



RESEARCH & DEVELOPMENT

Driver Behavior and Performance in High-to-Low Speed Transition Zones

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16. Abstract This study compiled site characteristics from 338 transition zones in North Carolina. Out of these locations, speed data were compiled from 50 locations (for 37 locations, speed data were compiled in the field; for the remaining 13 locations, INRIX was used to compile the data). These 50 locations represented 9 different categories of speed limit transitions. Regression models were estimated to examine the relationship between the change in speed and site characteristics including the reduction in the speed limit. For all the speed limit transition categories, the average speeds after the transition were higher than the after-transition speed limits. Speed compliance was generally better for roads with more than 2 lanes that are in lower speed limit categories. The regression models indicated that transition zones with divided facilities and changes in land use to more developed areas could be associated with a larger reduction in speed after the transition.			
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EXECUTIVE SUMMARY

Managing speeds within transition zones is an important consideration for state and local agencies, including North Carolina. This project initially sought to compile driver performance and safety data from different transition zones in North Carolina with varying traffic control devices with the goal of determining the effectiveness of specific treatments in transition zones. However, a survey of the Divisions in North Carolina revealed most of the transition zones in North Carolina primarily rely on an advance warning sign to warn the driver about the upcoming reduction in the limit. For this reason, the scope of the effort was modified. NCDOT suggested that the project team create an inventory of low-speed transition zones and compile speed data at selected locations before and after the transition.

With this change in scope, the project team compiled detailed site characteristics data at 338 transition zones in North Carolina. These transition zones were identified based on input from NCDOT's Traffic Safety Unit, a review of NCDOT's roadway inventory files, and a survey of the 14 Divisions within North Carolina. Out of these transition zones, 50 transition zones were selected for speed data collection before and after the transition. Speed data were compiled from 37 transition zones in the field. For the remaining 13 transition zones, speed data were compiled from INRIX. Among the 50 sites, the difference between the before and after speed limits were 10 mph in 26 sites, 15 mph in 10 sites, and 20 mph in 14 sites.

The analysis of the speed data revealed the following:

- In 5 (five) out of 9 (nine) speed reduction categories, the average speeds before transition are lower than the before transition speed limits.
- For all speed change categories, the after transition average speeds are higher than after transition speed limits.
- Based on average speed, the speed compliance after transition is the worst for
 - 65 mph (before) to 55 mph (after), followed by
 - 55 mph (before) to 35 mph (after), followed by
 - 70 mph (before) to 55 mph (after).
- Based on average speed, speed compliance after transition is the best for
 - 45 mph (before) to 35 mph (after),
- Speed compliance is generally better for roads with more than 2 lanes that are in lower speed limit categories.
- The regression models indicated that sites with divided facilities and changes in land use to more developed areas are associated with a larger reduction in speed after the transition.

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1. INTRODUCTION

As high-speed roads approach urban areas, transition zones are usually provided to encourage drivers to reduce their speed that is appropriate for the urban road that they are entering. Managing speed within these transition zones is an important consideration for state and local agencies, including North Carolina.

Two recent reports, NCHRP Report 737 (*Design Guidance for High-Speed to Low-Speed Transition Zones for Rural Highways*) and NCHRP Synthesis 412 (*Speed Reduction Techniques for Rural High-to-Low Speed Transitions*) provide some insight into the effectiveness of specific treatments in safely reducing the speed of vehicles in the transition area. NCHRP Report 737 also documents a process for assessing the transition zone, selecting appropriate transition zone treatments, and evaluating the effectiveness of the treatments after implementation. Despite these and other studies, NCHRP Report 737 concludes that “in the United States, design guidance for high- to low-speed transition zones for rural highways is in its infancy.” There is very little information in previous research about how driver performance is affected by different characteristics of transition zones.

The rest of this report outlines the original objectives that were proposed, literature review, survey of the NCDOT’s Divisions, changes to the study objectives, compilation of field data, analysis of the data, and the findings.

2. ORIGINAL OBJECTIVES

The original objectives of this project sought to answer the following questions:

- How is driver performance (e.g., average speed, speed variance, lane position, time to collision) affected by different characteristics of transition zones?
- How does driver performance vary between zones with specific treatments for reducing speeds versus zones without such specific treatments?
- At what point in or near the transition zone does a driver's speed change? What factors (e.g., speed limit signs, denser roadside development, etc.) are associated with the change?
- Does driver performance vary by time of day and traffic conditions?
- Is driver performance affected by familiarity of the route?
- Is driver performance affected by different types of internal or external distractions?
- Are specific improvements at transition zones in North Carolina effective in reducing crashes?

Among these questions, the questions related to driver performance/safety associated with specific improvements/treatments at transition zones were of primary interest to NCDOT. With that in mind, the project outlined the following steps to achieve the original objectives:

- Review of literature.
- Compile data – this included information about roadway characteristics, speed and driver performance, and crash data at locations with different types of treatments at transition zones. Compiling data from SHRP2 including driver performance and the roadway information database (RID) was also proposed.
- Analysis of evaluation – this included the analysis of driver performance and crash data to investigate the differences as a function of the type of improvements and treatments at transition zones.

To obtain an inventory of different types of treatments that have been implemented in North Carolina, NCDOT suggested a survey of the different Divisions. The questions included in the survey are presented following the section entitled Literature Review.

3. LITERATURE REVIEW

This section reviews previous studies that examined speed transition zones. A summary of relevant studies is provided below in chronological order.

Ray et al., (2008), Guidelines for selection of speed reduction treatments at high-speed intersections, NCHRP Report 613.

In this study, Ray *et al* (2008) developed guidelines for speed reduction treatments at high-speed intersections. Although this study did not specifically look at transition zones, some of the results may be useful for transition zones as well. They looked at the effectiveness of three treatments (dynamic warning signs, transverse pavement markings, and transverse rumble strips) in reducing speed and improving safety.

Following is a summary of each of these treatments and their effectiveness on reducing speeds and improving safety:

- Dynamic Warning Signs
 - Dynamic warning signs were tested at two sites in Washington and Texas – two approaches at each test site.
 - Dynamic warning signs were found to reduce speeds significantly at the three of the four high speed intersection approaches tested:
 - A 1.7 mph mean speed reduction was observed after a three-month acclimation period.
 - A 2.3 mph mean speed reduction was observed at the perception-reaction data collection locations.
 - A 2.8 mph mean speed reduction was observed at the accident-avoidance data collection locations.
- Transverse Pavement markings
 - Transverse pavement markings were tested at five sites in Oregon.
 - Transverse pavement markings were found to reduce speeds marginally at four of the five high speed intersection approaches tested:
 - A 0.6 mph mean speed reduction was observed at marking locations.
 - A 0.9 mph mean speed reduction was observed at perception-response data collection locations.
- Transverse rumble Strips
 - Transverse rumble strips were tested at three sites in Texas.

- Transverse rumble strips were found to produce statistically significant speed reduction in the mean speed of 1.3 mph at the perception-response data collection locations.

The study found that all three treatment types may reduce speeds on high-speed intersection approaches; however, that speed reduction appears to be most effective at perception/response locations. Of the three treatment types, dynamic warning signs may be the most effective at reducing speeds.

Cruzado, I. and Donnell, E. (2009), Evaluating effectiveness of dynamic speed display signs in transition zones of two-lane, rural highways in Pennsylvania, Transportation Research Record 2122.

In this study, Cruzado and Donnell (2009), evaluated the effectiveness of portable dynamic speed display signs (DSDS) using a sample of 12 speed transition zones at rural two-lane highways in Pennsylvania. The results of the analyses indicate that the dynamic speed display signs are effective in reducing free-flow passenger car operating speeds by an average of approximately 6.3 mph while in place and activated. This result was based on the difference between the mean speed reductions of approximately 15.6 mph while dynamic speed display signs were in place and activated, and a mean speed reduction along the transition zones of approximately 9.3 mph before dynamic speed display signs were placed. However, the speed reductions observed while the DSDSs were in place faded after the devices were removed from the study sites.

Cruzado, I. and Donnell, E. (2010), Factors affecting driver speed choice along two-lane rural highway transition zones, Journal of Transportation Engineering, Vol. 136, No. 8, 2010.

In this study, Cruzado and Donnell (2010) collected operating speed and roadway characteristic data along 20 two-lane rural highway transition zones in Pennsylvania to explore the roadway, roadside, and traffic control factors that are associated with driver speed differentials. Their dataset consisted of 2,859 speed differential observations. They estimated and compared single- and multi-level statistical models. In both models, the posted speed limit reduction as well as a change in the paved shoulder width, total number of driveways, various advance warning signs, the transition zone length, and the presence of horizontal curves were shown to increase the expected speed reduction in transition zones. Additionally, drivers entering transition zones at higher speeds were found to have greater speed reductions than drivers entering the transition zone at lower speeds.

Forbes, G. (2011), Speed reduction techniques for rural high-to-low speed transitions: a synthesis of highway practice, NCHRP Synthesis 412.

This synthesis (Forbes, 2011) documents various effective and ineffective rural high to low-speed transitions treatments that have been tried by state DOTs and overseas agencies. The study mentions lack of a national North American design guidelines for rural speed transitions, however,

talks about most existing literature being consistent in providing the transition zone design guidelines:

- More extensive and aggressive measures tend to produce greater reductions in speed and crash occurrence than less extensive and passive measures.
- There needs to be a distinct relationship between a settlement speed limit and a change in the roadway character.
- No one measure is appropriate for all situations. Each situation must be assessed and treated based on its own characteristics and merits.
- To maintain a speed reduction downstream of the transition zone, it is necessary to provide additional measures. Otherwise, speeds may rebound to previous levels as soon as 820 ft (250 m) from the start of the lower speed zone.

The scope of this research was limited to engineering measures used to transition motorists from high to low-speed areas and does not include broader topics of speed management or the more specialized techniques and methods required for areas such as work zones, toll plazas, and school zones.

The effectiveness of speed transition zone treatments grouped into four categories (geometric design, traffic control devices, surface treatments, and roadside features) on both operating speed and crash risk as extracted from the existing literature are presented in the synthesis. Based on the presented results, Forbes (2011) emphasizes that the effects of transition zone treatments on operating speed are generally small and are not sustained downstream of the urban/rural threshold without additional downstream measures. The report also outlines that although most of the studies reported significant crash reduction factors, methodological shortcomings with some of the studies are likely to overestimate the effectiveness.

Forbes (2011) reports that the current practices place emphasis on the precise location at which vehicles are expected to be traveling at the lower speed and the nature of the roadway at this point. However, treatments located along the segment of highway preceding this location are critical to alerting the driver of the change in desired speed and the need to provide adequate distance for this transition to take place. Forbes (2011) emphasizes that with respect to the design of transition zones, there needs to be greater attention to treating the transition zone as a length of highway upstream of the rural to urban threshold, rather than as a specific point (i.e., the threshold itself) to produce the most meaningful results. The basic principle is that motorists are first provided with warning devices and psychological measures early in the transition zone and are then presented with physical measures closer to the community. This approach to transition zone design is intended to avoid abrupt appearance of a physical traffic calming feature.

Finally, Forbes (2011) reported on the separate directions that European and North American countries are heading concerning speed management approaches. Several European countries are currently experimenting with minimizing and removing traffic control and design features that physically separate the road users. This is an attempt to create a measure of uncertainty in the driving environment, causing drivers to pay closer attention to the road and reduce their speeds. This is in stark contrast to the North American approach to speed management, which has been to add measures.

Torbic et al., (2012), Design guidance for high-speed to low-speed transitions zones for rural highways, NCHRP Report 737.

In this study, Torbic *et al* (2012) describe the field studies they conducted to evaluate the effectiveness of several transition zone treatments in reducing speeds and crashes and emphasize the need for establishing national guidelines for rural high to low speed transition zones.

They evaluated the effectiveness of three treatments (roundabouts, transverse pavement markings, and welcome signs at community entrances) in reducing speeds through a transition zone and the community. They collected field data at 15 treatment sites (sites where one or more of the three treatments were installed) and 7 non-treatment sites. Of the 15 treatments sites, roundabouts were installed at 4 sites, transverse pavement markings were installed at 7 sites, and welcome signs were installed at 8 sites.

With respect to speed reduction, they found that compared to non-treatment sites, roundabouts, and transverse pavement markings (TPMs) do not significantly decrease mean speeds from upstream to downstream of the transition zone beyond the speed reduction due to the change in posted speed limit. They did observe a small (not statistically significant) reduction in mean speed. However, they found that the speed-limit compliance rates were significantly higher at roundabouts and TPMs as compared to non-treatment sites. Roundabouts and TPMs were seen to increase the rate of compliance of vehicles traveling at or below the speed limit by amounts of 15 and 20 percent, respectively, as compared to no treatment. Roundabouts also increase the rate of compliance of vehicles traveling at or below the speed limit + 5 mph by an amount of 11 percent when compared to no treatment.

The fact that the decrease in mean speeds from upstream to downstream of the transition zone was not significantly larger at treatment sites than at non-treatment sites, while speed limit compliance rates increased with the treatment in place, indicates that roundabouts and TPMs do not necessarily decrease means speeds from upstream to downstream of the transition zone any more than does no treatment, but roundabouts and TPMs do increase speed-limit compliance. They also found that neither roundabouts nor TPMs significantly affect compliance rates of vehicles traveling at the speed limit within the community further downstream from the

transition zone exit. These findings support the need to provide additional measures through the community to maintain a speed reduction downstream of the transition zone through the community.

The study could not determine the effect of welcome signs at community entrances on mean speeds and compliance rates to speed limits because speeds upstream of the transition zones at several of the data collection sites were inexplicably low, leaving too few sites to conduct a reliable analysis of speeds and/or speed-limit compliance rates at transition zones due to welcome signs.

With respect to crash reduction, they found no evidence to suggest that the installation of a roundabout, TPMs, or welcome signs in a transition zone either improves or negatively impacts safety based upon an analysis of a combination of roadway segment and intersection crashes over an extended length of roadway beginning at the upstream end of the transition zone to 0.25 mi downstream of end of the transition zone.

Caliendo, C. and Guglielmo, M.L.D. (2013), Road transition zones between the rural and urban environment: Evaluation of speed and traffic performance using a microsimulation approach, Journal of Transportation Engineering, Vol. 139, No. 3, 2013.

In this study, Caliendo and Guglielmo (2013) present a microsimulation approach for evaluating the effectiveness of a transition zone connecting the rural to the urban environment using speeds computed in simulation for showing whether drivers slow down far enough below the imposed speed limit before entering the small, urbanized area. Their study site was in the Province of Medona in northern Italy. They tested five design alternatives. Their analysis showed a good level of conformity between the simulated traffic volumes and those measured in the field for all five design alternatives investigated. The simulated mean speed of vehicles was found to be lower than the 50 km/h speed limit imposed at the start of the urbanized area for all five scenarios. The model that they developed for the speed–delay time relationship showed that reductions in mean speed could bring about significant decreases in delay time on road sections within a transition zone or on sections approaching this zone. The effect on delay time was found to be greater at lower speeds.

Stamatiadis et al., (2014), Transition zone design, Kentucky Transportation Center, Report KTC-13-14/SPR 431-12-1F.

In this study, Stamatiadis *et al* (2014) identified and evaluated the effectiveness of possible treatments for transition zones. They identified four locations for implementation and evaluation of selected treatments. Before and after speed data were collected at various points throughout the transition zone. The data were reduced to use only free flowing vehicles and various speed metrics were utilized to determine the effectiveness of each treatment implemented.

The results from the evaluations at two locations indicate positive effects of transitional speed limit warning signs, with speeds being reduced around 2 mph at each location and the percentage of vehicles traveling over the speed limit been reduced as well. The treatment did not cause drastic changes in speed, but for such small cost and little to no maintenance, it was deemed effective enough. Similar conclusions were also reached from evaluations of pavement markings with all speeds reduced around 4 mph with decreases in speed variance as well. Spin Alert signs were also evaluated at one location and did not show any additional gains when placed with the warning signs, and thus their effectiveness could be limited.

Based on the evaluation, they recommend implementation of additional speed warning signs in all transition zones and considering them as the low-cost standard treatment of transition zones. They also recommend augmenting the warning signs with pavement markings in cases where additional emphasis in the transition zone is required.

Findings from the Literature Review

The literature review revealed that the following treatments can be effective in reducing speeds at transition zones:

- Dynamic warning signs
- Transverse rumble strips
- Portable dynamic speed display signs

Roundabouts and transverse rumble strips were found to increase speed limit compliance in one study. One study concluded that more extensive and aggressive measures tend to produce a greater reduction in speed compared to less extensive and aggressive measures.

