	76.27	-1.68

Table C-15a. Speed Estimate of Speed by Road Type, Horizontal Curvature and Light Condition (Free-Flow) (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
LIGHT CONDITION	HOR_ CURVED		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
2 Night (2100-0559)	3 Sharp	Mean	67.42	.	.	55.88	40.91	-14.97	41.28	40.04	-1.24	57.92	40.35	-17.57
		Median	66.26	.	.	56.34	40.54	-15.8	39.15	35.23	-3.92	62	37.99	-24.01
		Quantile (0.85)	73.68	.	.	62.09	47.47	-14.62	52.56	57.34	4.78	71.75	53.45	-18.31
		Quantile (0.95)	77.64	.	.	67.13	55.96	-11.17	58.17	64.48	6.31	76.78	62.68	-14.1
	Total	Mean	68.91	68.83	-0.08	52.62	55.82	3.2	47.08	48.93	1.85	57.96	63.19	5.24
		Median	68.88	68.97	0.09	52.27	56.5	4.23	46.2	47.92	1.72	59	65.59	6.59
		Quantile (0.85)	76.48	76.5	0.02	63	68.77	5.78	57.71	62.26	4.55	72.99	75.1	2.1
		Quantile (0.95)	80.46	80.71	0.25	69.83	75.76	5.93	65.16	71.22	6.07	78	79.79	1.8
Total	1 Straight	Mean	70.69	70.36	-0.32	52.99	56.65	3.66	47.71	49.93	2.21	56.72	63.14	6.42
		Median	70.92	70.81	-0.11	52.99	57.48	4.49	46.88	49.17	2.29	56.06	65.7	9.64
		Quantile (0.85)	78.69	78.07	-0.62	63.52	69.36	5.84	58.35	63.38	5.02	73	76.2	3.2
		Quantile (0.95)	82	82.22	0.22	70.09	76.3	6.21	66.08	72.2	6.12	78.99	80.9	1.9
	2 Moderate	Mean	68.91	72.24	3.33	58.45	49.43	-9.02	41.92	48.86	6.94	52.87	51.4	-1.47
		Median	69.33	72.67	3.34	58.7	50.22	-8.49	39.81	48.05	8.25	53.55	50.2	-3.35
		Quantile (0.85)	76.89	77.5	0.61	65.7	62.77	-2.93	53.95	62.19	8.24	70.99	68.13	-2.86
		Quantile (0.95)	80.32	80.61	0.29	70.84	70.54	-0.29	60.36	71.76	11.39	76.99	76.2	-0.79
	3 Sharp	Mean	68.56	.	.	58.19	40.53	-17.67	41.09	39.93	-1.16	54.3	40.18	-14.12
		Median	67.77	.	.	58.2	39.55	-18.65	39.04	35.75	-3.29	57.5	38.13	-19.37
		Quantile (0.85)	74.88	.	.	65.12	46.85	-18.27	52.63	56.25	3.63	71.98	51.81	-20.17
		Quantile (0.95)	78.36	.	.	69.82	53.88	-15.94	59.52	64.27	4.75	76.97	62.08	-14.88
	Total	Mean	70.5	70.38	-0.12	53.28	56.41	3.12	47.01	49.73	2.72	56.39	62.64	6.25
		Median	70.84	70.82	-0.02	53.37	57.34	3.97	46.15	49.04	2.89	56	65.3	9.3
		Quantile (0.85)	77.96	78.06	0.11	63.68	69.27	5.58	57.82	63.23	5.41	72.99	76	3.01
		Quantile (0.95)	81.83	82.21	0.38	70.14	76.22	6.08	65.56	72.14	6.58	78.99	80.8	1.81

Table C-15b. Standard Error of Speed by Road Type, Horizontal Curvature and Light Condition (Free-Flow)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
LIGHT CONDITION	HOR_ CURVED		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Day (0600-2059)	1 Straight	Mean	1.01	0.59	1.12	1.2	1.28	1.65	1.28	1.95	2.02	1.58	1.12	1.7
		Median	1.33	0.58	1.48	1.3	1.58	2.07	1.38	2.57	2.66	2.13	0.94	1.96
		Quantile (0.85)	0.83	0.51	1.03	1.54	0.93	1.38	2.07	2.23	2.4	1.65	0.5	1.73
		Quantile (0.95)	0.77	0.59	1.02	1.55	0.9	1.46	1.75	2.37	2.38	1.26	0.56	1.37
	2 Moderate	Mean	3.79	0.58	3.93	1.81	4.43	5.84	1.84	3.13	3.85	3.19	2.66	4.3
		Median	4.47	0.4	4.54	2.11	7.81	9.44	1.78	3.52	4.25	4.89	3.51	5.96
		Quantile (0.85)	3.23	0.96	3.45	1.09	2.7	3.86	3.17	4.48	5.6	5.89	3.79	7.04
		Quantile (0.95)	2.68	1.12	3.06	1.43	3.08	4.76	2.41	5.01	6.46	4.77	1.8	5.05
	3 Sharp	Mean	1.82	.	.	.	2.18	.	1.86	6.31	6.58	4.9	2.98	5.74
		Median	2.61	.	.	.	2.34	.	1.33	7.3	7.42	12.5	2.33	12.71
		Quantile (0.85)	1.83	.	.	.	2.43	.	5.53	10.14	11.56	3.68	6.5	7.48
		Quantile (0.95)	1.33	.	.	.	1.8	.	4.51	7.09	8.4	3.04	6.11	6.82
	Total	Mean	1.02	0.59	1.13	1.22	1.3	1.66	1.27	2.04	2.05	1.51	1.15	1.65
		Median	2.05	0.57	2.04	1.34	1.56	2.01	1.39	2.66	2.67	2.07	0.98	1.91
		Quantile (0.85)	1.16	0.51	1.31	1.43	1.02	1.29	2.01	2.38	2.49	1.61	0.55	1.67
		Quantile (0.95)	0.77	0.59	1.01	1.54	0.87	1.44	1.7	2.59	2.54	1.26	0.55	1.38
2 Night (2100-0559)	1 Straight	Mean	0.97	0.82	1.3	1.23	1.48	1.54	1.14	1.75	1.98	1.46	1.11	1.68
		Median	1.12	0.78	1.53	1.38	1.82	1.99	1.37	2.34	2.63	2.14	0.87	2.26
		Quantile (0.85)	0.83	0.55	1.08	1.94	1.21	1.43	1.73	1.89	2.34	1.41	0.6	1.65
		Quantile (0.95)	0.76	0.52	0.98	1.78	1.12	1.23	1.39	2.06	2.23	2.03	0.52	2.15
	2 Moderate	Mean	4.75	0.76	4.92	1.18	5.77	7.42	1.77	2.92	3.5	4.21	2.68	5
		Median	5.46	0.34	5.52	1.65	10.04	12.13	1.73	3.69	4.45	5.28	4.12	6.82
		Quantile (0.85)	4.65	0.74	4.76	1.27	4.44	5.83	3.05	4.15	4.88	7.24	3.6	8.12
		Quantile (0.95)	3.89	1.36	4.23	1.41	4.87	6.57	2.18	4.56	5.66	6.16	1.34	6.29