In addition to specific treatments, one study found that paved shoulder width, number of driveways, advance warning signs, transition zone length, and presence of horizontal curves increased the speed reduction in the transition zone.

4. SURVEY OF NCDOT DIVISIONS AND CHANGES IN PROJECT SCOPE

The steering and implementation committee (SIC) for this project recommended that the project team prepare a survey to be submitted to the different Regions/Divisions in North Carolina. The purpose of the survey was to determine if any of the Regions/Divisions had implemented engineering treatments at speed transition zones. The project team prepared a draft survey and circulated it to NCDOT, who suggested some changes to the survey. Here are the specific questions that were included in the survey:

Q1 - Please provide your name and contact information.

Q2 - Please indicate the NCDOT Division that you belong to.

Q3 - During the last 5 years, has your Division implemented any engineering treatments at any of the speed transition zones?

Q4 - If you answered Yes to the previous question, do you have information about when the treatments were installed, and the details about the specific treatments?

Q5 - Is your Division planning to implement engineering treatments at any of the speed transition zones in the next 6 months?

Q6 - Are you willing to answer further questions over the phone or email about this topic?

Q7 - Please indicate if you have any further comments.

The survey was sent to Division Engineers in January 2020. Three Divisions did not respond to the survey. Among the Divisions that responded to the survey, 5 Divisions indicated that they had not implemented any specific engineering treatments in the last 5 years and were unsure or did not plan to implement any treatments in the near future.

After receiving the results of the survey, HSRC staff contacted selected Divisions through email and phone call to get further information about the installations. HSRC staff were able to communicate with Divisions 3, 5, 8, and the Western Region. In North Carolina, in speed transition zones, a warning sign is required 600 feet before the reduced speed limit sign. Some of the divisions had implemented additional engineering measures including orange flags, dual mounted signs, and message boards. One Division had collected speed data before the implementation of such measures, but others had not.

Following the discussions with the Divisions, the project team had a meeting with the SIC to discuss the results of the survey. The survey had revealed that only a handful of existing known treatments in transition zones where before speed data had been collected. This led to some conversations about the possibility of installing treatments at selected locations and compiling speed data before and after the installation. However, due to Covid-19, such installations will not happen in 2020. Carrie Simpson, Chair of the SIC had a meeting with NCDOT Traffic Safety Unit

staff about the best ways to move forward on this project that would lead to an outcome that will be useful for NCDOT. After the meeting, NCDOT Traffic Safety Unit staff, suggested the following for the project team:

- Create an inventory of high to low-speed transition zones. This inventory could be compiled based on information from the NCDOT Traffic Safety Unit as well as the Divisions.
- The inventory should include the characteristics of each transition zone. The characteristics could include speed limits before and after transition, signing and markings in place, the type of facility (for example, freeway to expressway), land use characteristics, lane width, and shoulder widths, etc.
- Speed data before and after the transition could be collected by spot speeds and HERE data (potentially both could be used in conjunction) for a sample of the sites. The budget that was originally allocated for obtaining data from SHRP2 could be used for compiling spot speeds.
- Analyze the speed data to determine the relationship between speed and site characteristics.

The SIC also suggested that the compilation of the speed data should not be done during the pandemic. So, the project was put on hold for a few months.

5. COMPILATION OF DATA

Identification of Transition Zones and Compilation of Site Characteristics

Initially, the project team and the NCDOT Mobility and Safety Staff compiled a list of transition zones. A survey was then sent to the Divisions asking them to provide the location of additional speed transition zones. For the transition zones, the project team recorded the following information:

- Roadway
- County
- Division
- Latitude and Longitude
- Before speed limit
- After speed limit
- Length
- Shoulder width
- Lane width
- Number of lanes
- Divided or Undivided
- AADT
- The advancing warning sign that was present
- Pavement markings
- Dynamic speed display signs
- Dynamic warning signs
- Transverse rumble strips
- Welcome signs at community centers
- Presence of horizontal curves
- Presence of vertical curves
- Presence of curb and gutter
- Presence of sidewalk
- Presence of edgeline marking
- Description of any proximate traffic control (e.g., traffic signal downstream)
- Presence of roundabout
- Area type (rural or urban)
- Land use change

This data was compiled for 338 transition zones in North Carolina with the following breakdown by Division:

- Division 1: 7 transition zones
- Division 2: 29 transition zones
- Division 3: 57 transition zones
- Division 4: 96 transition zones
- Division 5: 18 transition zones
- Division 6: 9 transition zones
- Division 7: 9 transition zones
- Division 8: 7 transition zones
- Division 9: 3 transition zones
- Division 10: 21 transition zones
- Division 11: 28 transition zones
- Division 12: 45 transition zones
- Division 13: 6 transition zones
- Division 14: 3 transition zones

Compilation of Speed Data

Following the compilation of this data, the project team worked with NCDOT in identifying the transition zones for compiling speed data. The project team identified 50 transition zones anticipating that data can be compiled for these locations based on the budget that was originally allocated for compiling data from SHRP2. For these transition zones, the project team identified the locations where data need to be collected, i.e., before the advance warning sign, and after the reduced speed limit sign, and noted the coordinates for these points.

With the help of NCDOT, the project team prepared a request for a quote (for field data collection) and submitted this to two agencies recommended by NCDOT. Based on the quotes received, one vendor (Quality Counts) was selected to do the data collection. Based on the budget that was allocated for this activity, the number of sites had to be reduced to 37 sites (from 50 sites).

- Quality Counts compiled speed data for the 37 transition zones during August and September 2022. While collecting the data, the coordinates provided by UNC HSRC were mostly followed by Quality Counts, but there were a handful of instances where the locations had to be placed slightly farther away from the coordinates provided by UNC HSRC. For each transition zone, Quality Counts provided one excel file for the before location (before the advance warning sign), and one excel file for the after location (after the reduced speed limit sign). The excel file provided the following summaries in addition to the raw data on the speed of each vehicle:
 - Average speed
 - Standard deviation
 - 85th percentile speed

- Percentage exceeding speed limit
- Percentage 10+ mph over speed limit
- Pace range
- Percentage of vehicles in pace range
- Total number of vehicles

These summaries were also provided separately for daytime (8 am to 5 pm) and nighttime (9 pm to 5 am).

For the 13 locations (out of 50) there were not covered by Quality Counts, the project team compiled speed data from INRIX. To be consistent with the data collected from the field, the INRIX probe data were collected for 2 (two) days from 08/16/2022, 12 AM to 08/18/2022, 11:55 PM. This data provided 5 mins average driver speeds for the aforementioned time period. The aggregation of INRIX speed data for mean, 85th percentile, and standard deviation of speeds were calculated using R version 4.1.2.

Table 1 through Table 3 show the comparison between field and probe sites for mean and 85th percentile speeds and their respective speed reductions for four sites. It is worth mentioning that unlike spot speeds that were compiled in the field, INRIX provides speed metrics over a corridor and that may include traffic accessing the mainline from access points such as driveways and intersections. Hence, for the probe data, choosing the appropriate corridor, where the roadway section does not have many non-mainline traffic as well as not too far away from the speed transition zone was crucial while comparing field and probe data.

Table 1: Comparison of mean speeds between field and probe sites

Site Number	Before Speed Limit (mph)	After Speed Limit (mph)	Average Mean Speed_B (mph)			Average Mean Speed_A (mph)		
			Field	Probe	Field-Probe	Field	Probe	Field-Probe
38	55	35	50.7	49.6	1.1	44.7	43.5	1.2
108	55	45	54.6	54.7	0.1	49.4	48.3	1.1
123	65	55	66.7	64.3	2.4	64.1	62.2	1.9
126	70	60	72.6	70.2	2.4	67.9	67.3	0.2

Table 2: Comparison of 85th percentile speeds between field and probe sites

Site Number	Before Speed Limit (mph)	After Speed Limit (mph)	Average 85 th Percentile Speed_B (mph)			Average 85 th Percentile Speed_A (mph)		
			Field	Probe	Field-Probe	Field	Probe	Field-Probe
38	55	35	57.0	52.6	4.4	52.0	45.1	6.9
108	55	45	61.0	57.5	3.5	55.0	50.9	4.1
123	65	55	73.0	67.4	5.6	72.0	65.2	6.8
126	70	60	80.0	73.2	6.8	73.0	70.4	2.6

Table 3: Comparison of speed reductions between field and probe sites

Site Number	Before Speed Limit (mph)	After Speed Limit (mph)	Average Mean Speed_Reduction (mph)			Average 85 th Percentile Speed_Reduction (mph)		
			Field	Probe	Field-Probe	Field	Probe	Field-Probe
38	55	35	6.0	6.1	-0.1	5.0	7.5	-2.5
108	55	45	5.2	6.4	-1.2	6.0	6.6	-0.6
123	65	55	2.6	2.1	0.5	1.0	2.2	-1.2
126	70	60	4.7	2.9	1.8	7.0	2.8	4.2

- When the field and probe sites are compared for the 4 (four) different cases (speed transition categories), it can be seen that the mean speeds both before- and after-transition are fairly comparable between the field and probe sites, although in all cases, field speeds are higher than that for the probe sites for both before and after transitions. However, the difference in the 85th percentile speeds are much larger between the field and probe sites. This is most likely because while the field sites collect individual vehicle data or spot speeds, probe sites provide 5 minutes aggregated data. This means, from probe sites, the actual 85th percentile speeds cannot be obtained.

- Hence in the following analysis, the 85th percentile speed-related statistics are provided only for the field sites (a total of 37 sites), whereas the statistics for mean speeds and average standard deviation of speeds encompass both field and probe data (all 50 sites).

6. ANALYSIS AND RESULTS

This section provides the results of the analysis of the speed data that were compiled at 50 transition zones in North Carolina. As indicated earlier, driver speed and roadway characteristics were obtained through field data collection and INRIX probe data. Driver speed data at a total of 50 sites were collected and analyzed.

This section provides summary statistics including sample size for different categories of transition zones. Tables and Figures are also provided summarizing the changes in speed in the transition zones and any relevant findings based on these summaries.

Number of Sites by Category of Transition Zone

Table 4 through Table 6 provide the number of transition zones based on the combination of before and after speed limits. Table 4 provides the statistics for all the 50 transition zones that were included. Table 5 provides the statistics for the 37 sites where speed data were compiled in the field, and Table 6 provides the statistics for the 13 sites where speed were compiled using INRIX.

As can be seen in Table 4, 5 (five) out of 9 (nine) speed transition categories have at least 4 (four) sites as follow:

- 45 mph to 35 mph (6 sites)
- 55 mph to 35 mph (11 sites)
- 55 mph to 45 mph (14 sites)
- 65 mph to 55 mph (4 sites)
- 70 mph to 55 mph (8 sites)

The combination with the largest number of sites is the transition zone where the before speed limit was 55 mph and the after-speed limit was 45 mph (14 sites). The other two common combinations were sites with a before speed limit of 55 mph and after speed limit of 35 mph (11 sites), and sites with before speed limit of 70 mph and with after speed limit of 55 mph (8 sites).

Table 4: Number of sites for all before-after speed limit categories (number of sites = 50)

Field and Probe Data						
Before Speed Limit	After Speed Limit					Grand Total
	35 mph	45 mph	50 mph	55 mph	60 mph	
45 mph	6					6
50 mph	2*					2
55 mph	11	14				25
65 mph		1*		4		5
70 mph			2*	8	2	12
Grand Total	19	15	2	12	2	50

Note: Asterisks () are added to indicate the speed transition categories with only probe sites*

Table 5: Number of sites for all before-after speed limit categories for field data (number of sites = 37)

Field Data						
Before Speed Limit	After Speed Limit					Grand Total
	35 mph	45 mph	50 mph	55 mph	60 mph	
45 mph	6					6
50 mph						
55 mph	10	10				20
65 mph				3		3
70 mph				7	1	8
Grand Total	16	10		10	1	37

Table 6: Number of sites for all before-after speed limit categories for probe data (number of sites = 13)

Probe Data						
Before Speed Limit	After Speed Limit					Grand Total
	35 mph	45 mph	50 mph	55 mph	60 mph	
45 mph						
50 mph	2*					2
55 mph	1	4				5
65 mph		1*		1		2
70 mph			2*	1	1	4
Grand Total	3	5	2	2	1	13

Note: Asterisks () are added to indicate the speed transition categories with only probe sites*

Summary Statistics and Observations

Table 7 provides the summary statistics including speed and site characteristics. Appendix A provides detailed statistics for each transition zone along with photographs of each location.

Table 7: Summary statistics for of variables all transition zones

<i>Parameter</i>	Minimum	Maximum	Mean	Standard Deviation
AADT (vehicles per day) (<i>n=50</i>)	900	98,000	17,994	20561.10
Length (miles) (<i>n=50</i>)	0.08	0.54	0.19	0.09
Left Shoulder Width (feet) (<i>n=50</i>)	0	12	2.40	2.39
Right Shoulder Width (feet) (<i>n=50</i>)	0	12	3.86	4.04
Lane Width (feet) (<i>n=50</i>)	9	12	10.94	0.89
Number of Lanes (<i>n=50</i>)	2	10	3.44	1.69
Presence of two-way left turn lane (<i>n=50</i>)	0	1	0.12	0.33
Divided facility (Divided=1, Undivided=0) (<i>n=50</i>)	0	1	0.42	0.50
Presence of Horizontal Curves (<i>n=50</i>)	0	1	0.44	0.50
Presence of Vertical Curves (<i>n=50</i>)	0	1	0.40	0.50
Presence of Curb and Gutter (<i>n=50</i>)	0	1	0.12	0.33
Presence of Sidewalk (<i>n=50</i>)	0	1	0.04	0.20
Presence of Edge Line Marking (<i>n=50</i>)	0	1	0.96	0.20
Area Type Rural vs Urban (Rural =1, Urban =0) (<i>n=50</i>)	0	1	0.74	0.44
Before Speed Limit (mph) (<i>n=50</i>)	45	70	58.20	8.55
After Speed Limit (mph) (<i>n=50</i>)	35	60	44.40	8.39
Before-After Speed Limit Difference (mph) (<i>n=50</i>)	10	20	13.80	4.35
MeanSpeed_Before (mph) (<i>n=50</i>)	38.80	72.62	57.10	9.76
85 th Percentile Speed_Before (mph) (<i>n=37</i>)	46	80	63.05	9.81
Standard Deviation of Speed_Before (mph) (<i>n=50</i>)	2.12	13.12	6.31	
Night_MeanSpeed_Before (mph) (<i>n=50</i>)	41.90	72.20	56.90	9.14
Night_85 th Percentile Speed_Before (<i>n=37</i>)	48	80	63.81	9.04
Night_Standard Deviation of Speed_Before (mph) (<i>n=50</i>)	2.11	15.72	6.32	
Day_MeanSpeed_Before (mph) (<i>n=50</i>)	37.65	72.46	57.04	10.14
Day_85 th Percentile Speed_Before (mph) (<i>n=37</i>)	45	80	62.58	9.92
Day_Standard Deviation of Speed_Before (mph) (<i>n=50</i>)	1.61	14.29	6.04	
MeanSpeed_After (mph) (<i>n=50</i>)	32.05	68.69	51.06	10.29
85 th Percentile Speed_After (mph) (<i>n=37</i>)	37	75	57.81	10.74

Standard Deviation of Speed_ After (mph) (n=50)	2.27	15.31	6.54	
Night_MeanSpeed_ After (mph) (n=50)	32.84	69.57	51.26	9.70
Night_85 th Percentile Speed_ After (mph) (n=37)	38	76	58.10	10.11
Night_Standard Deviation of Speed_ After (mph) (n=50)	1.74	11.02	6.28	
Day_MeanSpeed_ After (mph) (n=50)	31.65	69.65	50.78	10.55
Day_85 th Percentile Speed_ After (mph) (n=37)	36	74	57.49	10.91
Day_Standard Deviation of Speed_ After (mph) (n=50)	1.83	16.98	6.46	
Percent of Vehicles Exceeding Speed Limit_Before (n=50)	0	97.45	44.62	27.67
Percent of Observations 10+ mph over Speed Limit_Before (n=50)	0	44.20	6.03	9.58
Percent of Observations Exceeding Speed Limit_After (n=50)	11.23	100	81.12	21.21
Percent of Observations 10+ mph over Speed Limit_After (n=50)	0	94.79	30.30	24.33

The following observations are based on the speed data that were compiled:

- Among all sites, 4 (four) sites were along the interstates, with 3 (three) sites having 70 mph before speed limit and 1 (one) site having 65 mph before speed limit.
- The majority (37 out of 50) of the sites are along US or NC routes. 8 (eight) sites were along SR routes.
- In terms of the general proximity of transition zone to nearest upstream or downstream signal or sign-controlled intersection, 38 sites out of all 50 sites had no traffic control device upstream or downstream of the speed transition zones. Additionally, 10 sites had traffic signals in the downstream of transition zone, 1 (one) site had traffic signal in the upstream of the transition zone and 1 (one) site had traffic control on both upstream and downstream of the transition zone. While collecting this data, presence of traffic controls was considered and validated within ¼ to ½ a mile for any site.
- No sites had any roundabouts in the transition zone.
- No sites had any supplemental pavement markings in the transition zone. Supplemental pavement markings are where the transition zone is indicated by markings painted on the roadway as shown in the picture below.



Figure 1: Example of supplemental pavement markings where the transition zone is indicated by markings painted on the roadway surface.

- No sites had any dynamic warning signs in the transition zone.
- No sites had any transverse rumble strips in the transition zone.
- For sites with 65 and 70 mph before speed limits, all have 2+ lanes.
- 26 sites had the before after speed limit difference of 10 mph, while 10 and 14 sites have the speed limit reduction by 15 and 20 mph, respectively (see Figure 2).
- Although, after-transition mean daytime speed is lower than their nighttime speed counterparts, the before-transition daytime mean speed is marginally higher than its respective nighttime before-transition mean speed. Before transition nighttime mean speeds are lower than the daytime mean speeds in majority of the sites (29 sites out of all 50 sites) by an average value of -1.7 mph (i.e., nighttime before-transition mean speed – daytime before-transition mean speed). These sites, where the daytime mean speeds are higher than the nighttime mean speeds, comprise both field and probe sites. However, among the sites where the difference between the nighttime speed is lower than the daytime speed, the magnitude of these differences is the largest for probe sites. This may

be because probe data are less reliable during night hours due to limited sample sizes. This also suggests that any finding pertaining to nighttime data should be interpreted with caution. Among the sites where before-transition nighttime mean speeds are lower than daytime mean speeds, the top 6 (six) sites with the largest differences are all probe sites with an average difference of 4.6 mph. Except for 1 (one) site among these 6 (six) sites, the before speed limits were at least 65 mph or higher. Also, except for 1 (one) site, there were no land use changes at these sites. Moreover, all these 6 (six) sites are divided facilities and do not have a two-way left turn lane. The average AADTs for these 6 (six) sites are higher (19,733 vpd) compared to the average AADTs for all sites (18,326 vpd).

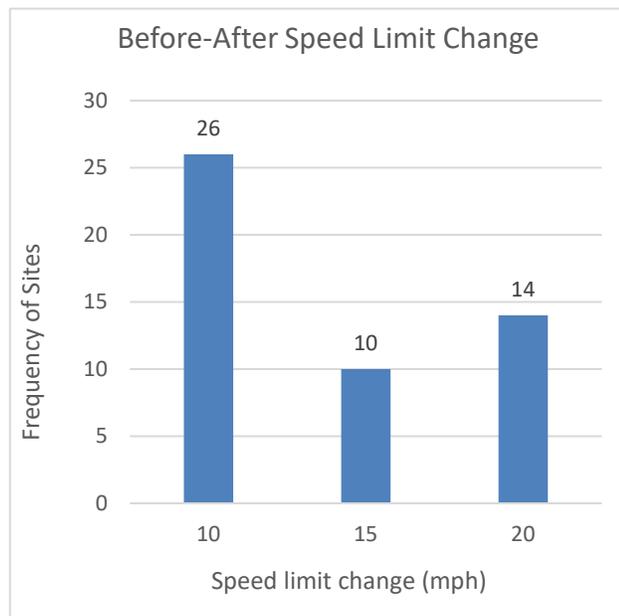


Figure 2: Number of sites based on speed limit reduction magnitude (number of sites = 50).

Reduction in Speed Due to the Transition Zone

Table 8 shows the reduction (after minus before) in the mean speed and the 85th percentile speed based on the magnitude of the difference between the before and after speed limits. As expected, the reduction in speeds is generally higher with a higher reduction in speed limit except in the case of nighttime 85th percentile speed which is only based on the field sites.

Table 8: Average reduction in mean speed and 85th percentile speed based on the magnitude of before speed limit minus after speed limit

Speed Limit Change (mph)	Average Mean Speed Change (mph) (50 sites)	Average 85 Speed Change (mph) (37 sites)	Average Night Mean Speed Change (mph) (50 sites)	Average Night 85 Speed Change (mph) (37 sites)	Average Day Mean Speed Change (mph) (50 sites)	Average Day 85 Speed Change (mph) (37 sites)
10	4.8	5.4	4.7	5.8	4.9	5.2
15	5.6	4.4	5.1	4.9	5.9	4.0
20	8.6	5.6	7.8	6.1	9.0	5.6

Table 9 through Table 14 show the before and after speeds (mean and 85th percentile speeds) and the reductions in speed from before to after the transition.

Table 9: Average mean speed before speed transition based on all speed limit reduction categories (number of sites = 50)

	Average of MeanSpeed_B	AFTER SPEED LIMIT					Grand Total
		35	45	50	55	60	
BEFORE SPEED LIMIT	45	45.9					45.9
	50	46.9*					46.9
	55	51.5	53.5*				52.5
	65		65.3		68.4		66.9
	70			69.0*	69.0	71.0	69.7

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 10: Average mean speed after speed transition based on all speed limit reduction categories (number of sites = 50)

	Average of MeanSpeed_A	AFTER SPEED LIMIT					Grand Total
		35	45	50	55	60	
BEFORE SPEED LIMIT	45	37.0					37.0
	50	40.7*					40.7
	55	44.5	49.7				47.1
	65		52.6*		64.9		58.7
	70			53.6*	63.5	68.1	61.7

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 11: Average mean speed change based on all speed limit reduction categories (number of sites = 50)

	AVG SPEED CHANGE_B-A	AFTER SPEED LIMIT					Grand Total
		35	45	50	55	60	
BEFORE SPEED LIMIT	45	8.8					8.8
	50	6.2*					6.2
	55	7.0	3.8				5.4
	65		12.7*		3.5		8.1
	70			15.5*	5.5	2.9	7.9

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 12: Average 85th percentile speed before speed transition based on all speed limit reduction categories (number of sites = 37)

	Average of 85Speed_B	AFTER SPEED LIMIT					Grand Total
		35	45	50	55	60	
BEFORE SPEED LIMIT	45	52.0					52.0
	50						
	55	57.9	61.1				59.5
	65				73.7		73.7
	70				75.7	80.0	77.9

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 13: Average 85th percentile speed after speed transition based on all speed limit reduction categories (number of sites = 37)

	Average of 85Speed_A	AFTER SPEED LIMIT					Grand Total
		35	45	50	55	60	
BEFORE SPEED LIMIT	45	43.2					43.2
	50						
	55	52.3	57.0				54.7
	65				71.7		71.7
	70				71.3	73.0	72.1

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 14: Average 85th percentile speed change based on all speed limit reduction categories (number of sites = 37)

	Average of 85Speed_B-A	AFTER SPEED LIMIT					Grand Total
		35	45	50	55	60	
BEFORE SPEED LIMIT	45	8.8					8.8
	50						
	55	5.6	4.1				4.9
	65				2.0		2.0
	70				4.4	7.0	5.7

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Following are some observations about specific sites that had showed unexpected results regarding the change in speed after the transition:

- 2 (two) sites among 26 sites, where speed limits decreased by 10 mph, had mean speed increase after the transition zone.
- 1 (one) site among 20 field sites, where speed limits decreased by 10 mph, had 85th percentile speed increase after the transition zone.
- 3 (three) sites among 26 sites where speed limits decreased by 10 mph had day mean speed increase after the transition zone.
- 2 (two) sites among 20 field sites, where speed limits decreased by 10 mph, had day 85th percentile speed increase after the transition zone.

Figure 3 and Figure 4 provide the frequency distribution for the range of speed before and after the transition zone; Figure 3 provides the distribution of mean speed for all 50 sites, and Figure 4 provides the distribution for the 85th percentile speed for 37 field sites. Figure 5 provides information on the number of sites based on the percentage of observations exceeding the speed limit before and after the transition zone for all 50 sites. Interestingly, in 6 (six) out of 50 sites, the percentage of observations exceeding the speed limits were higher before transition zone than

after the transition. 4 (four) out of these 6 (six) sites had a speed limit of 45 mph, while 1 (one) had 55 mph, and the other had 70 mph.

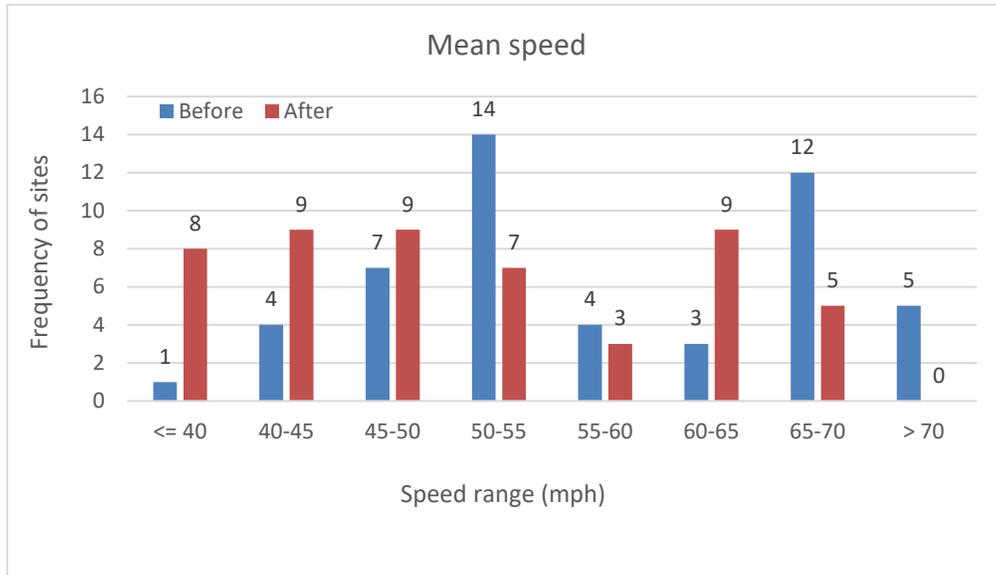


Figure 3: Number of sites before and after speed transition based on different mean speed ranges (number of sites = 50)

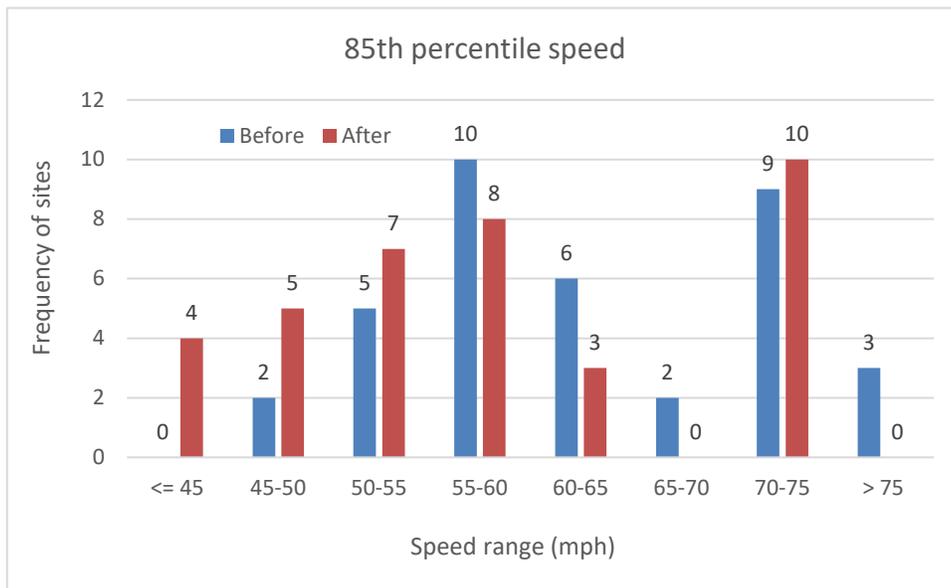


Figure 4: Number of sites before and after speed transition based on different 85th percentile speed ranges (number of sites = 37)

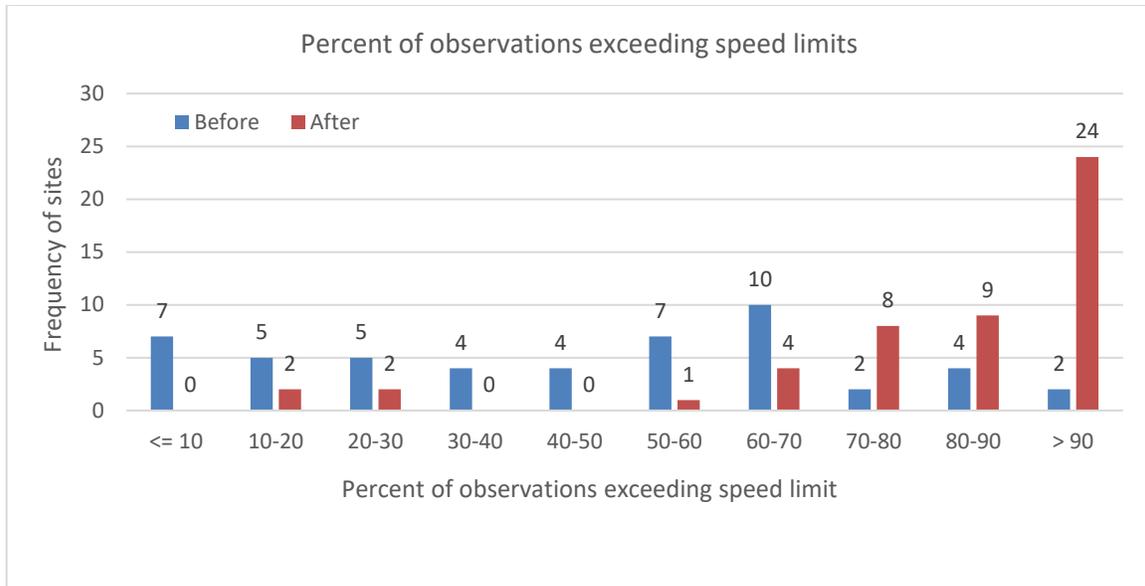


Figure 5: Number of sites based on the percent of observations exceeding speed limits (number of sites = 50)

Table 15 through Table 23 show the reductions in speed from the before to after for all the 9 (nine) speed transition zone categories. A positive value in the last column indicates a reduction in speed.