Table C-15b. Standard Error of Speed by Road Type, Horizontal Curvature and Light Condition (Free-Flow) (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
LIGHT CONDITION	HOR_ CURVED		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
2 Night (2100-0559)	3 Sharp	Mean	1.68	.	.	.	0.67	.	1.36	5.9	6.06	5.2	3.43	6.22
		Median	2.33	.	.	.	0.48	.	1.53	6.28	6.47	6.59	3.14	7.3
		Quantile (0.85)	2.01	.	.	.	0.27	.	4.06	10.55	11.3	1.93	7.74	7.98
		Quantile (0.95)	1.56	.	.	.	2.26	.	2.92	6.92	7.51	2.23	5.61	6.04
	Total	Mean	0.97	0.81	1.31	1.23	1.52	1.56	1.08	1.82	1.96	1.37	1.14	1.62
		Median	1.06	0.78	1.49	1.49	1.85	2.02	1.26	2.49	2.62	1.97	0.91	2.15
		Quantile (0.85)	0.91	0.54	1.14	1.76	1.2	1.4	1.7	2.02	2.25	1.26	0.59	1.47
		Quantile (0.95)	0.77	0.52	0.99	1.72	1.14	1.27	1.35	2.26	2.29	1.06	0.53	1.26
Total	1 Straight	Mean	1.01	0.63	1.16	1.2	1.29	1.61	1.25	1.92	2.02	1.55	1.11	1.69
		Median	1.72	0.63	1.86	1.31	1.58	1.99	1.39	2.52	2.64	2.19	0.89	2.09
		Quantile (0.85)	1.56	0.51	1.6	1.63	1	1.39	2.05	2.17	2.38	1.65	0.55	1.75
		Quantile (0.95)	0.73	0.56	0.97	1.57	0.9	1.34	1.7	2.4	2.38	1.26	0.51	1.37
	2 Moderate	Mean	3.98	0.58	4.11	1.7	4.56	6.01	1.83	3.1	3.8	3.35	2.65	4.4
		Median	4.66	0.31	4.72	2.1	8.18	9.96	1.72	3.56	4.32	4.95	3.61	6.11
		Quantile (0.85)	3.44	0.91	3.63	0.96	2.78	3.89	3.19	4.44	5.51	6	3.73	7.09
		Quantile (0.95)	2.85	1.16	3.25	1.11	3.41	4.87	2.36	4.95	6.26	5.12	1.7	5.35
	3 Sharp	Mean	1.78	.	.	.	2.01	.	1.75	6.23	6.48	5.03	3.02	5.87
		Median	2.57	.	.	.	2.25	.	1.32	7.33	7.45	11.89	2.49	12.14
		Quantile (0.85)	1.86	.	.	.	2.13	.	5.15	10.08	11.32	3.48	6.66	7.51
		Quantile (0.95)	1.34	.	.	.	1.5	.	4.38	6.96	8.22	2.9	6	6.67
	Total	Mean	1.02	0.63	1.17	1.22	1.31	1.62	1.23	2.01	2.03	1.47	1.14	1.63
		Median	0.84	0.62	1.1	1.3	1.61	1.97	1.37	2.66	2.67	2.03	0.95	1.93
		Quantile (0.85)	1.63	0.51	1.72	1.49	1.1	1.37	1.97	2.34	2.46	1.55	0.56	1.72
		Quantile (0.95)	0.74	0.57	0.98	1.46	0.9	1.31	1.66	2.63	2.58	1.38	0.5	1.48

Table C-15c. Standard Deviation of Speed by Road Type, Horizontal Curvature and Light Condition (Free-Flow)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation			Speed Standard		
LIGHT CONDITION	HOR_ CURVED	2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Day (0600-2059)	1 Straight	8.18	8.12	-0.06	10.43	12.96	2.53	10.35	13.12	2.78	14.13	13.91	-0.23
	2 Moderate	8.47	5.63	-2.83	7.81	13.25	5.44	10.21	13.11	2.9	15.43	14.42	-1.01
	3 Sharp	6.35	.	.	7.18	7.74	0.56	9.46	13.07	3.61	15.8	11.15	-4.65
	Total	8.17	8.11	-0.06	10.38	13.04	2.66	10.49	13.15	2.66	14.31	14.16	-0.15
2 Night (2100-0559)	1 Straight	7.68	7.95	0.27	10.1	12.92	2.81	10.2	12.87	2.67	13.43	12.61	-0.82
	2 Moderate	8.9	5.99	-2.91	7.81	14.04	6.23	9.7	13.17	3.47	14.99	14.91	-0.08
	3 Sharp	6.34	.	.	7.18	8.38	1.2	9.18	13.29	4.12	14.48	11.78	-2.69
	Total	7.71	7.94	0.23	10.05	13	2.95	10.31	12.92	2.61	13.6	12.83	-0.77
Total	1 Straight	8.12	8.13	0.01	10.38	12.95	2.58	10.33	13.09	2.77	14.03	13.66	-0.37
	2 Moderate	8.59	5.72	-2.87	7.83	13.39	5.55	10.14	13.12	2.98	15.37	14.48	-0.89
	3 Sharp	6.39	.	.	7.22	7.8	0.57	9.42	13.09	3.67	15.64	11.22	-4.42
	Total	8.11	8.11	0	10.33	13.04	2.71	10.46	13.12	2.66	14.21	13.92	-0.29

Table C-16a. Speed Estimate of Speed by Road Type, Vertical Curvature and Light Condition (Free-Flow)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
LIGHT CONDITION	**VER_ CURVED**		**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**
1 Day (0600-2059)	**1 Flat**	**Mean**	71.03	70.83	-0.2	53.39	56.76	3.37	47.12	49.94	2.82	56.37	62.67	6.3
		Median	71.91	71.36	-0.55	53.53	57.76	4.24	46.37	49.2	2.82	55.81	65.4	9.59
		Quantile (0.85)	78.78	78.44	-0.34	63.85	69.46	5.6	57.85	63.48	5.64	73	76.3	3.3
		Quantile (0.95)	82.2	82.54	0.35	70.25	76.38	6.13	65.59	72.32	6.73	79	81.1	2.1
	2 Moderate	**Mean**	67.13	71.17	4.04	52.68	50.4	-2.28	46.9	45.02	-1.88	50.22	51.13	0.91
		Median	66.17	71.12	4.95	52.21	50.88	-1.33	44.74	44.59	-0.16	49.1	50.87	1.77
		Quantile (0.85)	72.31	76.8	4.49	57.72	62.34	4.62	59.55	58.33	-1.22	64.45	66.72	2.26
		Quantile (0.95)	76.06	80.82	4.76	62.62	69.33	6.71	66.45	66.13	-0.33	70.86	74.51	3.65
	3 Steep	**Mean**	69.32	.	.	55.86	43.95	-11.91	39.48	52.56	13.09	44.38	51.95	7.58
		Median	69.13	.	.	57.47	43.2	-14.27	39.27	54.47	15.21	42.35	53.46	11.12
		Quantile (0.85)	74.93	.	.	67.57	50.49	-17.08	47.09	63.73	16.65	58.37	63.41	5.04
		Quantile (0.95)	78.34	.	.	73.34	57.76	-15.58	52.1	70.67	18.57	67.39	70.4	3.01
	Total	**Mean**	70.98	70.83	-0.14	53.41	56.51	3.11	47	49.86	2.86	56.06	62.5	6.45
		Median	71.89	71.36	-0.53	53.51	57.41	3.91	46.14	49.16	3.01	55.35	65.2	9.85
		Quantile (0.85)	78.76	78.43	-0.33	63.85	69.33	5.47	57.85	63.38	5.53	72.99	76.2	3.21
		Quantile (0.95)	82.15	82.54	0.39	70.25	76.29	6.04	65.58	72.23	6.64	78.99	81	2.01
2 Night (2100-0559)	**1 Flat**	**Mean**	68.98	68.83	-0.15	52.61	56	3.39	47.19	48.98	1.8	58.23	63.3	5.07
		Median	68.91	68.97	0.06	52.27	56.74	4.47	46.4	48.03	1.63	59.48	65.62	6.14
		Quantile (0.85)	76.54	76.5	-0.04	62.96	68.84	5.88	57.74	62.3	4.56	73	75.1	2.1
		Quantile (0.95)	80.52	80.72	0.19	69.83	75.96	6.12	65.18	71.26	6.08	78	79.8	1.8
	2 Moderate	**Mean**	65.71	69.3	3.59	51.69	50.31	-1.38	47.1	44.51	-2.6	53.13	51.52	-1.62
		Median	64.71	68.97	4.26	50.99	51.1	0.11	45.38	42.81	-2.58	53.66	51.74	-1.92
		Quantile (0.85)	70.6	75.29	4.69	57.96	60.6	2.64	59.31	57.65	-1.65	66.96	66.2	-0.77
		Quantile (0.95)	74.61	79.24	4.63	62.63	67.57	4.94	65.78	65.45	-0.33	71.7	74.03	2.34
	3 Steep	**Mean**	64.99	.	.	54.49	46.57	-7.92	41.04	52.06	11.02	45.27	51.92	6.65
		Median	64.45	.	.	54.83	45.59	-9.24	40.54	54.35	13.81	43.5	54.3	10.8
		Quantile (0.85)	71.51	.	.	66.78	55.82	-10.96	48.59	65.66	17.07	57.65	65.58	7.93
		Quantile (0.95)	75.04	.	.	72.8	55.97	-16.84	53.96	72.36	18.4	67.01	72.34	5.33

Table C-16a. Speed Estimate of Speed by Road Type, Vertical Curvature and Light Condition (Free-Flow) (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
LIGHT CONDITION	VER_ CURVED		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
2 Night (2100-0559)	Total	Mean	68.91	68.83	-0.08	52.62	55.82	3.2	47.08	48.93	1.85	57.96	63.19	5.24
		Median	68.88	68.97	0.09	52.27	56.5	4.23	46.2	47.92	1.72	59	65.59	6.59
		Quantile (0.85)	76.48	76.5	0.02	63	68.77	5.78	57.71	62.26	4.55	72.99	75.1	2.1
		Quantile (0.95)	80.46	80.71	0.25	69.83	75.76	5.93	65.16	71.22	6.07	78	79.79	1.8
Total	1 Flat	Mean	70.56	70.38	-0.19	53.26	56.64	3.38	47.13	49.8	2.67	56.69	62.79	6.1
		Median	70.88	70.82	-0.06	53.37	57.51	4.14	46.38	49.07	2.69	56.38	65.4	9.02
		Quantile (0.85)	77.99	78.07	0.08	63.74	69.39	5.64	57.82	63.28	5.46	73	76.09	3.1
		Quantile (0.95)	81.87	82.21	0.34	70.14	76.32	6.18	65.56	72.19	6.63	78.99	80.87	1.88
	2 Moderate	Mean	66.67	70.86	4.19	52.59	50.39	-2.2	46.93	44.96	-1.97	50.72	51.18	0.46
		Median	65.68	70.81	5.13	52.19	50.91	-1.28	44.77	44.37	-0.4	49.82	50.95	1.12
		Quantile (0.85)	71.81	76.59	4.78	57.77	62.1	4.33	59.54	58.29	-1.25	65	66.66	1.67
		Quantile (0.95)	75.7	80.57	4.88	62.62	69.32	6.7	66.45	65.99	-0.46	70.91	74.49	3.58
	3 Steep	Mean	68.59	.	.	55.62	44.1	-11.51	39.73	52.49	12.76	44.53	51.95	7.42
		Median	68.45	.	.	57.02	43.23	-13.79	39.48	54.47	14.99	42.6	53.49	10.89
		Quantile (0.85)	74.55	.	.	67.45	50.59	-16.85	47.63	64.21	16.58	58.37	63.7	5.33
		Quantile (0.95)	77.99	.	.	73.27	57.73	-15.54	52.59	71.29	18.7	67.07	70.85	3.78
	Total	Mean	70.5	70.38	-0.12	53.28	56.41	3.12	47.01	49.73	2.72	56.39	62.64	6.25
		Median	70.84	70.82	-0.02	53.37	57.34	3.97	46.15	49.04	2.89	56	65.3	9.3
		Quantile (0.85)	77.96	78.06	0.11	63.68	69.27	5.58	57.82	63.23	5.41	72.99	76	3.01
		Quantile (0.95)	81.83	82.21	0.38	70.14	76.22	6.08	65.56	72.14	6.58	78.99	80.8	1.81