Table 15: Reduction in mean speed (number of sites = 50)

Before Speed Limit (mph)	After Speed Limit (mph)	Speed Limit Reduction (mph)	Number of Sites	Before Speed (mph)	After Speed (mph)	Speed Reduction_BA (mph)
45	35	10	6	45.9	37.0	8.9
50	35	15	2	46.9*	40.7*	6.2*
55	35	20	11	51.5	44.5	7.0
55	45	10	14	53.5	49.7	3.8
65	45	20	1	65.3*	52.6*	12.7*
65	55	10	4	68.4	64.9	3.5
70	50	20	2	69.0*	53.6*	15.5*
70	55	15	8	69.0	63.5	5.5
70	60	10	2	71.0	68.1	2.9

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites



Figure 6: Mean speeds in the before and after periods along with the mean speed reductions (number of sites = 50)

Table 16: Reduction in 85th percentile speed (number of sites = 37)

Before Speed Limit (mph)	After Speed Limit (mph)	Speed Limit Reduction (mph)	Number of Sites	Before Speed (mph)	After Speed (mph)	Speed Reduction_BA (mph)
45	35	10	6	52.0	43.2	8.8
50	35	15	0			
55	35	20	10	57.9	52.3	5.6
55	45	10	10	61.1	57.0	4.1
65	45	20	0			
65	55	10	3	73.7	71.7	2.0
70	50	20	0			
70	55	15	7	75.7	71.3	4.4
70	60	10	1	80.0	73.0	7.0

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites



Figure 7: 85th Percentile speeds in the before and after periods along with the 85th percentile speed reductions (number of sites = 37)

Table 17: Reduction in mean speed at night (number of sites = 50)

Before Speed Limit (mph)	After Speed Limit (mph)	Speed Limit Reduction (mph)	Number of Sites	Before Speed (mph)	After Speed (mph)	Speed Reduction_BA (mph)
45	35	10	6	46.4	37.4	9.0
50	35	15	2	46.0*	41.5*	4.5*
55	35	20	11	52.4	45.9	6.5
55	45	10	14	53.5	49.9	3.6
65	45	20	1	62.2*	51.6*	10.6*
65	55	10	4	66.8	63.9	2.9
70	50	20	2	66.9*	53.6*	13.3*
70	55	15	8	68.5	63.1	5.4
70	60	10	2	69.2	66.6	2.6

Note: Asterisks () are added to indicate the speed transition categories with only probe sites*

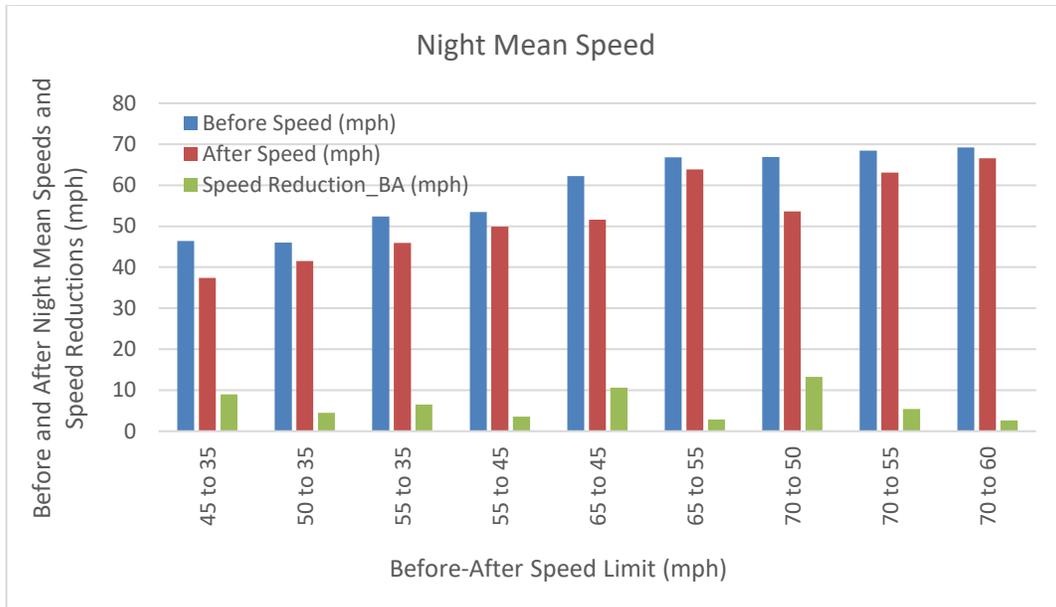


Figure 8: Nighttime mean speeds in the before and after periods along with the nighttime mean speed reductions (number of sites = 50)

Table 18: Reduction in the 85th percentile speed at night (number of sites = 37)

Before Speed Limit (mph)	After Speed Limit (mph)	Speed Limit Reduction (mph)	Number of Sites	Before Speed (mph)	After Speed (mph)	Speed Reduction_BA (mph)
45	35	10	6	53.2	44.0	9.2
50	35	15	0			
55	35	20	10	59.7	53.6	6.1
55	45	10	10	62.1	57.1	5.0
65	45	20	0			
65	55	10	3	72.7	71.0	1.7
70	50	20	0			
70	55	15	7	75.3	70.4	4.9
70	60	10	1	79.0	73.0	6.0

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

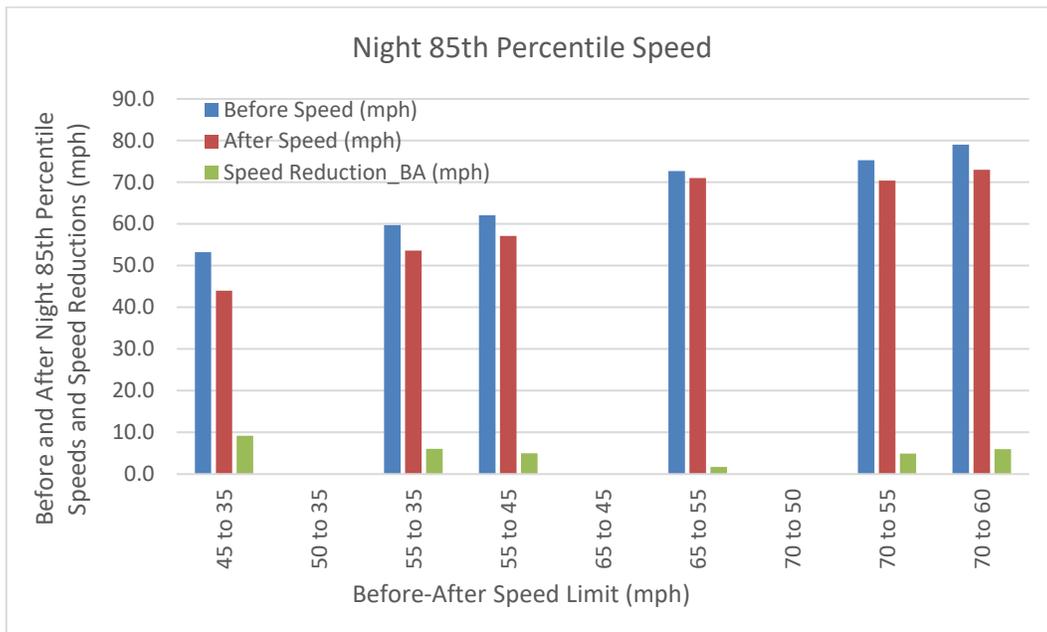


Figure 9: Nighttime 85th percentile speeds in the before and after periods along with the nighttime 85th percentile speed reductions (number of sites = 37)

Table 19: Reduction in mean speed during the day (number of sites = 50)

Before Speed Limit (mph)	After Speed Limit (mph)	Speed Limit Reduction (mph)	Number of Sites	Before Speed (mph)	After Speed (mph)	Speed Reduction_BA (mph)
45	35	10	6	45.4	36.9	8.5
50	35	15	2	47.2*	39.6*	7.6*
55	35	20	11	51.1	44.0	7.1
55	45	10	14	53.2	49.3	3.9
65	45	20	1	67.2*	52.8*	14.4*
65	55	10	4	68.5	64.7	3.8
70	50	20	2	70.4*	53.3*	17.1*
70	55	15	8	69.1	63.6	5.5
70	60	10	2	71.6	68.6	3.0

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

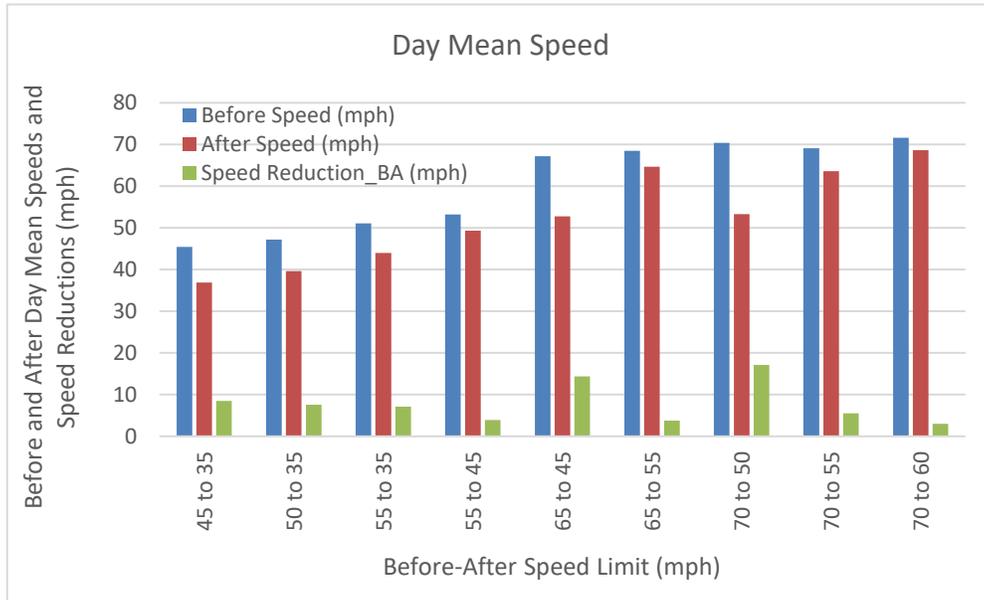


Figure 10: Daytime mean speeds in the before and after periods along with the daytime mean speed reductions (number of sites = 50)

Table 20: Reduction in 85th percentile speed during the day (number of sites = 37)

Before Speed Limit (mph)	After Speed Limit (mph)	Speed Limit Reduction (mph)	Number of Sites	Before Speed (mph)	After Speed (mph)	Speed Reduction_BA (mph)
45	35	10	6	51.6	42.8	8.8
50	35	15	0			
55	35	20	10	57.3	51.7	5.6
55	45	10	10	60.5	56.7	3.8
65	45	20	0			
65	55	10	3	73.7	71.3	2.4
70	50	20	0			
70	55	15	7	75.3	71.3	4.0
70	60	10	1	60.0	73.0	7.0

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

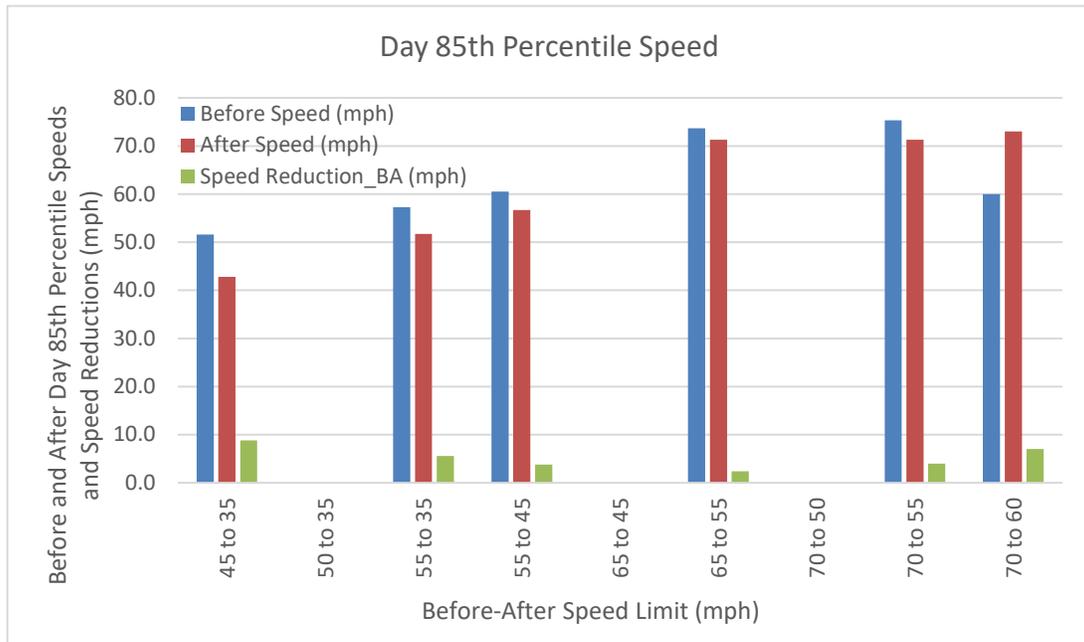


Figure 11: Daytime 85th percentile speeds in the before and after periods along with the daytime 85th percentile speed reductions (number of sites = 37)

Table 21: Reduction in the standard deviation of speed (number of sites = 50)

Before Speed Limit (mph)	After Speed Limit (mph)	Speed Limit Reduction (mph)	Number of Sites	Before SD Speed (mph)	After SD Speed (mph)	SD Speed Reduction_BA (mph)
45	35	10	6	6.5	6.4	0.1
50	35	15	2	2.7*	2.7*	0.0*
55	35	20	11	6.5	7.2	-0.7
55	45	10	14	6.4	6.4	0.0
65	45	20	1	3.5*	3.6*	-0.1*
65	55	10	4	6.5	6.4	0.1
70	50	20	2	3.0*	3.4*	-0.4*
70	55	15	8	8.1	8.7	-0.6
70	60	10	2	5.3	4.9	0.4

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 22: Reduction in the standard deviation of speed at night (number of sites = 50)

Before Speed Limit (mph)	After Speed Limit (mph)	Speed Limit Reduction (mph)	Number of Sites	Before SD Speed (mph)	After SD Speed (mph)	SD Speed Reduction_BA (mph)
45	35	10	6	6.6	6.9	-0.3
50	35	15	2	2.3*	2.4*	-0.1*
55	35	20	11	7.3	7.3	0.0
55	45	10	14	6.3	6.0	0.3
65	45	20	1	3.5*	3.4*	0.1*
65	55	10	4	6.7	6.6	0.1
70	50	20	2	3.0*	3.6*	-0.6*
70	55	15	8	7.1	7.1	0.0
70	60	10	2	5.2	4.6	0.6

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 23: Reduction in the standard deviation of speed during the day (number of sites = 50)

Before Speed Limit (mph)	After Speed Limit (mph)	Speed Limit Reduction (mph)	Number of Sites	Before SD Speed (mph)	After SD Speed (mph)	SD Speed Reduction_BA (mph)
45	35	10	6	6.5	6.4	0.1
50	35	15	2	2.6*	2.7*	-0.1*
55	35	20	11	6.4	7.1	-0.7
55	45	10	14	6.2	6.3	-0.1
65	45	20	1	1.7*	3.9*	-2.2*
65	55	10	4	6.3	6.6	-0.3
70	50	20	2	1.9*	3.2*	-1.3*
70	55	15	8	7.6	8.4	-0.8
70	60	10	2	4.6	4.4	0.2

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

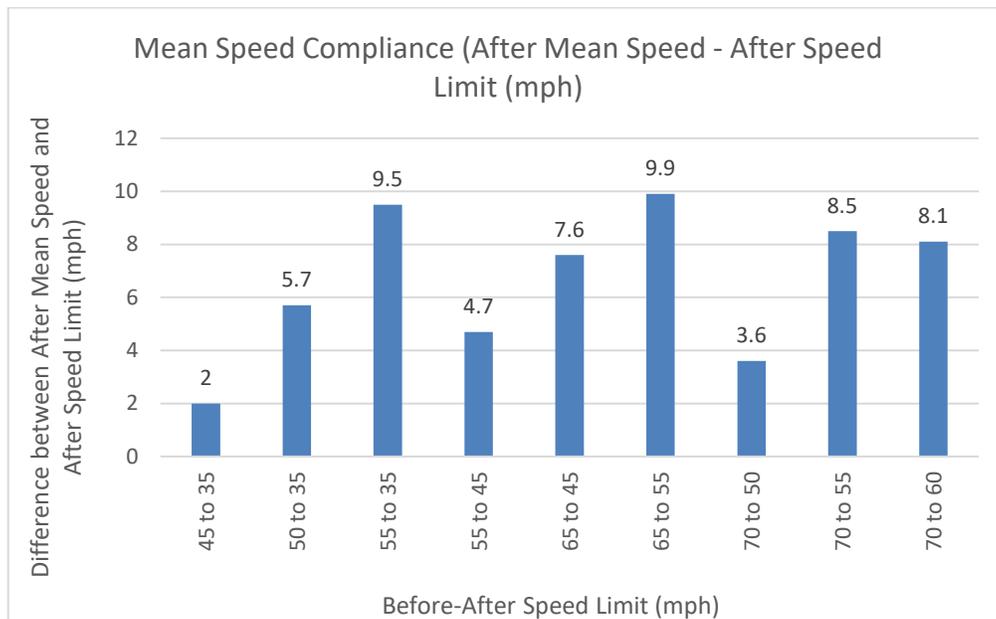


Figure 12: Mean speed compliance for all speed reduction categories (number of sites = 50)

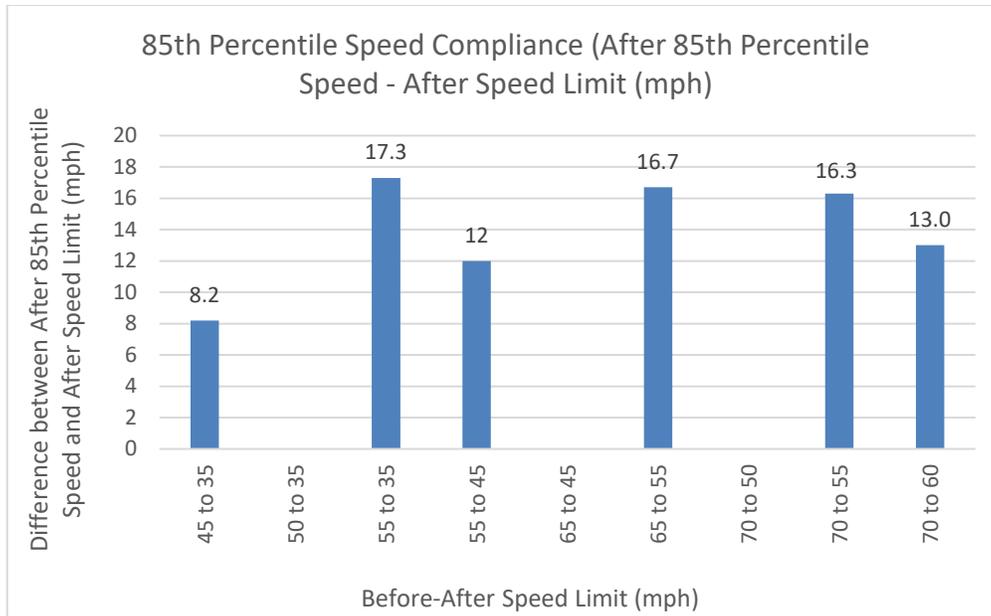


Figure 13: 85th Percentile speed compliance for all speed reduction categories (number of sites = 37)

Table 24 through Table 36 compare only 2-lane sites for 55 mph before speed limit and 35 mph and 45 mph after speed limits, respectively.