Table C-16b. Standard Error of Speed by Road Type, Vertical Curvature and Light Condition (Free-Flow)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
LIGHT CONDITION	**VER_ CURVED**		**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**
1 Day (0600-2059)	**1 Flat**	**Mean**	1.02	0.59	1.13	1.24	1.34	1.76	1.2	2.07	2	1.52	1.16	1.66
		Median	1.61	0.57	1.74	1.35	1.67	2.15	1.33	2.7	2.65	2.05	1	1.86
		Quantile (0.85)	1.13	0.51	1.29	1.53	0.96	1.4	1.92	2.41	2.35	1.87	0.5	1.91
		Quantile (0.95)	0.76	0.59	1	1.64	0.94	1.56	1.7	2.64	2.44	1.26	0.57	1.34
	2 Moderate	**Mean**	.	.	.	.	7.59	.	4.08	3.04	4.79	3.38	4.96	5.24
		Median	.	.	.	.	8.78	.	4.55	3.67	5.65	5.82	6.89	6.3
		Quantile (0.85)	.	.	.	.	10.11	.	5.39	3.72	5.52	4.26	5	6.63
		Quantile (0.95)	.	.	.	.	11.1	.	4.78	2.08	4.88	3.93	4.46	5.95
	3 Steep	**Mean**	.	.	.	10.85	2.8	13.14	2.55	6.14	7.76	4.58	5.75	8.48
		Median	.	.	.	11.87	3.11	14.31	3.44	9	11.88	3.38	7.77	10.78
		Quantile (0.85)	.	.	.	13.84	2.72	14.48	2.92	3.05	4.77	10.34	3.22	11.12
		Quantile (0.95)	.	.	.	14.2	2.34	13.32	3.43	2.82	4.96	12.33	2.77	12.83
	Total	**Mean**	1.02	0.59	1.13	1.22	1.3	1.66	1.27	2.04	2.05	1.51	1.15	1.65
		Median	2.05	0.57	2.04	1.34	1.56	2.01	1.39	2.66	2.67	2.07	0.98	1.91
		Quantile (0.85)	1.16	0.51	1.31	1.43	1.02	1.29	2.01	2.38	2.49	1.61	0.55	1.67
		Quantile (0.95)	0.77	0.59	1.01	1.54	0.87	1.44	1.7	2.59	2.54	1.26	0.55	1.38
2 Night (2100-0559)	**1 Flat**	**Mean**	0.97	0.81	1.3	1.23	1.59	1.66	1	1.84	1.92	1.4	1.14	1.65
		Median	1.13	0.78	1.54	1.47	1.91	2.04	1.21	2.51	2.65	2.21	0.89	2.29
		Quantile (0.85)	0.8	0.55	1.06	1.82	1.28	1.43	1.6	2.07	2.2	1.46	0.57	1.66
		Quantile (0.95)	0.75	0.52	0.97	1.79	1.18	1.32	1.32	2.28	2.24	2.47	0.5	2.53
	2 Moderate	**Mean**	.	.	.	.	7.16	.	3.91	2.87	4.31	4.93	4.32	6.63
		Median	.	.	.	.	7.94	.	4.33	3.76	5.49	6.78	6.5	9.86
		Quantile (0.85)	.	.	.	.	8.35	.	5.35	3.99	5.28	6.98	5.27	8.7
		Quantile (0.95)	.	.	.	.	9.39	.	5.23	2.53	4.92	4.81	5.17	7.07
	3 Steep	**Mean**	.	.	.	11.21	6.82	11.68	4.01	6.62	9.03	3.77	6.33	8.55
		Median	.	.	.	11.46	1.29	10.07	4.51	10.99	14.91	2.42	10.25	13.22
		Quantile (0.85)	.	.	.	15.19	5.5	10.88	5.08	4.74	7.81	9.3	5.14	11.29
		Quantile (0.95)	.	.	.	15.63	2.69	12.4	6.11	3.92	7.86	11.39	4.37	12.65

Table C-16b. Standard Error of Speed by Road Type, Vertical Curvature and Light Condition (Free-Flow) (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
LIGHT CONDITION	VER_ CURVED		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
2 Night (2100-0559)	Total	Mean	0.97	0.81	1.31	1.23	1.52	1.56	1.08	1.82	1.96	1.37	1.14	1.62
		Median	1.06	0.78	1.49	1.49	1.85	2.02	1.26	2.49	2.62	1.97	0.91	2.15
		Quantile (0.85)	0.91	0.54	1.14	1.76	1.2	1.4	1.7	2.02	2.25	1.26	0.59	1.47
		Quantile (0.95)	0.77	0.52	0.99	1.72	1.14	1.27	1.35	2.26	2.29	1.06	0.53	1.26
Total	1 Flat	Mean	1.02	0.63	1.17	1.24	1.36	1.73	1.17	2.04	1.99	1.49	1.15	1.65
		Median	1.23	0.62	1.42	1.3	1.67	2.1	1.32	2.69	2.64	2.13	0.96	2.05
		Quantile (0.85)	2.09	0.51	2.11	1.56	1.03	1.38	1.86	2.38	2.4	1.8	0.52	1.88
		Quantile (0.95)	0.72	0.57	0.96	1.54	0.95	1.46	1.65	2.61	2.42	1.26	0.54	1.34
	2 Moderate	Mean	.	.	.	.	7.47	.	4.05	2.97	4.69	3.44	4.84	5.37
		Median	.	.	.	.	8.63	.	4.46	3.78	5.63	5.87	6.78	6.27
		Quantile (0.85)	.	.	.	.	9.89	.	5.34	3.7	5.42	4.57	4.95	6.75
		Quantile (0.95)	.	.	.	.	11.02	.	4.75	2.03	4.71	4.02	4.53	6.06
	3 Steep	Mean	.	.	.	10.87	2.61	12.92	2.73	6.18	7.9	4.44	5.81	8.44
		Median	.	.	.	11.8	2.82	14.08	3.68	9.69	12.83	3.12	8.35	11.23
		Quantile (0.85)	.	.	.	14.19	1.89	14.41	3.32	3.32	5.35	10.26	3.49	11.15
		Quantile (0.95)	.	.	.	14.6	2.16	13.53	3.79	3.27	5.58	11.97	3.11	12.67
	Total	Mean	1.02	0.63	1.17	1.22	1.31	1.62	1.23	2.01	2.03	1.47	1.14	1.63
		Median	0.84	0.62	1.1	1.3	1.61	1.97	1.37	2.66	2.67	2.03	0.95	1.93
		Quantile (0.85)	1.63	0.51	1.72	1.49	1.1	1.37	1.97	2.34	2.46	1.55	0.56	1.72
		Quantile (0.95)	0.74	0.57	0.98	1.46	0.9	1.31	1.66	2.63	2.58	1.38	0.5	1.48

Table C-16c. Standard Deviation of Speed by Road Type, Vertical Curvature and Light Condition (Free-Flow)

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation		
LIGHT CONDITION	VER_CURVED	2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Day (0600-2059)	1 Flat	8.19	8.11	-0.08	10.41	13.03	2.62	10.45	13.14	2.69	14.31	14.1	-0.22
	2 Moderate	5.42	5.86	0.44	5.72	11.75	6.02	11.08	13.14	2.06	12.23	14.02	1.79
	3 Steep	7.03	.	.	11.83	8.78	-3.04	7.49	12.36	4.87	11.79	12.34	0.55
	Total	8.17	8.11	-0.06	10.38	13.04	2.66	10.49	13.15	2.66	14.31	14.16	-0.15
2 Night (2100-0559)	1 Flat	7.74	7.95	0.2	10.05	13.02	2.97	10.29	12.91	2.61	13.58	12.77	-0.8
	2 Moderate	5.41	6.17	0.77	6.33	11.16	4.83	10.66	12.52	1.85	12.5	13.57	1.07
	3 Steep	6.72	.	.	11.37	6.04	-5.33	7.67	14.1	6.43	10.99	13.98	2.99
	Total	7.71	7.94	0.23	10.05	13	2.95	10.31	12.92	2.61	13.6	12.83	-0.77
Total	1 Flat	8.13	8.12	-0.02	10.35	13.03	2.68	10.43	13.11	2.68	14.21	13.85	-0.35
	2 Moderate	5.46	5.95	0.49	5.79	11.67	5.88	11.02	13.07	2.05	12.33	13.96	1.64
	3 Steep	7.16	.	.	11.76	8.67	-3.09	7.54	12.64	5.1	11.67	12.59	0.93
	Total	8.11	8.11	0	10.33	13.04	2.71	10.46	13.12	2.66	14.21	13.92	-0.29