Table 24: Number of sites based on number of lanes (number of sites = 17)

		AFTER SPEED LIMIT	
		35	45
BEFORE SPEED LIMIT	NUMBER OF SITES	35	45
	NUMBER OF LANES	2	2
	55	11 (10 field sites and 1 probe site)	6 (5 field sites and 1 probe site)

Table 25: Average before mean speed based on number of lanes (number of sites = 17)

		AFTER SPEED LIMIT		
		AVERAGE MEAN SPEED_B	35	45
		NUMBER OF LANES	2	2
BEFORE SPEED LIMIT	55		51.5	52.0

Table 26: Average after mean speed based on number of lanes (number of sites = 17)

		AFTER SPEED LIMIT		
		AVERAGE MEAN SPEED_A	35	45
		NUMBER OF LANES	2	2
BEFORE SPEED LIMIT	55		44.5	49.9

Table 27: Average before 85th percentile speed based on number of lanes (number of sites = 15)

		AFTER SPEED LIMIT		
		AVERAGE 85 PERCENTILE SPEED_B	35	45
		NUMBER OF LANES	2	2
BEFORE SPEED LIMIT	55		57.9	58.0

Table 28: Average after 85th percentile speed based on number of lanes (number of sites = 15)

		AFTER SPEED LIMIT		
		AVERAGE 85 PERCENTILE SPEED_A	35	45
		NUMBER OF LANES	2	2
BEFORE SPEED LIMIT	55		52.3	56.0

Table 29: Difference between before-after mean speed reduction (number of sites = 17)

		AFTER SPEED LIMIT		
		AVERAGE MEAN SPEED REDUCTION_B-A	35	45
		NUMBER OF LANES	2	2
BEFORE SPEED LIMIT	55	7.0	2.1	

Table 30: Difference between before-after 85th percentile speed reduction (number of sites = 15)

		AFTER SPEED LIMIT		
		AVERAGE 85 PERCENTILE SPEED REDUCTION_B-A	35	45
		NUMBER OF LANES	2	2
BEFORE SPEED LIMIT	55	5.6	2.0	

Table 31: Difference between before mean speed and before speed limit (number of sites = 17)

		AFTER SPEED LIMIT		
		AVERAGE MEAN SPEED_B - BEFORE SPEED LIMIT	35	45
		NUMBER OF LANES	2	2
BEFORE SPEED LIMIT	55	-3.5	-3.0	

Table 32: Difference between after mean speed and before speed limit (number of sites = 17)

		AFTER SPEED LIMIT		
		AVERAGE MEAN SPEED_A - BEFORE SPEED LIMIT	35	45
		NUMBER OF LANES	2	2
BEFORE SPEED LIMIT	55	-10.5	-5.1	

Table 33: Difference between after mean speed and after speed limit (number of sites = 17)

		AFTER SPEED LIMIT		
		AVERAGE MEAN SPEED_A - AFTER SPEED LIMIT	35	45
		NUMBER OF LANES	2	2
BEFORE SPEED LIMIT	55	9.5	4.9	

Table 34: Difference between before 85th percentile speed and before speed limit (number of sites = 15)

		AFTER SPEED LIMIT		
		AVERAGE 85 PERCENTILE SPEED_B - BEFORE SPEED LIMIT	35	45
		NUMBER OF LANES	2	2
BEFORE SPEED LIMIT	55	2.9	3.0	

Table 35: Difference between after 85th percentile speed and before speed limit (number of sites = 15)

		AFTER SPEED LIMIT		
		AVERAGE 85 PERCENTILE SPEED_A - BEFORE SPEED LIMIT	35	45
		NUMBER OF LANES	2	2
BEFORE SPEED LIMIT	55	-2.7	1.0	

Table 36: Difference between after 85th percentile speed and after speed limit (number of sites = 15)

		AFTER SPEED LIMIT		
		AVERAGE 85 PERCENTILE SPEED_A - AFTER SPEED LIMIT	35	45
		NUMBER OF LANES	2	2
BEFORE SPEED LIMIT	55	17.3	11.0	

- Looking at only the 2-lane sites with before speed limit of 55 mph, and after speeds of 35 mph and 45 mph, as shown in Table 24 through Table 36, after-transition mean speeds are approximately 45 mph and 50 mph respectively, indicating speed reduced almost halfway to the after-speed limit.

- For only field sites, 85th percentile after speeds are about 52.3 mph and 56 mph for 55 mph to 35 mph and 55 mph to 45 mph categories. This means, although for 55 mph to 35 mph category, 85th percentile after speed is lower than the before speed limit (55 mph), for 55 mph to 45 mph category, 85th percentile after speed is even higher than the before speed limit (55 mph), indicating worse compliance of 85th percentile after speeds compared to that of after mean speeds.
- In terms of the absolute reduction in mean speeds, the 55 mph to 35 mph category shows about 7 mph of mean speed reduction, approximately 1/3rd of the speed limit reduction of 20 mph. The reduction in mean speed for the 55 mph to 45 mph category, on the other hand, is about 2.1 mph, which is approximately 1/5th of the speed limit reduction (10 mph).
- For only field sites, the reduction in 85th percentile speed reduction are 5.6 mph and 2.0 mph, respectively, for 55 mph to 35 mph and 55 mph to 45 mph categories.
- For both speed reduction categories, before mean speeds were lower than the before speed limits by 3.5 mph and 3.0 mph, respectively, for the 55 mph to 35 mph and the 55 mph to 45 mph categories.

Table 37 through Table 49 compare only 2-lane sites for 55 mph and 45 mph before speed limits, respectively, with after speed limit of 35 mph for both cases.

Table 37: Number of sites based on number of lanes (number of sites = 15)

BEFO RE SPEE D LIMIT	AFTER SPEED LIMIT	
	NUMBER OF SITES	35
	NUMBER OF LANES	2
	45	4
	55	11 (10 field sites and 1 probe site)

Table 38: Average before mean speed based on number of lanes (number of sites = 15)

BEFO RE SPEE D LIMIT	AFTER SPEED LIMIT	
	AVERAGE MEAN SPEED_B	35
	NUMBER OF LANES	2
	45	46.5
	55	51.5

Table 39: Average after mean speed based on number of lanes (number of sites = 15)

BEFO RE SPEED D LIMIT			AFTER SPEED LIMIT
	AVERAGE MEAN SPEED_A		35
	NUMBER OF LANES		2
	45		37.9
	55		44.5

Table 40: Average before 85th percentile speed based on number of lanes (number of sites = 14)

BEFO RE SPEED D LIMIT			AFTER SPEED LIMIT
	AVERAGE 85 PERCENTILE SPEED_B		35
	NUMBER OF LANES		2
	45		52.5
	55		57.9

Table 41: Average after 85th percentile speed based on number of lanes (number of sites = 14)

BEFO RE SPEED D LIMIT			AFTER SPEED LIMIT
	AVERAGE 85 PERCENTILE SPEED_A		35
	NUMBER OF LANES		2
	45		44.3
	55		52.3

Table 42: Difference between before-after mean speed reduction (number of sites = 15)

BEFO RE SPEED D LIMIT			AFTER SPEED LIMIT
	AVERAGE MEAN SPEED CHANGE_B-A		35
	NUMBER OF LANES		2
	45		8.6
	55		7.0

Table 43: Difference between before-after 85th percentile speed reduction (number of sites = 14)

BEFO RE SPEED D LIMIT			AFTER SPEED LIMIT
	AVERAGE 85 PERCENTILE SPEED CHANGE_B-A		35
	NUMBER OF LANES		2
	45		8.3
	55		5.6

Table 44: Difference between before mean speed and before speed limit (number of sites = 15)

BEFORE SPEED LIMIT	AFTER SPEED LIMIT	
	AVERAGE MEAN SPEED_B - BEFORE SPEED LIMIT	35
	NUMBER OF LANES	2
	45	1.5
55	-3.5	

Table 45: Difference between after mean speed and before speed limit (number of sites = 15)

BEFORE SPEED LIMIT	AFTER SPEED LIMIT	
	AVERAGE MEAN SPEED_A - BEFORE SPEED LIMIT	35
	NUMBER OF LANES	2
	45	-7.1
55	-10.5	

Table 46: Difference between after mean speed and after speed limit (number of sites = 15)

BEFORE SPEED LIMIT	AFTER SPEED LIMIT	
	AVERAGE MEAN SPEED_A - AFTER SPEED LIMIT	35
	NUMBER OF LANES	2
	45	2.9
55	9.5	

Table 47: Difference between before 85th percentile speed and before speed limit (number of sites = 14)

BEFORE SPEED LIMIT	AFTER SPEED LIMIT	
	AVERAGE 85 PERCENTILE SPEED_B - BEFORE SPEED LIMIT	35
	NUMBER OF LANES	2
	45	7.5
55	2.9	

Table 48: Difference between after 85th percentile speed and before speed limit (number of sites = 14)

BEFORE SPEED LIMIT	AFTER SPEED LIMIT	
	AVERAGE 85 PERCENTILE SPEED_A - BEFORE SPEED LIMIT	35
	NUMBER OF LANES	2
	45	-0.8
55	-2.7	

Table 49: Difference between after 85th percentile speed and after speed limit (number of sites = 14)

BEFORE SPEED LIMIT	AFTER SPEED LIMIT	
	AVERAGE 85 PERCENTILE SPEED_A - AFTER SPEED LIMIT	35
	NUMBER OF LANES	2
	45	9.3
55	17.3	

- Looking at only the 2-lane sites with before speed limit of 55 mph and 45 mph, respectively, and after speeds of 35 mph, as shown in Table 37 through Table 47, it can be seen that while the before mean speed (46.5 mph) for the 45 mph to 35 mph category was higher than the before speed limit (45 mph), for the 55 mph to 35 mph category, the before mean speed (51.5 mph) was lower than the before speed limit (55 mph).
- For the 45 to 35 mph category, after mean speed (38 mph) was about 3 mph higher than the after speed limit (35 mph). However, for the 55 to 35 mph category, speed compliance is much worse, where after mean speed (44.5) is almost 10 mph higher than the after speed limit.
- Speed reduction (9 mph) is close to the magnitude of the speed limit reduction (10 mph) for the 45 mph to 35 mph category. However, for the 55 mph to 35 mph category, speed reduction is even lower than that for the 45 mph to 35 mph category, about 7 mph, resulting in about 1/3rd of the speed limit reduction (20 mph) after transition. In the case of 85th percentile speeds at only field sites, speed reduction for the 55 mph to 35 mph category is almost a quarter (5.6 mph) of the speed limit reduction (20 mph).
- While the before mean speed is higher than the before speed limit for the 45 mph to 35 mph category by 1.5 mph, the same statistic is lower than the before speed limit by 3.5 mph for the 55 mph to 35 mph category.

Table 50 through Table 62 compare sites for 70 mph to 55 mph, and 65 mph to 55 mph speed transitions.

Table 50: Number of sites based on number of lanes (number of sites = 12)

BEFORE SPEED LIMIT	AFTER SPEED LIMIT	
	NUMBER OF SITES	55
	65	4 (3 field sites and 1 probe site)
	70	8 (7 field sites and 1 probe site)
Grand Total	12	

Table 51: Average before mean speed based on number of lanes (number of sites = 12)

		AFTER SPEED LIMIT
	AVERAGE MEAN SPEED_B	55
BEFORE SPEED LIMIT	65	68.4
	70	69.0
	Grand Total	68.7

Table 52: Average after mean speed based on number of lanes (number of sites = 12)

		AFTER SPEED LIMIT
	AVERAGE MEAN SPEED_A	55
BEFORE SPEED LIMIT	65	64.9
	70	63.5
	Grand Total	64.2

Table 53: Average before 85th percentile speed based on number of lanes (number of sites = 10)

		AFTER SPEED LIMIT
	AVERAGE 85 PERCENTILE SPEED_B	55
BEFORE SPEED LIMIT	65	73.7
	70	75.7
	Grand Total	74.7

Table 54: Average after 85th percentile speed based on number of lanes (number of sites = 10)

		AFTER SPEED LIMIT
	AVERAGE 85 PERCENTILE SPEED_A	55
BEFORE SPEED LIMIT	65	71.7
	70	71.3
	Grand Total	71.5

Table 55: Difference between before-after mean speed reduction (number of sites = 12)

		AFTER SPEED LIMIT
	AVERAGE MEAN SPEED CHANGE_B-A	55
BEFORE SPEED LIMIT	65	3.5
	70	5.5
	Grand Total	4.5

Table 56: Difference between before-after 85th percentile speed reduction (number of sites = 10)

		AFTER SPEED LIMIT
	AVERAGE 85 PERCENTILE SPEED CHANGE_B-A	55
BEFORE SPEED LIMIT	65	2.0
	70	4.4
	Grand Total	3.2

Table 57: Difference between before mean speed and before speed limit (number of sites = 12)

		AFTER SPEED LIMIT
	AVERAGE MEAN SPEED_B - BEFORE SPEED LIMIT	55
BEFORE SPEED LIMIT	65	3.4
	70	-1.0
	Grand Total	1.2

Table 58: Difference between after mean speed and before speed limit (number of sites = 12)

		AFTER SPEED LIMIT
	AVERAGE MEAN SPEED_A - BEFORE SPEED LIMIT	55
BEFORE SPEED LIMIT	65	-0.1
	70	-6.5
	Grand Total	-3.3

Table 59: Difference between after mean speed and after speed limit (number of sites = 12)

		AFTER SPEED LIMIT
	AVERAGE MEAN SPEED_A - AFTER SPEED LIMIT	55
BEFORE SPEED LIMIT	65	9.9
	70	8.5
	Grand Total	9.2

Table 60: Difference between before 85th percentile speed and before speed limit (number of sites = 10)

		AFTER SPEED LIMIT
	AVERAGE 85 PERCENTILE SPEED_B - BEFORE SPEED LIMIT	55
BEFORE SPEED LIMIT	65	8.7
	70	5.7
	Grand Total	7.2

Table 61: Difference between after 85th percentile speed and before speed limit (number of sites = 10)

		AFTER SPEED LIMIT
AVERAGE 85 PERCENTILE SPEED_A - BEFORE SPEED LIMIT		55
BEFORE SPEED LIMIT	65	6.7
	70	1.3
	Grand Total	4.0

Table 62: Difference between after 85th percentile speed and after speed limit (number of sites = 10)

		AFTER SPEED LIMIT
AVERAGE 85 PERCENTILE SPEED_A - AFTER SPEED LIMIT		55
BEFORE SPEED LIMIT	65	16.7
	70	16.3
	Grand Total	16.5

- Looking at sites with before speed limits of 65 mph and 70 mph, respectively, and after speeds of 55 mph, as shown in Table 50 through Table 62, it can be seen that, while the before mean speed (68.4 mph) for the 65 mph to 55 mph category was higher than the before speed limit (65 mph), the same statistic (69.0 mph) for the 70 mph to 55 mph category was slightly lower than the before speed limit (70 mph).
- After speed transition, for both speed transition categories (65 mph to 55 mph, and 70 mph to 55 mph), the 85th percentile after speeds were higher than even the before speed limits. For example, for 65 mph to 55 mph category, 85th percentile after speed was 71.7 mph, and for the 70 mph to 55 mph category, the 85th percentile after speed was 71.3 mph. It is interesting to note that the 85th percentile after the transition was lower in the case of 70 mph to 55 mph transition compared to that for the 65 mph to 55 mph transition.
- For the 65 mph to 55 mph category, the mean speed reduction was only 3.5 mph, much lower compared to the 10 mph reduction in speed limit. Similarly, for the 70 mph to 55 mph category, the mean speed reduction was only 5.5 mph, considerably lower than the 15 mph reduction in speed limits.
- While for the 65 mph to 55 mph category, the before mean speed was higher by 3.4 mph compared to before speed limit, for the 70 mph to 55 mph category, the before mean speed was lower than the before speed limit by 1.0 mph.