Table C-17a. Speed Estimate of Speed by Road Type, Length Class and Light Condition (Free-Flow)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
LIGHT CONDITION	VEH_ LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Day (0600-2059)	1 (<20 ft)	Mean	71.83	71.88	0.05	51.19	55.36	4.17	45.03	48.47	3.44	54.63	62.51	7.88
		Median	72.5	72.5	0.01	51.52	56.24	4.72	44.22	47.66	3.45	52.75	65.7	12.95
		Quantile (0.85)	78.95	79.08	0.14	60.97	67.94	6.97	55.23	61.53	6.31	72.99	76.79	3.79
		Quantile (0.95)	82.73	83.06	0.34	66.64	74.4	7.76	62.13	69.66	7.52	79	81.29	2.29
	2 (20<30 ft)	Mean	72.1	71.27	-0.83	56.8	60.05	3.25	50.63	53.15	2.52	57.87	62.34	4.47
		Median	72.81	72.11	-0.7	57.06	60.94	3.88	50	52.64	2.64	57.52	64.4	6.88
		Quantile (0.85)	78.95	78.9	-0.04	67.11	72.56	5.45	62	67.06	5.06	73.36	76.2	2.84
		Quantile (0.95)	82.36	83.15	0.79	73.23	80.06	6.84	69.52	75.95	6.43	78.99	81.55	2.56
	3 (30<40 ft)	Mean	67.72	67.36	-0.36	56.32	56.56	0.24	51.13	52.94	1.81	57.48	60.64	3.16
		Median	67.83	67.61	-0.22	56.32	57.88	1.56	50.55	52.56	2.01	57.72	62.79	5.08
		Quantile (0.85)	76.09	75.65	-0.44	67.59	69.51	1.92	62.68	67.76	5.07	71.22	73.8	2.57
		Quantile (0.95)	80.12	80.03	-0.09	75.05	78.27	3.22	71.1	79.54	8.45	77.55	79.79	2.23
	4 (40<50 ft)	Mean	66.8	67.33	0.53	55.99	55.96	-0.02	51.67	52.94	1.27	58.51	61.27	2.76
		Median	66.86	67.66	0.81	56.5	57.38	0.87	51.84	52.91	1.07	59.31	63.5	4.18
		Quantile (0.85)	74.72	75.38	0.66	65.88	69.4	3.52	62.13	67.33	5.2	71	73.8	2.8
		Quantile (0.95)	78.58	79.67	1.09	72.35	77.84	5.48	68.88	77.26	8.37	76.11	79.19	3.07
	5 (50<80 ft)	Mean	65.48	65.71	0.23	55.81	56.26	0.45	52.73	53.62	0.89	62.96	63.89	0.93
		Median	65.74	65.67	-0.07	56.8	57.55	0.75	54.19	53.63	-0.56	64	64.99	0.99
		Quantile (0.85)	71.83	71.59	-0.25	65.95	69.36	3.41	63.45	68.83	5.38	71.92	71.49	-0.43
		Quantile (0.95)	75.52	75.1	-0.43	72.2	78.34	6.14	69.15	78.94	9.79	75.61	75.4	-0.21
	6 (80<100 ft)	Mean	66.06	68.59	2.53	59.09	57.18	-1.9	54.88	53.77	-1.11	64.67	66.38	1.72
		Median	66.2	69.04	2.83	59.57	59.34	-0.23	56.44	54.66	-1.78	65.96	67.99	2.02
		Quantile (0.85)	73.03	74.56	1.53	66.81	68.65	1.84	63.65	66.84	3.19	72.94	74.3	1.36
		Quantile (0.95)	76.99	77.53	0.54	71.61	75.33	3.73	69.93	78.68	8.75	76.51	77.5	0.99
	Total	Mean	70.98	70.83	-0.14	53.41	56.51	3.11	47	49.86	2.86	56.06	62.5	6.45
		Median	71.89	71.36	-0.53	53.51	57.41	3.91	46.14	49.16	3.01	55.35	65.2	9.85
		Quantile (0.85)	78.76	78.43	-0.33	63.85	69.33	5.47	57.85	63.38	5.53	72.99	76.2	3.21
		Quantile (0.95)	82.15	82.54	0.39	70.25	76.29	6.04	65.58	72.23	6.64	78.99	81	2.01

Table C-17a. Speed Estimate of Speed by Road Type, Length Class and Light Condition (Free-Flow) (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
LIGHT CONDITION	**VEH_ LENGTH**		**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**	**2009**	**2015**	**Change**
2 Night (2100-0559)	**1 (<20 ft)**	**Mean**	69.58	69.7	0.12	50.37	54.46	4.09	45	47.54	2.54	56.46	63.06	6.6
		Median	69.59	70.12	0.52	50.27	54.92	4.65	44.17	46.45	2.28	56.31	65.9	9.59
		Quantile (0.85)	76.9	77.3	0.4	59.77	67.21	7.44	55.02	60.22	5.19	72.99	75.69	2.7
		Quantile (0.95)	81	81.42	0.41	65.78	73.79	8.01	61.39	68.09	6.71	78	80.2	2.2
	2 (20<30 ft)	**Mean**	70.66	69.84	-0.82	56.14	60.25	4.1	51	52.84	1.84	59.22	63.29	4.07
		Median	70.98	70.5	-0.48	56.12	61.24	5.12	50.54	52.19	1.65	59.5	65.5	5.99
		Quantile (0.85)	77.86	77.53	-0.33	66.67	72.82	6.15	62.15	66.74	4.59	74	75.8	1.8
		Quantile (0.95)	81.41	81.82	0.41	72.97	80.02	7.05	69.17	75.72	6.56	78.99	80.9	1.91
	3 (30<40 ft)	**Mean**	67.01	65.74	-1.27	56.49	56.91	0.43	53.05	53.11	0.06	59.16	61.16	2.01
		Median	66.97	66.11	-0.85	56.12	58.63	2.51	52.61	53.43	0.83	59.99	63.6	3.61
		Quantile (0.85)	74.36	73.44	-0.92	67.84	70.86	3.02	64.72	69.39	4.67	71.31	72.9	1.59
		Quantile (0.95)	78.49	77.65	-0.85	74.89	79.94	5.05	73.06	81.76	8.69	76.99	78.49	1.51
	4 (40<50 ft)	**Mean**	66.37	66.03	-0.34	57.41	54.29	-3.12	54.13	51.76	-2.36	61.51	61.97	0.46
		Median	66.33	66.62	0.29	57.84	56.54	-1.3	54.9	52.05	-2.85	62.92	64.6	1.67
		Quantile (0.85)	73.41	73.83	0.42	67.21	69.3	2.1	65.06	69.44	4.39	71.94	73.07	1.13
		Quantile (0.95)	77.1	77.59	0.49	73.49	78.49	5	71.14	80.86	9.72	76	77.98	1.98
	5 (50<80 ft)	**Mean**	65.11	65.39	0.28	55.75	55.75	0	53.78	50.43	-3.35	64.14	64.34	0.2
		Median	64.47	65.4	0.93	56.51	58	1.49	54.8	49.34	-5.46	64.81	65.07	0.26
		Quantile (0.85)	70.99	71.13	0.15	65.25	68.04	2.8	64.21	65.31	1.1	70.98	71.1	0.12
		Quantile (0.95)	74.69	74.46	-0.23	71.24	75.36	4.12	69.9	76.69	6.78	74.98	74.57	-0.41
	6 (80<100 ft)	**Mean**	66.33	68.77	2.44	56.33	57.88	1.56	55.55	50.81	-4.74	65.44	67.4	1.96
		Median	65.78	69.35	3.57	58.84	59.96	1.12	55.31	49.13	-6.18	65.84	68.8	2.97
		Quantile (0.85)	72.19	74.83	2.64	65.71	67.35	1.64	64.93	65.1	0.17	71.86	74.57	2.71
		Quantile (0.95)	76.16	77.6	1.44	70.03	70.43	0.4	73.64	69.01	-4.62	76	77.41	1.41
	Total	**Mean**	68.91	68.83	-0.08	52.62	55.82	3.2	47.08	48.93	1.85	57.96	63.19	5.24
		Median	68.88	68.97	0.09	52.27	56.5	4.23	46.2	47.92	1.72	59	65.59	6.59
		Quantile (0.85)	76.48	76.5	0.02	63	68.77	5.78	57.71	62.26	4.55	72.99	75.1	2.1
		Quantile (0.95)	80.46	80.71	0.25	69.83	75.76	5.93	65.16	71.22	6.07	78	79.79	1.8