Additional data for before-speed limit of 55 mph are shown below from Table 63 through Table 74. Additional statistics are added in Appendix B as well.

Table 63: Average before mean speed based on number of lanes (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE MEAN SPEED_B	2	2	2+
		NUMBER OF LANES	2	2	2+
BEFORE SPEED LIMIT	55	51.5	52.0	54.6	52.7

Table 64: Average after mean speed based on number of lanes (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE MEAN SPEED_A	2	2	2+
		NUMBER OF LANES	2	2	2+
BEFORE SPEED LIMIT	55	44.5	49.9	49.6	48.0

Table 65: Average before 85th percentile speed based on number of lanes (number of sites = 20)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE 85 PERCENTILE SPEED_B	2	2	2+
		NUMBER OF LANES	2	2	2+
BEFORE SPEED LIMIT	55	57.9	58.0	64.2	60.0

Table 66: Average after 85th percentile speed based on number of lanes (number of sites = 20)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE 85 PERCENTILE SPEED_A	2	2	2+
		NUMBER OF LANES	2	2	2+
BEFORE SPEED LIMIT	55	52.3	56.0	58.0	55.4

Table 67: Difference between before-after mean speed reduction (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		NUMBER OF LANES			Grand Total
		2	2	2+	
BEFORE SPEED LIMIT	AVERAGE MEAN SPEED REDUCTION_B-A	7.0	2.1	5.1	4.7
	55				

Table 68: Difference between before-after 85th percentile speed reduction (number of sites = 20)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		NUMBER OF LANES			Grand Total
		2	2	2+	
BEFORE SPEED LIMIT	AVERAGE 85 PERCENTILE SPEED REDUCTION_B-A	5.6	2.0	6.2	4.6
	55				

Table 69: Difference between before mean speed and before speed limit (number of sites = 25)

		AFTER SPEED LIMIT		
		35	45	
		NUMBER OF LANES		
		2	2	2+
BEFORE SPEED LIMIT	AVERAGE MEAN SPEED_B - BEFORE SPEED LIMIT	-3.5	-3.0	-0.4
	55			

Table 70: Difference between after mean speed and before speed limit (number of sites = 25)

		AFTER SPEED LIMIT		
		35	45	
		NUMBER OF LANES		
		2	2	2+
BEFORE SPEED LIMIT	AVERAGE MEAN SPEED_A - BEFORE SPEED LIMIT	-10.5	-5.1	-5.4
	55			

Table 71: Difference between after mean speed and after speed limit (number of sites = 25)

		AFTER SPEED LIMIT		
		AVERAGE MEAN SPEED_A - AFTER SPEED LIMIT	35	45
		NUMBER OF LANES	2	2 2+
BEFORE SPEED LIMIT	55	9.5	4.9	4.6

Table 72: Difference between before 85th percentile speed and before speed limit (number of sites = 20)

		AFTER SPEED LIMIT		
		AVERAGE 85 PERCENTILE SPEED_B - BEFORE SPEED LIMIT	35	45
		NUMBER OF LANES	2	2 2+
BEFORE SPEED LIMIT	55	2.9	3.0	9.2

Table 73: Difference between after 85th percentile speed and before speed limit (number of sites = 20)

		AFTER SPEED LIMIT		
		AVERAGE 85 PERCENTILE SPEED_A - BEFORE SPEED LIMIT	35	45
		NUMBER OF LANES	2	2 2+
BEFORE SPEED LIMIT	55	-2.7	1.0	3.0

Table 74: Difference between after 85th percentile speed and after speed limit (number of sites = 20)

		AFTER SPEED LIMIT		
		AVERAGE 85 PERCENTILE SPEED_A - AFTER SPEED LIMIT	35	45
		NUMBER OF LANES	2	2 2+
BEFORE SPEED LIMIT	55	17.3	11.0	13.0

Following are some overall observations regarding the different speed limit reduction categories:

- Out of the 9 (nine) speed reduction categories, in 5 (five) of the categories, average speeds before transition are lower than before transition speed limits.
- For all the 9 (nine) speed reduction categories, the after transition average speeds are higher than after transition speed limits.
- Based on average speed values, the speed compliance is the worst for
 - 65 mph (before) to 55 mph (after), followed by
 - 55 mph (before) to 35 mph (after), followed by
 - 70 mph (before) to 55 mph (after).
- Based on average speed, speed compliance is the best for
 - 45 mph (before) to 35 mph (after), followed by
 - 70 mph (before) to 50 mph (after) - This group included only 2 (two) sites, followed by
 - 55 mph (before) to 45 mph (after).
- The average speed after transition for sites with
 - 65 mph (before) to 55 mph (after) is almost 10 mph above the after speed limit.
 - 55 mph (before) to 35 mph (after) is 9.5 mph above the after speed limit.
 - 70 mph (before) to 55 mph (after) is 8.5 mph above the after speed limit.
- The average speed after transition for sites with
 - 45 mph (before) to 35 mph (after) is only 2 mph above the after speed limit.
 - 70 mph (before) to 50 mph (after) is only 3.6 mph above the after speed limit, and
 - 55 mph (before) to 45 mph (after) is only 4.7 mph above the after speed limit.
- Among all 37 field sites, the average 85th percentile speed before transition is higher than before transition speed limits.
- Among all 37 field sites, the average 85th percentile speeds after transition are higher than after transition speed limits.
- Based on 85th percentile speed among all 37 field sites, the speed compliance is the worst for
 - 55 mph (before) to 35 mph (after), followed by
 - 65 mph (before) to 55 mph (after), followed by
 - 70 mph (before) to 55 mph (after).
- Based on 85th percentile speed among all 37 field sites, speed compliance is the best for
 - 70 mph (before) to 50 mph (after) (this group includes 2 sites), followed by
 - 50 mph (before) to 35 mph (after), followed by
 - 45 mph (before) to 35 mph (after).
- The average 85th percentile speed after transition for sites with
 - 55 mph (before) to 35 mph (after) is 17.3 mph above the after speed limit.

- 65 mph (before) to 55 mph (after) is 16.7 mph above the after speed limit.
- 70 mph (before) to 55 mph (after) is 16.3 mph above the after speed limit.
- The average 85th percentile speed after transition for sites with
 - 70 mph (before) to 50 mph (after) is 6.8 mph above the after speed limit.
 - 50 mph (before) to 35 mph (after) is 7.9 mph above the after speed limit,
 - 45 mph (before) to 35 mph (after) is 8.2 mph above the after speed limit.
- Daytime average speed is higher than the nighttime average speed for 65 and 70 mph before speed limit both before and after transitions.
- For 50 mph before-transition speed limit, before transition daytime average speed is higher than nighttime average speed, while after transition daytime average speed is lower than nighttime average speed.
- For both before and after transitions, in case of 55 mph before speed limit, the nighttime average speed is higher than the daytime average speed.
- For 45 mph, the nighttime average speed is higher than the daytime average speed only in the before transition.
- The change in the standard deviation of speed after transition was higher during the daytime compared to nighttime.

Table 75 through Table 79 show the number of sites by the number of lanes based on sites classified based on the before speed limit.

**Table 75: Number of sites based on the number of lanes for 45 mph before speed limit
(number of sites = 6)**

BEFORE SPEED LIMIT	AFTER SPEED LIMIT			
	NUMBER OF SITES	35		Grand Total
	NUMBER OF LANES	2	2+	
45	4	2		6

**Table 76: Number of sites based on the number of lanes for 50 mph before speed limit
(number of sites = 2)**

BEFORE SPEED LIMIT	AFTER SPEED LIMIT			
	NUMBER OF SITES	35		Grand Total
	NUMBER OF LANES	2	2+	
50	1*	1*		2

Note: Asterisks () are added to indicate the speed transition categories with only probe sites*

**Table 77: Number of sites based on the number of lanes for 55 mph before speed limit
(number of sites = 25)**

BEFORE SPEED LIMIT	55	AFTER SPEED LIMIT			Grand Total
		NUMBER OF SITES	35	45	
		NUMBER OF LANES	2	2+ 2+	
		11	6	8	25

**Table 78: Number of sites based on the number of lanes for 65 mph before speed limit
(number of sites = 5)**

BEFORE SPEED LIMIT	65	AFTER SPEED LIMIT		Grand Total	
		NUMBER OF SITES	45		55
		NUMBER OF LANES	2+		2+
		1*	4	5	

Note: Asterisks () are added to indicate the speed transition categories with only probe sites*

**Table 79: Number of sites based on the number of lanes for 70 mph before speed limit
(number of sites = 12)**

BEFORE SPEED LIMIT	70	AFTER SPEED LIMIT			Grand Total	
		NUMBER OF SITES	50	55		60
		NUMBER OF LANES	2+	2+		2+
		2*	8	2	12	

Note: Asterisks () are added to indicate the speed transition categories with only probe sites*

Here are some additional observations regarding sites with more than 2 lanes:

- Among 45 mph to 35 mph sites, speed compliance (based on mean speed and the 85th percentile speed) is better for 2+ lane sites compared to 2 lane sites.
- Average standard deviation of speed is higher for sites with speed limit 55 mph (before) compared to 45/50 mph (before speed limit) categories.
- For sites with 45 mph (before) speed limit, the average speed for 2 lane sites is higher compared to sites with 2+ lanes. However, a higher speed reduction was observed for 2+ lanes.

- For sites with 50 mph (before) speed limit, higher speed reduction was observed for 2+ lanes.
- For sites with 55 mph (before) to 45 mph (after), higher speed reduction was observed for 2+ lanes.

As shown in Table 5, for field sites, 4 (four) speed limit transition categories have at least 4 (four) sites as below:

- 45 mph to 35 mph (6 sites),
- 55 mph to 35 mph (10 sites),
- 55 mph to 45 mph (10 sites), and
- 70 mph to 55 mph (7 sites).

Figure 14 through Figure 17 show the difference between the individual vehicle operating speeds and speed limits for these speed limit transition categories. For all these graphs, the X-axis shows the difference between vehicle operating speeds and speed limit, while the Y-axis shows the number of vehicles for the corresponding difference between vehicle operating speeds and speed limits. As can be seen from these graphs, for the first 3 (three) speed transition categories (i.e., 45 mph to 35 mph, 55 mph to 35 mph, and 55 mph to 45 mph), the difference between vehicle operating speeds and speed limits for most vehicles both before and after the transition is between -10 mph to 10 mph. However, for 70 mph to 55 mph speed transition, the number of vehicles for individual difference between vehicle operating speeds and speed limits had multiple peaks (for the 70 to 55 mph speed transition zones, radar was used to collect the speed data, while for most of the other sites, tubes were used). Following some discussion with NCDOT, a decision was made to plot the number of vehicles against 10 mph bins for the difference between vehicle operating speeds and speed limits. As can be seen from Figure 17, the difference between vehicle operating speeds and speed limits for most vehicles fall in the range of 0 to 10 mph.

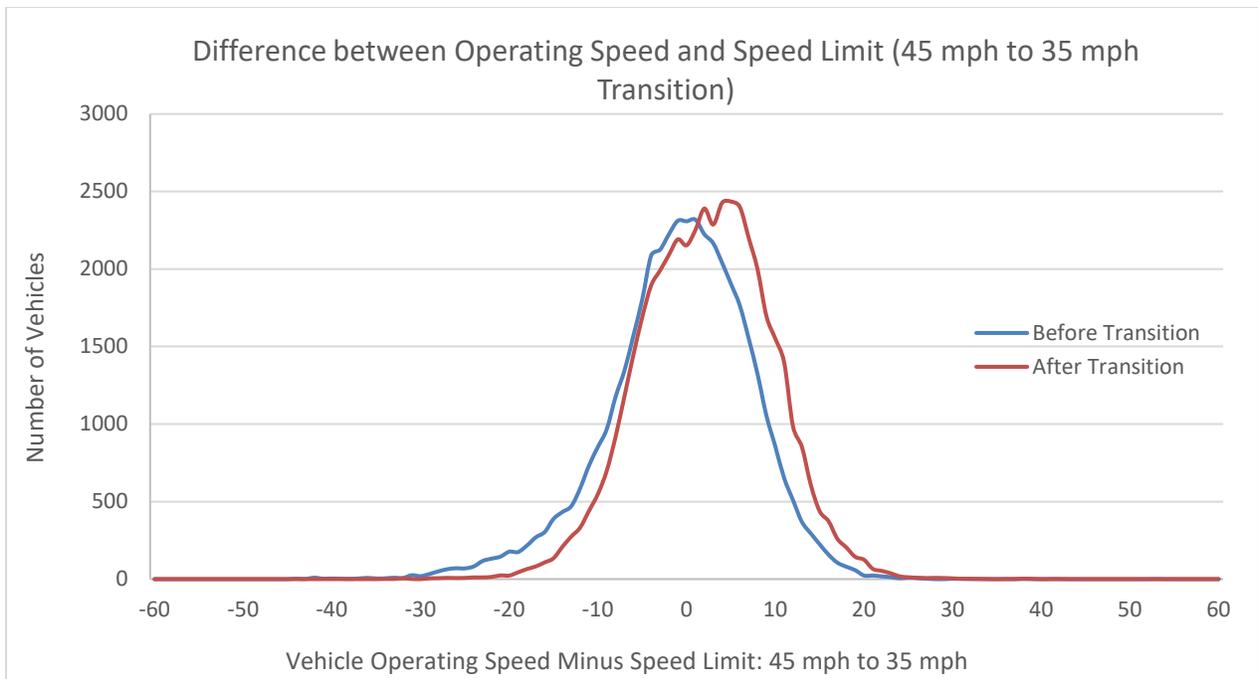


Figure 14: Difference between vehicle operating speed and speed limits for 45 mph to 35 mph transition (number of sites = 6)

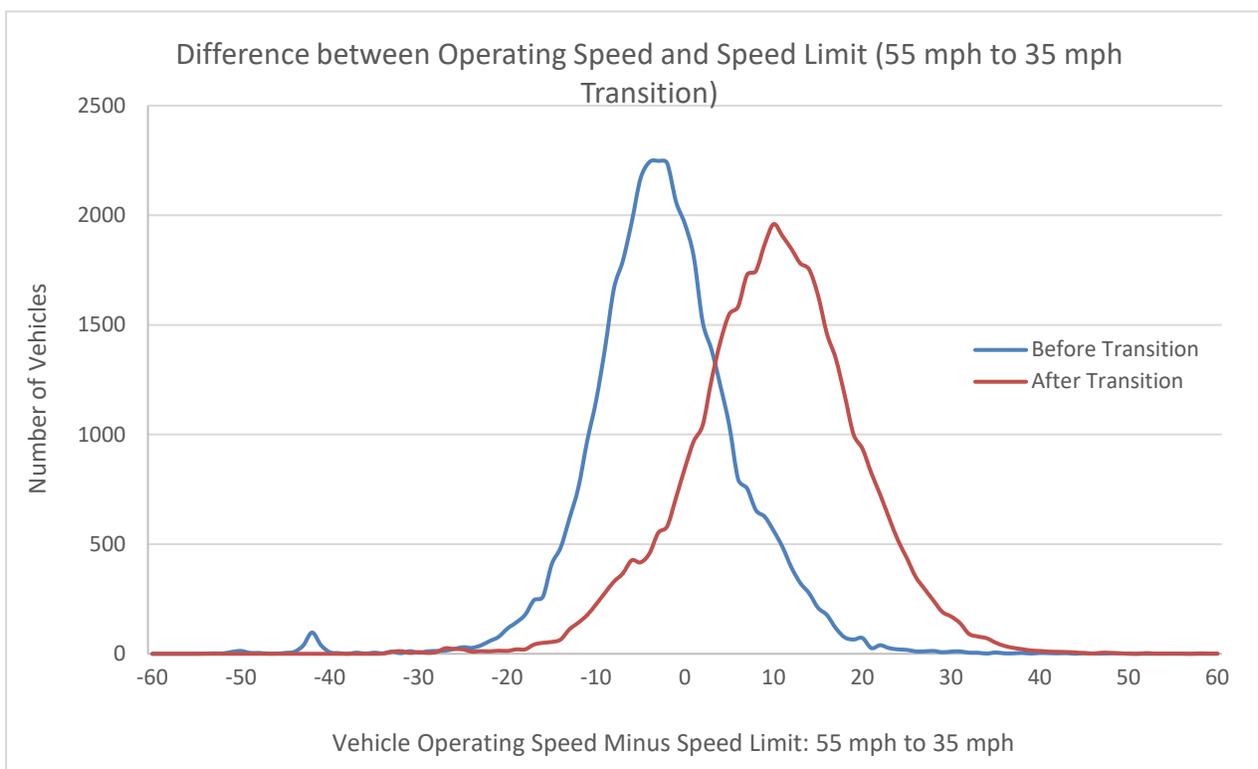


Figure 15: Difference between vehicle operating speed and speed limits for 55 mph to 35 mph transition (number of sites = 10)

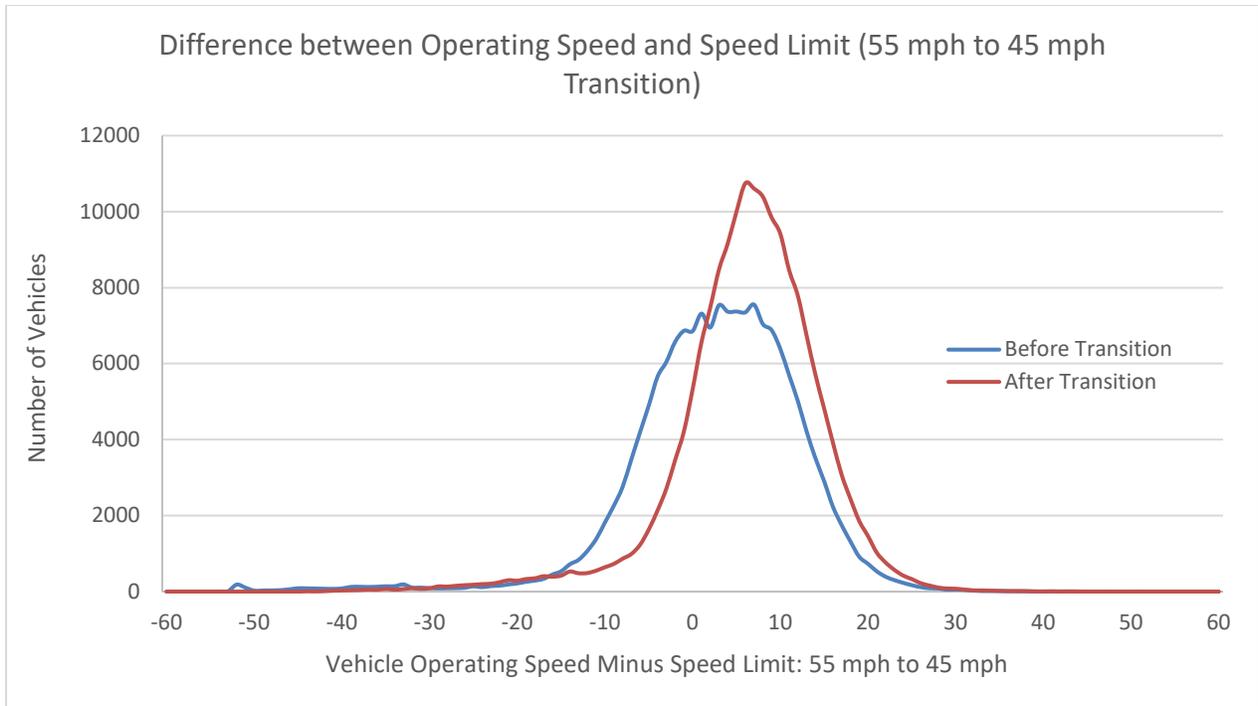


Figure 16: Difference between vehicle operating speed and speed limits for 55 mph to 45 mph transition (number of sites = 10)

There are some differences in the vehicle counts (after removing the 0 mphs) before and after the transitions at the same sites for 55 mph to 45 mph transition as shown in the below table. Quality Counts indicated that for sites with more than 6% difference in the before and after vehicle counts, the difference is because of cross streets, on ramps, or a park between the before and after setups. As shown in Table 80, overall, the total vehicle counts after transition is approximately 6.4 percent greater than that in the before transition for 55 mph to 45 mph category.

Table 80: Number of vehicles before and after speed transitions for speed reduction category of 55 mph to 45 mph

Site Number	Vehicle Counts Before Transition	Vehicle Counts After Transition
Site 4	20,815	28,143
Site 7	57,179	55,315
Site 17	13,560	17,154
Site 85	1,320	1,249
Site 108	19,815	20,829
Site 239	22,714	22,993
Site 278	7,563	7,603
Site 282	5,221	5,255

Site 306	2,381	2,376
Site 321	12,512	12,594
Grand total	163,080	173,511

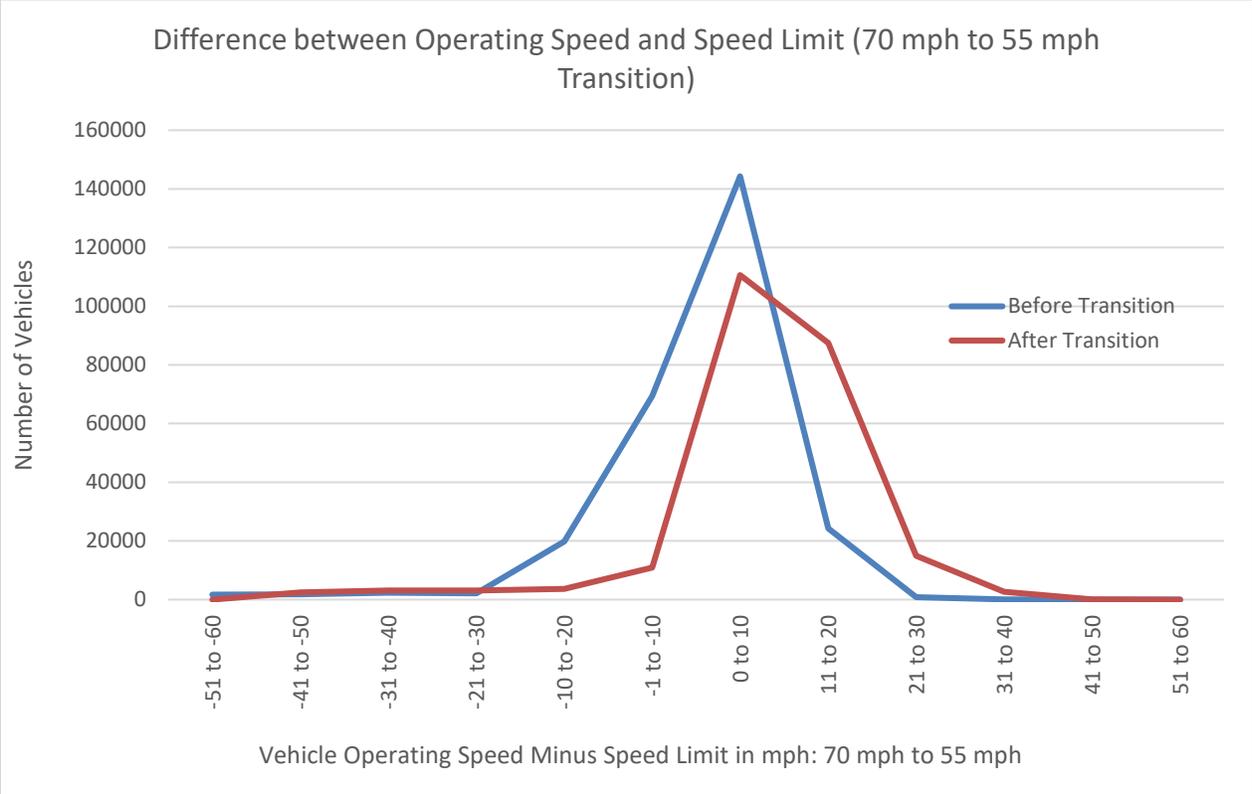


Figure 17: Difference between vehicle operating speed and speed limits for 70 mph to 55 mph transition (number of sites = 7)

Additionally, photographs illustrating land use changes are provided in Figure 18 through Figure 21. As shown in Figure 18, speed limit is seemingly reduced due to increase in mixed development (mix of residential/commercial or residential/industrial). Similarly, Figure 19 shows a land use change to more residential development at the end of zone. Figure 20 and Figure 21 show land use changes to more commercial (with shopping centers, restaurants, banks, gas stations, etc.), and industrial development (i.e., manufacturing, food processing, warehouses), respectively, at the end of the speed transition zones.



Figure 18: Example of more developed land use at the end of zone



Figure 19: Example of more residential developments at the end of speed transition zone



Figure 20: Example of more commercial developments at the end of speed transition zone



Figure 21: Example of more industrial developments at the end of speed transition zone

Additional statistics are provided in Appendix B. Appendix C summarizes the results from regression models that were estimated to investigate the reduction in speed as a function of site characteristics including reduction in speed limit in the transition zone.

7. SUMMARY OF FINDINGS

This study compiled site characteristics data from 338 transition zones in North Carolina. Table 80 shows the speed transition categories of all 338 sites based on the number of sites for each category.

Table 81: Number of sites based on the different speed transition categories for all 338 sites

Before Speed Limit (mph)	After Speed Limit (mph)	Number of Sites
35	20	2
35	25	1
35	45	1
45	35	52
45	40	1
50	35	6
50	40	1
50	45	6
55	35	114
55	40	2
55	45	115
55	50	4
60	45	4
60	55	4
65	45	2
65	55	7
65	60	1
70	45	1
70	50	1
70	55	10
70	60	2
70	65	1
Total		338

From these sites, speed data were compiled at 50 transition zones. The 50 transition zones included sites with one of the following 9 speed transition categories:

- 45 mph to 35 mph (6 sites)
- 50 mph to 35 mph (2 sites)
- 55 mph to 35 mph (11 sites)
- 55 mph to 45 mph (14 sites)
- 65 mph to 45 mph (1 site)
- 65 mph to 55 mph (4 sites)

- 70 mph to 50 mph (2 sites)
- 70 mph to 55 mph (8 sites)
- 70 mph to 60 mph (2 sites)

Among the 50 sites, the difference between the before and after speed limits were 10 mph in 26 sites, 15 mph in 10 sites, and 20 mph in 14 sites.

- In 5 (five) out of 9 (nine) speed reduction categories, the average speeds before transition are lower than the before transition speed limits.
- For all speed reduction categories, the after transition average speeds are higher than after transition speed limits. Similarly, for all 9 (nine) speed reduction categories, the after-transition average 85th percentile speeds are higher than after-transition speed limits.
- Based on average speed, the speed compliance after transition is the worst for
 - 65 mph (before) to 55 mph (after), followed by
 - 55 mph (before) to 35 mph (after), followed by
 - 70 mph (before) to 55 mph (after).
- Based on average speed, speed compliance after transition is the best for
 - 45 mph (before) to 35 mph (after), followed by
 - 70 mph (before) to 50 mph (after), followed by
 - 55 mph (before) to 45 mph (after).
- Based on 85th percentile speed among 37 field sites, the speed compliance after transition is the worst for
 - 55 mph (before) to 35 mph (after), followed by
 - 65 mph (before) to 55 mph (after), followed by
 - 70 mph (before) to 55 mph (after).
- Based on 85th percentile speed among 37 field sites, speed compliance after transition is the best for
 - 70 mph (before) to 50 mph (after), followed by
 - 50 mph (before) to 35 mph (after), followed by
 - 45 mph (before) to 35 mph (after).
- Speed compliance is generally better for roads with more than 2 lanes that are in the lower speed categories.
- The change in the standard deviation after transition is higher at daytime compared to nighttime.
- In 44 out of the 50 sites, the percentage of vehicles exceeding the speed limit is higher after transition compared to before transition.
- The regression models indicated that while sites with wider right shoulders are associated with a larger reduction in mean speed after the transition, changes in land use to more developed areas are associated with a larger reduction in speed after the transition for both mean and 85th percentile speeds.

- Left and right shoulder widths vary from 0 feet to 12 feet. While the average left shoulder width for all sites is 2.6 feet, the average right shoulder width is approximately 4 feet. The different scenarios in relation to the land use change include “more developed at end of zone”, “more commercial at end of zone”, “more industrial at end of zone”, and “more residential at end of zone”. The examples of different land use changes are provided in Figure 18 through Figure 21.

Conclusions and Recommendations

- In terms of the speed compliance, certain speed transition categories seem to be performing better than the other categories. For example, among speed transition categories with at least 4 (four) sites, 45 mph to 35 mph transition, and 55 mph to 45 mph transition are shown to have better speed compliance than other groups.
- Based on the regression models, higher before speed limits are associated with lower speed reductions for both mean and 85th percentile speeds.
- The regression models also show that the divided facilities have larger mean and 85th percentile speed reductions. However, site characteristics are considerably different between divided and undivided facilities. For instance, the majority of undivided sites have 2 lanes (23 out of 29), average AADT approximately of 7,514 vpd, and before speed limit of ≤ 55 mph (includes 45 mph, 50 mph, and 55 mph), after speed limit of ≤ 45 mph for all sites, include SR routes, and do not include interstates. Whereas, for divided sites, all (21 sites) have more than 2 lanes, average AADT is much higher (approximately 32,467 vpd), before speed limit is ≥ 55 mph, after speed limit is 45 mph or higher, and include interstates.
- Again, from the regression models, land use change to more developed areas is associated with larger speed reductions. This indicates that the drivers are more inclined to reduce speeds when they observe land use changes to denser areas due to which the speed limit reduction might have taken place.

8. REFERENCES

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APPENDIX A. SITE CHARACTERISTICS

Site number: 4

Speed data source: Field

Speed data collection date and time range (before after combined): 08/09/2022 12:00:00 AM
to 08/10/2022 11:59:00 PM

Roadway name: Freeman Mill Rd

Route:

County: Guilford

Speed limit sign -Latitude: 36.038475

Speed limit sign – Longitude: -79.818223

Length (miles): 0.24

Left shoulder width (feet): 9

Right shoulder width (feet): 12

Lane width (feet): 12

Number of lanes in both directions: 6

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 35,000

Advance warning sign: Reduce Speed Ahead

Presence of horizontal curve: Yes

Presence of vertical curve and type: Yes (crest)

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: Traffic signal downstream

Area type: Urban

Land use: Interchange

Land use change: No

Before speed limit (mph): 55

After speed limit (mph): 45

Before mean speed (mph): 64.9

After mean speed (mph): 55.7

Before 85th percentile speed (mph): 71.0

After 85th percentile speed (mph): 62.0

Before night mean speed (mph): 64.1

After night mean speed (mph): 53.9

Before night 85th percentile speed (mph): 72.0

After night 85th percentile speed (mph): 61.0

Before day mean speed (mph): 64.7

After day mean speed (mph): 56.1

Before day 85th percentile speed (mph): 70.0

After day 85th percentile speed (mph): 62.0

Percent of vehicles exceeding speed limit in the before period (mph): 95.2

Percent of vehicles exceeding speed limit in the after period (mph): 96.2

Data collection method: Tubes



Figure 22: Site 4 (before)



Figure 23: Site 4 (After)



Figure 24: Speed sign at Site 4 in June 2022



Figure 25: Advance warning sign at Site 4

Site number: 5

Speed data source: Field

Speed data collection date and time range (before after combined): 08/17/2022 12:00:00 AM
to 08/18/2022 11:59:00 PM

Roadway name: US 1-15-501

Route: US

County: Lee

Speed limit sign -Latitude: 35.455222

Speed limit sign – Longitude: -79.211337

Length (miles): 0.19

Left shoulder width (feet): 5

Right shoulder width (feet): 5

Lane width (feet): 11

Number of lanes in both directions: 4

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 36,500

Advance warning sign: Speed Limit 55 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Woodland

Land use change: No

Before speed limit (mph): 70

After speed limit (mph): 55

Before mean speed (mph): 66.4

After mean speed (mph): 63.1

Before 85th percentile speed (mph): 73.0

After 85th percentile speed (mph): 71.0

Before night mean speed (mph): 64.3

After night mean speed (mph): 60.0

Before night 85th percentile speed (mph): 72.0

After night 85th percentile speed (mph): 65.0

Before day mean speed (mph): 66.3

After day mean speed (mph): 63.1

Before day 85th percentile speed (mph): 73.0

After day 85th percentile speed (mph): 71.0

Percent of vehicles exceeding speed limit in the before period (mph): 35.4

Percent of vehicles exceeding speed limit in the after period (mph): 91.6

Data collection method: Radar



Figure 26. Site 5 (before)



Figure 27: Site 5 (after)



Figure 28: Speed sign at Site 5 in September 2022



Figure 29: Advance warning sign at Site 5

Site number: 7

Speed data source: Field

Speed data collection date and time range (before after combined): 08/03/2022 12:00:00 AM
to 08/04/2022 11:59:00 PM

Roadway name: NC 16 (Brookshire Blvd)