Table C-17a. Speed Estimate of Speed by Road Type, Length Class and Light Condition (Free-Flow) (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Estimate			Speed Estimate			Speed Estimate			Speed Estimate		
LIGHT CONDITION	VEH_ LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
Total	1 (<20 ft)	Mean	71.33	71.4	0.07	51.05	55.22	4.16	45.03	48.34	3.31	54.95	62.61	7.67
		Median	71.93	72.01	0.08	51.34	56.07	4.74	44.21	47.44	3.23	53.37	65.78	12.42
		Quantile (0.85)	78.82	78.75	-0.08	60.79	67.84	7.05	55.22	61.34	6.12	72.99	76.59	3.6
		Quantile (0.95)	82.43	82.77	0.34	66.46	74.3	7.84	62.06	69.36	7.3	79	81.09	2.09
	2 (20<30 ft)	Mean	71.8	70.98	-0.82	56.71	60.08	3.37	50.68	53.11	2.43	58.09	62.5	4.42
		Median	72.64	71.79	-0.85	56.96	61	4.05	50.06	52.58	2.52	57.74	64.6	6.86
		Quantile (0.85)	78.88	78.65	-0.23	67.06	72.6	5.54	62	67.04	5.04	73.74	76.2	2.46
		Quantile (0.95)	82.18	82.92	0.74	73.16	80.06	6.91	69.4	75.93	6.53	78.99	81.5	2.5
	3 (30<40 ft)	Mean	67.59	67.06	-0.53	56.34	56.61	0.27	51.37	52.96	1.6	57.73	60.72	2.99
		Median	67.72	67.33	-0.4	56.31	57.99	1.68	50.83	52.67	1.85	58	62.9	4.9
		Quantile (0.85)	75.91	75.29	-0.62	67.6	69.65	2.05	62.92	68.03	5.12	71.23	73.6	2.36
		Quantile (0.95)	79.88	79.68	-0.2	75.05	78.63	3.58	71.3	79.88	8.58	77.29	79.6	2.3
	4 (40<50 ft)	Mean	66.71	67.07	0.36	56.18	55.75	-0.44	51.92	52.82	0.9	58.97	61.39	2.42
		Median	66.74	67.44	0.71	56.76	57.34	0.58	52.14	52.83	0.69	60	63.72	3.72
		Quantile (0.85)	74.46	75.07	0.61	66.1	69.38	3.28	62.25	67.51	5.26	71	73.7	2.7
		Quantile (0.95)	78.31	79.3	0.99	72.61	77.84	5.23	69.08	77.61	8.53	76.04	79	2.96
	5 (50<80 ft)	Mean	65.36	65.62	0.26	55.8	56.17	0.37	52.87	53.15	0.28	63.3	64.01	0.71
		Median	64.95	65.58	0.63	56.79	57.65	0.86	54.28	53.14	-1.13	64	65	1
		Quantile (0.85)	71.58	71.46	-0.12	65.86	69.13	3.26	63.58	68.38	4.8	71	71.3	0.3
		Quantile (0.95)	75.26	74.92	-0.34	72.14	78.06	5.93	69.34	78.68	9.34	75	75.2	0.2
	6 (80<100 ft)	Mean	66.15	68.64	2.49	58.48	57.33	-1.15	55.01	53.27	-1.74	64.93	66.67	1.75
		Median	66.05	69.13	3.08	59.53	59.5	-0.03	56.42	53.61	-2.81	65.96	68.24	2.27
		Quantile (0.85)	72.8	74.65	1.85	66.58	68.57	1.99	63.85	66.05	2.2	72.93	74.37	1.44
		Quantile (0.95)	76.67	77.56	0.89	71.51	74.93	3.42	69.97	77.91	7.95	76.32	77.49	1.18
	Total	Mean	70.5	70.38	-0.12	53.28	56.41	3.12	47.01	49.73	2.72	56.39	62.64	6.25
		Median	70.84	70.82	-0.02	53.37	57.34	3.97	46.15	49.04	2.89	56	65.3	9.3
		Quantile (0.85)	77.96	78.06	0.11	63.68	69.27	5.58	57.82	63.23	5.41	72.99	76	3.01
		Quantile (0.95)	81.83	82.21	0.38	70.14	76.22	6.08	65.56	72.14	6.58	78.99	80.8	1.81

Table C-17b. Standard Error of Speed by Road Type, Length Class and Light Condition (Free-Flow)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
LIGHT CONDITION	VEH_ LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Day (0600-2059)	1 (<20 ft)	**Mean**	1.25	0.68	1.33	0.93	1.19	1.45	1.07	2.12	2.12	1.64	1.24	1.82
		Median	1.77	0.64	1.73	0.8	1.5	1.69	1.19	2.71	2.78	1.91	1.24	1.85
		Quantile (0.85)	0.42	0.54	0.69	1.29	1.05	1	1.52	2.63	2.62	2.21	0.59	2.18
		Quantile (0.95)	1.06	0.62	1.24	1.27	0.95	0.92	1.71	3.08	2.95	1.55	0.59	1.66
	2 (20<30 ft)	**Mean**	0.96	0.78	1.15	1.43	1.64	2.07	1.42	2.15	2.24	1.18	1.37	1.71
		Median	0.51	0.73	0.87	1.52	1.89	2.57	1.68	2.8	3.02	1.57	1.29	1.94
		Quantile (0.85)	0.18	0.65	0.7	1.53	0.92	1.54	1.95	2.32	2.53	1.88	0.57	1.95
		Quantile (0.95)	0.5	0.73	0.9	1.26	1.08	1.33	1.52	2.08	2.21	0.4	0.63	0.79
	3 (30<40 ft)	**Mean**	1.06	0.66	1.17	1.27	1.03	1.49	1.29	1.22	1.5	1.08	0.76	1.2
		Median	0.97	0.58	1.09	1.36	0.97	1.46	1.82	1.53	2.07	1.18	0.74	1.26
		Quantile (0.85)	0.6	0.54	0.81	1.24	0.86	1.56	1.21	1.21	1.53	1.27	0.49	1.4
		Quantile (0.95)	0.68	0.53	0.89	0.87	1.31	2.01	1.34	1.21	1.88	1.55	0.58	1.71
	4 (40<50 ft)	**Mean**	1	0.68	1.09	1	1.05	1.29	1.6	1.38	1.81	1.08	0.83	1.3
		Median	1.19	0.64	1.3	1.23	0.96	1.44	1.9	1.73	2.52	1.24	0.83	1.42
		Quantile (0.85)	0.67	0.51	0.83	0.81	1.17	1.53	0.97	1.45	1.5	0.87	0.66	1.11
		Quantile (0.95)	0.54	0.57	0.77	0.91	1.11	1.55	0.93	1.39	1.61	1.7	0.61	1.86
	5 (50<80 ft)	**Mean**	1.49	0.54	1.43	1.42	1.06	2.05	2.27	1.28	2.44	1.53	0.67	1.44
		Median	2.03	0.45	1.97	1.4	1.02	2.12	2.63	1.69	2.89	1.58	0.55	1.54
		Quantile (0.85)	1.25	0.44	1.43	0.82	1.46	2.09	0.98	1.19	1.61	2.56	0.5	2.71
		Quantile (0.95)	0.84	0.55	1.2	0.63	1.8	1.99	0.73	1.25	1.35	1.79	0.68	2.02
	6 (80<100 ft)	**Mean**	1.94	0.7	2.03	3.27	1	3.56	2.66	1.49	3.39	1.77	0.81	1.9
		Median	1.59	0.54	1.7	3.13	0.95	3.19	2.16	3.87	5.07	1.39	0.88	1.7
		Quantile (0.85)	1.92	0.41	2.06	2.81	0.52	3.25	1.86	2.93	5.11	2.13	0.37	2.28
		Quantile (0.95)	1.69	0.73	2.15	3.26	3.63	7.67	1.74	2.73	4	1.76	0.87	2.43
	Total	**Mean**	1.02	0.59	1.13	1.22	1.3	1.66	1.27	2.04	2.05	1.51	1.15	1.65
		Median	2.05	0.57	2.04	1.34	1.56	2.01	1.39	2.66	2.67	2.07	0.98	1.91
		Quantile (0.85)	1.16	0.51	1.31	1.43	1.02	1.29	2.01	2.38	2.49	1.61	0.55	1.67
		Quantile (0.95)	0.77	0.59	1.01	1.54	0.87	1.44	1.7	2.59	2.54	1.26	0.55	1.38

Table C-17b. Standard Error of Speed by Road Type, Length Class and Light Condition (Free-Flow) (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
LIGHT CONDITION	VEH_ LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
2 Night (2100-0559)	1 (<20 ft)	Mean	1.22	0.98	1.61	0.92	1.48	1.55	0.91	1.9	2.02	1.42	1.18	1.7
		Median	1.65	0.99	2.01	1	1.74	1.83	1.04	2.3	2.47	2.07	1.13	2.24
		Quantile (0.85)	1.15	0.6	1.35	1.58	1.45	1.34	1.28	2.31	2.43	1.53	0.65	1.69
		Quantile (0.95)	1.1	0.58	1.27	1.59	1.2	0.96	1.37	2.53	2.71	3.23	0.56	3.21
	2 (20<30 ft)	Mean	0.95	1.05	1.33	1.47	1.67	1.94	1.19	2.02	2.27	1.2	1.47	1.86
		Median	2.49	1.03	2.63	1.71	1.87	2.5	1.47	2.57	2.93	1.53	1.23	2
		Quantile (0.85)	0.37	0.77	0.83	1.73	0.95	1.59	1.46	2.11	2.59	1.44	0.65	1.4
		Quantile (0.95)	0.56	0.79	0.9	1.29	0.89	1.13	1.14	1.67	1.97	0.95	0.63	0.88
	3 (30<40 ft)	Mean	0.79	1.01	1.29	1.04	1.28	1.31	1.03	0.91	1.41	0.85	0.93	1.22
		Median	1.18	0.74	1.44	1.23	1.34	1.41	1.41	1.33	2.07	0.34	0.8	0.88
		Quantile (0.85)	0.75	0.49	0.94	1.01	1.2	1.44	1.21	1.21	2.12	1.53	0.49	1.67
		Quantile (0.95)	0.5	0.46	0.68	0.59	1.47	1.58	1.63	1.82	2.96	0.02	0.77	0.86
	4 (40<50 ft)	Mean	0.74	0.95	1.19	0.81	1.41	1.39	1.42	1.66	1.47	0.8	1.03	1.28
		Median	1.51	0.64	1.64	1.02	1.53	1.42	1.81	2.56	2.4	1.22	0.78	1.43
		Quantile (0.85)	0.87	0.66	1.16	0.84	1.18	1.49	0.63	1.13	1.17	0.42	0.58	0.74
		Quantile (0.95)	0.58	0.52	0.9	1.38	2.43	2.94	0.94	3.23	3.39	0.96	0.7	1.39
	5 (50<80 ft)	Mean	1.29	0.64	1.4	1.38	1.19	2.15	1.75	1.42	2.09	1.26	0.75	1.38
		Median	0.93	0.45	1.03	1.28	1.18	1.76	1.66	1.83	2.27	1.96	0.54	2.02
		Quantile (0.85)	1.46	0.47	1.63	0.62	1.51	1.39	0.88	1.16	1.59	1.55	0.53	1.69
		Quantile (0.95)	1.1	0.52	1.38	0.68	1.55	1.65	0.39	1.99	2.14	1.24	0.52	1.52
	6 (80<100 ft)	Mean	1.38	0.95	1.68	3	1.37	3.16	1.21	2.58	3.21	1.34	1.08	1.7
		Median	1.45	0.58	1.57	1.14	0.95	1.4	2.74	2.74	4.23	1.15	0.86	1.45
		Quantile (0.85)	1.8	0.48	1.99	2.26	1.57	2.16	4.29	3.22	4.57	1.4	0.39	1.56
		Quantile (0.95)	1.53	0.47	1.66	3.36	1.09	3.5	7.43	3.73	5.84	1.48	0.45	1.62
	Total	Mean	0.97	0.81	1.31	1.23	1.52	1.56	1.08	1.82	1.96	1.37	1.14	1.62
		Median	1.06	0.78	1.49	1.49	1.85	2.02	1.26	2.49	2.62	1.97	0.91	2.15
		Quantile (0.85)	0.91	0.54	1.14	1.76	1.2	1.4	1.7	2.02	2.25	1.26	0.59	1.47
		Quantile (0.95)	0.77	0.52	0.99	1.72	1.14	1.27	1.35	2.26	2.29	1.06	0.53	1.26

Table C-17b. Standard Error of Speed by Road Type, Length Class and Light Condition (Free-Flow) (continued)

			FCC ROAD CLASS											
			1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
			Speed Standard Error			Speed Standard Error			Speed Standard Error			Speed Standard Error		
LIGHT CONDITION	VEH_ LENGTH		2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
Total	1 (<20 ft)	Mean	1.26	0.74	1.4	0.93	1.21	1.43	1.04	2.09	2.11	1.59	1.22	1.78
		Median	1.45	0.71	1.58	0.96	1.53	1.72	1.18	2.55	2.65	1.97	1.2	1.94
		Quantile (0.85)	1.28	0.54	1.39	1.24	1.09	0.99	1.47	2.5	2.55	2.17	0.59	2.14
		Quantile (0.95)	1.08	0.61	1.24	1.31	0.95	0.88	1.66	2.98	2.99	1.26	0.56	1.34
	2 (20<30 ft)	Mean	0.95	0.82	1.17	1.44	1.64	2.05	1.38	2.13	2.25	1.17	1.38	1.72
		Median	1.23	0.78	1.31	1.56	1.87	2.5	1.58	2.77	2.94	1.44	1.26	1.87
		Quantile (0.85)	0.21	0.65	0.72	1.5	0.91	1.49	1.86	2.26	2.52	1.68	0.63	1.77
		Quantile (0.95)	0.49	0.74	0.89	1.25	1.04	1.26	1.48	2	2.14	0.45	0.67	0.74
	3 (30<40 ft)	Mean	1	0.68	1.15	1.21	1.06	1.43	1.24	1.17	1.48	1.04	0.78	1.19
		Median	0.79	0.58	0.96	1.35	0.97	1.49	1.7	1.48	2	1.28	0.72	1.38
		Quantile (0.85)	0.34	0.49	0.62	1.17	1.04	1.64	1.08	1.17	1.46	1.3	0.57	1.47
		Quantile (0.95)	0.63	0.57	0.88	0.85	1.39	1.96	1.04	1.33	1.96	1.49	0.61	1.69
	4 (40<50 ft)	Mean	0.93	0.68	1.06	0.96	1.06	1.23	1.58	1.39	1.74	1.05	0.84	1.27
		Median	0.88	0.61	1.04	1.19	0.98	1.39	1.79	1.73	2.47	1.07	0.77	1.33
		Quantile (0.85)	0.7	0.49	0.87	0.76	1.09	1.37	1.04	1.44	1.45	1.1	0.63	1.36
		Quantile (0.95)	0.56	0.5	0.77	1.03	1.07	1.47	0.81	1.7	1.89	1.55	0.54	1.68
	5 (50<80 ft)	Mean	1.41	0.54	1.4	1.42	1.05	2.05	2.19	1.28	2.35	1.42	0.67	1.39
		Median	1.85	0.43	1.85	1.38	1.04	2.05	2.58	1.79	2.84	1.56	0.52	1.57
		Quantile (0.85)	1.33	0.44	1.51	0.65	1.4	1.83	1.05	1.26	1.73	2.45	0.53	2.53
		Quantile (0.95)	0.92	0.55	1.26	0.7	1.63	1.83	0.63	1.22	1.21	0.92	0.59	1.12
	6 (80<100 ft)	Mean	1.71	0.73	1.84	3.2	0.97	3.47	2.15	1.52	2.87	1.58	0.85	1.75
		Median	1.55	0.56	1.67	2.35	0.82	2.31	1.23	3.95	4.47	1.33	0.89	1.66
		Quantile (0.85)	1.95	0.4	2.11	2.42	1.11	2.82	0.57	1.48	2.13	2.52	0.39	2.67
		Quantile (0.95)	1.56	0.56	1.86	2.78	2.83	6.08	0.32	2.61	3.31	1.6	0.64	2.01
	Total	Mean	1.02	0.63	1.17	1.22	1.31	1.62	1.23	2.01	2.03	1.47	1.14	1.63
		Median	0.84	0.62	1.1	1.3	1.61	1.97	1.37	2.66	2.67	2.03	0.95	1.93
		Quantile (0.85)	1.63	0.51	1.72	1.49	1.1	1.37	1.97	2.34	2.46	1.55	0.56	1.72
		Quantile (0.95)	0.74	0.57	0.98	1.46	0.9	1.31	1.66	2.63	2.58	1.38	0.5	1.48

Table C-17c. Standard Deviation of Speed by Road Type, Length Class and Light Condition (Free-Flow

		FCC ROAD CLASS											
		1 Limited access			2 Major arterial			3 Minor arterial/collector			Total		
		Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation			Speed Standard Deviation		
LIGHT CONDITION	VEH_ LENGTH	2009	2015	Change	2009	2015	Change	2009	2015	Change	2009	2015	Change
1 Day (0600-2059)	1 (<20 ft)	7.8	7.78	-0.02	9.8	12.62	2.83	9.79	12.54	2.76	14.91	14.64	-0.27
	2 (20-<30 ft)	7.95	8.73	0.78	10.2	13.14	2.93	10.7	13.54	2.84	13.28	14.09	0.81
	3 (30-<40 ft)	9.27	9.03	-0.24	11.05	14.15	3.11	11.1	15.21	4.11	12.63	13.97	1.34
	4 (40-<50 ft)	9.17	8.9	-0.27	10.34	14.18	3.84	10.48	14.64	4.15	11.97	13.5	1.53
	5 (50-<80 ft)	7.39	6.37	-1.02	10.78	14.05	3.28	11.11	14.95	3.84	9.57	9.27	-0.3
	6 (80<100ft)	8.44	6.92	-1.53	8.54	13.32	4.79	9.89	14.42	4.54	9.16	9.8	0.64
	Total	8.17	8.11	-0.06	10.38	13.04	2.66	10.49	13.15	2.66	14.31	14.16	-0.15
2 Night (2100-0559)	1 (<20 ft)	7.73	7.91	0.18	9.3	12.39	3.09	9.47	12.04	2.57	14.36	13.38	-0.98
	2 (20-<30 ft)	7.69	8.56	0.87	10.08	13.13	3.05	10.53	13.55	3.02	12.88	13.28	0.39
	3 (30-<40 ft)	7.64	8.86	1.22	10.7	15.66	4.96	11.29	16.77	5.49	11.63	13.67	2.05
	4 (40-<50 ft)	7.55	8.77	1.22	10.01	15.74	5.73	10.7	17.88	7.18	10.44	13.33	2.89
	5 (50-<80 ft)	6.26	6.14	-0.12	10.11	13.39	3.28	10.83	15.16	4.34	7.4	8	0.6
	6 (80<100ft)	6.42	6.85	0.43	9.94	11.92	1.98	10.84	13.61	2.77	7.42	8.68	1.26
	Total	7.71	7.94	0.23	10.05	13	2.95	10.31	12.92	2.61	13.6	12.83	-0.77
Total	1 (<20 ft)	7.84	7.86	0.02	9.72	12.59	2.87	9.74	12.48	2.73	14.84	14.41	-0.42
	2 (20-<30 ft)	7.92	8.71	0.8	10.19	13.14	2.95	10.68	13.54	2.86	13.22	13.96	0.73
	3 (30-<40 ft)	9.01	9.02	0.01	10.99	14.38	3.39	11.14	15.41	4.27	12.5	13.93	1.42
	4 (40-<50 ft)	8.86	8.89	0.03	10.3	14.41	4.1	10.53	15.01	4.48	11.79	13.47	1.68
	5 (50-<80 ft)	7.04	6.3	-0.74	10.67	13.94	3.27	11.08	15.02	3.94	9	8.94	-0.06
	6 (80<100ft)	7.79	6.9	-0.89	8.94	13.05	4.11	10.08	14.33	4.25	8.62	9.5	0.88
	Total	8.11	8.11	0	10.33	13.04	2.71	10.46	13.12	2.66	14.21	13.92	-0.29

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