Route: NC

County: Mecklenburg

Speed limit sign -Latitude: 35.258334

Speed limit sign – Longitude: -80.871641

Length (miles): 0.16

Left shoulder width (feet): 0

Right shoulder width (feet): 12

Lane width (feet): 12

Number of lanes in both directions: 4

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 59,000

Advance warning sign: Speed Limit 45 ↑

Presence of horizontal curve: Yes

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: Traffic signal downstream

Area type: Urban

Land use: Woodland

Land use change: Yes - more developed at end of zone

Before speed limit (mph): 55

After speed limit (mph): 45

Before mean speed (mph): 61.8

After mean speed (mph): 51.3

Before 85th percentile speed (mph): 69.0

After 85th percentile speed (mph): 60.0

Before night mean speed (mph): 63.6

After night mean speed (mph): 53.9

Before night 85th percentile speed (mph): 70.0

After night 85th percentile speed (mph): 61.0

Before day mean speed (mph): 62.2

After day mean speed (mph): 50.6
Before day 85th percentile speed (mph): 69.0
After day 85th percentile speed (mph): 59.0
Percent of vehicles exceeding speed limit in the before period (mph): 88.5
Percent of vehicles exceeding speed limit in the after period (mph): 80.7
Data collection method: Tubes



Figure 30: Site 7 (before)



Figure 31: Site 7 (after)



Figure 32: Speed sign at Site 7 in November 2022

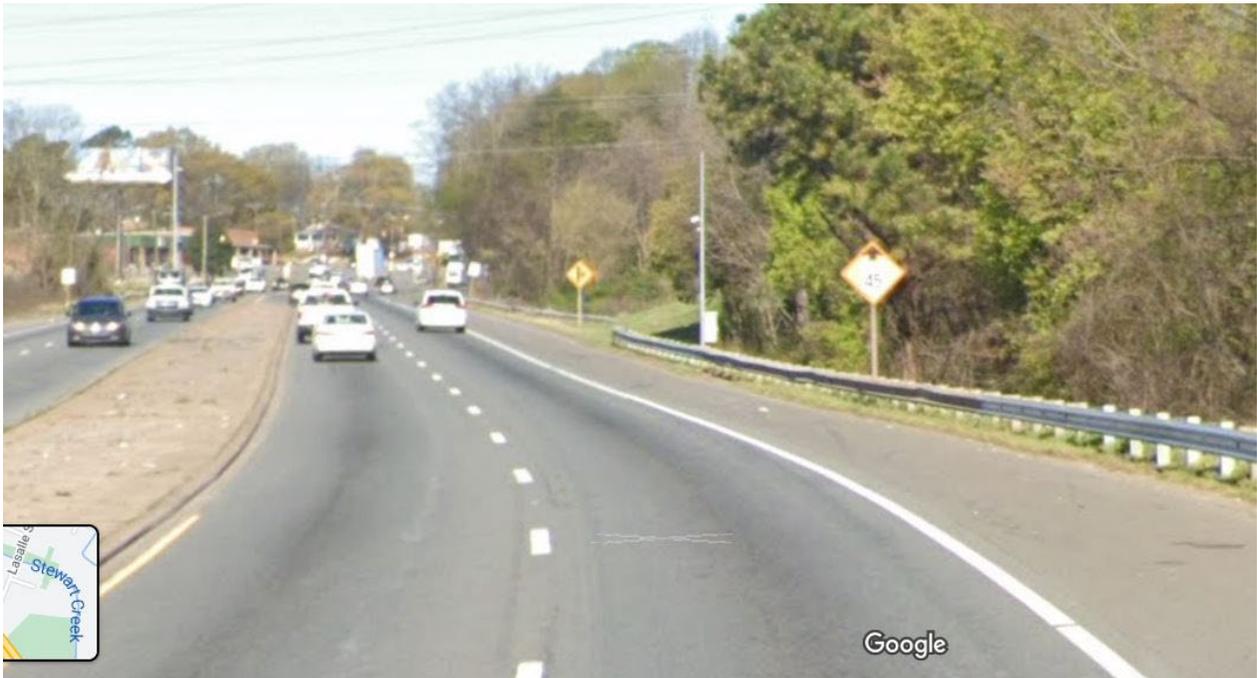


Figure 33: Advance warning sign at Site 7

Site number: 8

Speed data source: Field

Speed data collection date and time range (before after combined): 09/13/2022 12:00:00 AM
to 09/14/2022 11:59:00 PM

Roadway name: I 40 / N College Rd

Route: I

County: New Hanover

Speed limit sign -Latitude: 34.286676

Speed limit sign – Longitude: -77.867007

Length (miles): 0.26

Left shoulder width (feet): 10

Right shoulder width (feet): 10

Lane width (feet): 12

Number of lanes in both directions: 4

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 35,000

Advance warning sign: Speed Limit 55 ↑

Presence of horizontal curve: Yes

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Urban

Land use: Woodland

Land use change: No

Before speed limit (mph): 70

After speed limit (mph): 55

Before mean speed (mph): 68.2

After mean speed (mph): 64.3

Before 85th percentile speed (mph): 74.0

After 85th percentile speed (mph): 73.0

Before night mean speed (mph): 69.9

After night mean speed (mph): 66.3

Before night 85th percentile speed (mph): 74.0

After night 85th percentile speed (mph): 73.0

Before day mean speed (mph): 70.0

After day mean speed (mph): 66.6
Before day 85th percentile speed (mph): 74.0
After day 85th percentile speed (mph): 74.0
Percent of vehicles exceeding speed limit in the before period (mph): 63.6
Percent of vehicles exceeding speed limit in the after period (mph): 90.2
Data collection method: Radar



Figure 34: Speed sign at Site 8 in July 2022



Figure 35: Advance warning sign at Site 8

Site number: 9

Speed data source: Probe

Speed data collection date and time range (before after combined): 08/16/2022 12:00:00 AM
to 08/18/2022 11:55:00 PM

Roadway name: US 17 Bypass / US 17

Route: US

County: Pasquotank

Speed limit sign -Latitude: 36.249944

Speed limit sign – Longitude: -76.318554

Length (miles): 0.23

Left shoulder width (feet): 0

Right shoulder width (feet): 12

Lane width (feet): 11

Number of lanes in both directions: 4

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 9,400

Advance warning sign: Speed Limit 55 ↑

Presence of horizontal curve: Yes

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Fields

Land use change: No

Before speed limit (mph): 70

After speed limit (mph): 55

Before mean speed (mph): 67.2

After mean speed (mph): 66.5

Before 85th percentile speed (mph): 70.0

After 85th percentile speed (mph): 69.6

Before night mean speed (mph): 65.0

After night mean speed (mph): 64.7

Before night 85th percentile speed (mph): 67.0

After night 85th percentile speed (mph): 67.0

Before day mean speed (mph): 68.6

After day mean speed (mph): 67.6

Before day 85th percentile speed (mph): 70.4

After day 85th percentile speed (mph): 70.0

Percent of vehicles exceeding speed limit in the before period (mph): 13.8

Percent of vehicles exceeding speed limit in the after period (mph): 100.0



Figure 36: Speed sign at Site 9 in August 2022



Figure 37: Advance warning sign at Site 9

Site number: 11

Speed data source: Probe

Speed data collection date and time range (before after combined): 08/16/2022 12:00:00 AM
to 08/18/2022 11:55:00 PM

Roadway name: US 64

Route: US

County: Washington

Speed limit sign -Latitude: 35.87194

Speed limit sign – Longitude: -76.677824

Length (miles): 0.27

Left shoulder width (feet): 5

Right shoulder width (feet): 4

Lane width (feet): 12

Number of lanes in both directions: 4

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 5,500

Advance warning sign: Reduce Speed Ahead

Presence of horizontal curve: Yes

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Woodland

Land use change: No

Before speed limit (mph): 70

After speed limit (mph): 50

Before mean speed (mph): 68.2

After mean speed (mph): 61.6

Before 85th percentile speed (mph): 70.7

After 85th percentile speed (mph): 64.4

Before night mean speed (mph): 66.8

After night mean speed (mph): 61.1

Before night 85th percentile speed (mph): 68.0

After night 85th percentile speed (mph): 62.0

Before day mean speed (mph): 69.3

After day mean speed (mph): 61.8

Before day 85th percentile speed (mph): 71.3

After day 85th percentile speed (mph): 64.8

Percent of vehicles exceeding speed limit in the before period (mph): 23.1

Percent of vehicles exceeding speed limit in the after period (mph): 98.7



Figure 38: Speed sign at Site 11 in July 2022



Figure 39: Advance warning sign at Site 11

Site number: 12

Speed data source: Probe

Speed data collection date and time range (before after combined): 08/16/2022 12:00:00 AM
to 08/18/2022 11:55:00 PM

Roadway name: I 795

Route: I

County: Wayne

Speed limit sign -Latitude: 35.396561

Speed limit sign – Longitude: -78.009405

Length (miles): 0.25

Left shoulder width (feet): 4

Right shoulder width (feet): 10

Lane width (feet): 12

Number of lanes in both directions: 4

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 16,000

Advance warning sign: Speed Limit 50 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Urban

Land use: Interchange

Land use change: No

Before speed limit (mph): 70

After speed limit (mph): 50

Before mean speed (mph): 69.8

After mean speed (mph): 45.5

Before 85th percentile speed (mph): 72.8

After 85th percentile speed (mph): 49.2

Before night mean speed (mph): 67.0

After night mean speed (mph): 46.0

Before night 85th percentile speed (mph): 70.4

After night 85th percentile speed (mph): 50.9

Before day mean speed (mph): 71.6

After day mean speed (mph): 44.8
Before day 85th percentile speed (mph): 73.2
After day 85th percentile speed (mph): 47.9
Percent of vehicles exceeding speed limit in the before period (mph): 56.5
Percent of vehicles exceeding speed limit in the after period (mph): 11.2



Figure 40: Speed sign at Site 12 in July 2022



Figure 41: Advance warning sign at Site 12

Site number: 15

Speed data source: Field

Speed data collection date and time range (before after combined): 08/23/2022 12:00:00 AM
to 08/24/2022 11:59:00 PM

Roadway name: I 87 / US 64 Bypass

Route: I

County: Wake

Speed limit sign -Latitude: 35.778391

Speed limit sign – Longitude: -78.56244

Length (miles): 0.54

Left shoulder width (feet): 12

Right shoulder width (feet): 12

Lane width (feet): 12

Number of lanes in both directions: 8

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 90,500

Advance warning sign: Speed Limit 55 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: Yes, sag

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Urban

Land use: Interchange

Land use change: No

Before speed limit (mph): 70

After speed limit (mph): 55

Before mean speed (mph): 69.7

After mean speed (mph): 66.0

Before 85th percentile speed (mph): 80.0

After 85th percentile speed (mph): 75.0

Before night mean speed (mph): 72.2

After night mean speed (mph): 69.6

Before night 85th percentile speed (mph): 80.0

After night 85th percentile speed (mph): 76.0

Before day mean speed (mph): 67.9

After day mean speed (mph): 63.6

Before day 85th percentile speed (mph): 80.0

After day 85th percentile speed (mph): 74.0

Percent of vehicles exceeding speed limit in the before period (mph): 60.8

Percent of vehicles exceeding speed limit in the after period (mph): 88.8

Data collection method: Radar



Figure 42: Site 15 (before)



Figure 43: Site 15 (after)



Figure 44: Speed sign at Site 15 in July 2022



Figure 45: Advance warning sign at Site 15

Site number: 17

Speed data source: Field

Speed data collection date and time range (before after combined): 08/02/2022 12:00:00 AM
to 08/03/2022 11:59:00 PM

Roadway name: SR 1613 (Davis Dr)

Route: SR

County: Wake

Speed limit sign -Latitude: 35.841728

Speed limit sign – Longitude: -78.854647

Length (miles): 0.32

Left shoulder width (feet): 4

Right shoulder width (feet): 8

Lane width (feet): 12

Number of lanes in both directions: 4

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 23,000

Advance warning sign: Speed Limit 45 ↑

Presence of horizontal curve: Yes

Presence of vertical curve and type: No

Presence of curb and gutter: Yes (at beginning of zone)

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: Traffic signal downstream (> 500 ft)

Area type: Urban

Land use: Woodland

Land use change: No

Before speed limit (mph): 55

After speed limit (mph): 45

Before mean speed (mph): 56.4

After mean speed (mph): 49.6

Before 85th percentile speed (mph): 62.0

After 85th percentile speed (mph): 56.0

Before night mean speed (mph): 56.1

After night mean speed (mph): 51.4

Before night 85th percentile speed (mph): 62.0

After night 85th percentile speed (mph): 58.0

Before day mean speed (mph): 56.6

After day mean speed (mph): 50.3

Before day 85th percentile speed (mph): 62.0

After day 85th percentile speed (mph): 56.0

Percent of vehicles exceeding speed limit in the before period (mph): 58.0

Percent of vehicles exceeding speed limit in the after period (mph): 77.5

Data collection method: Tubes



Figure 46: Site 17 (before)



Figure 47: Site 17 (after)



Figure 48: Speed sign at Site 17 in July 2022



Figure 49: Advance warning sign at Site 17

Site number: 18

Speed data source: Probe

Speed data collection date and time range (before after combined): 08/16/2022 12:00:00 AM
to 08/18/2022 11:55:00 PM

Roadway name: US 70 / Glenwood Avenue

Route: US

County: Wake

Speed limit sign -Latitude: 35.897791

Speed limit sign – Longitude: -78.76072

Length (miles): 0.11

Left shoulder width (feet): 3

Right shoulder width (feet): 0

Lane width (feet): 12

Number of lanes in both directions: 5

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 41,000

Advance warning sign: Speed Limit 45 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: Yes, sag

Presence of curb and gutter: Yes

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: Traffic signal upstream

Area type: Urban

Land use: Commercial

Land use change: No

Before speed limit (mph): 55

After speed limit (mph): 45

Before mean speed (mph): 53.2

After mean speed (mph): 47.9

Before 85th percentile speed (mph): 59.4

After 85th percentile speed (mph): 52.0

Before night mean speed (mph): 47.4

After night mean speed (mph): 47.1

Before night 85th percentile speed (mph): 55.2

After night 85th percentile speed (mph): 51.0

Before day mean speed (mph): 56.9

After day mean speed (mph): 48.3

Before day 85th percentile speed (mph): 59.8

After day 85th percentile speed (mph): 51.8

Percent of vehicles exceeding speed limit in the before period (mph): 50.7

Percent of vehicles exceeding speed limit in the after period (mph): 82.1



Figure 50: Speed sign at Site 18 in June 2022

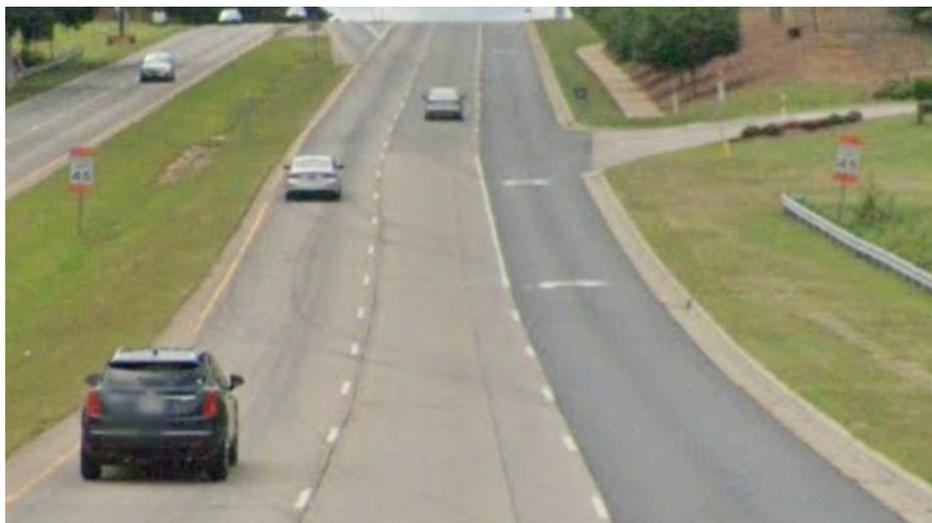


Figure 51: Advance warning sign at Site 18

Site number: 29

Speed data source: Field

Speed data collection date and time range (before after combined): 08/16/2022 12:00:00 AM
to 08/17/2022 11:59:00 PM

Roadway name: NC 11/42

Route: NC

County: Martin

Speed limit sign -Latitude: 35.967708

Speed limit sign – Longitude: -77.299405

Length (miles): 0.09

Left shoulder width (feet): 2

Right shoulder width (feet): 2

Lane width (feet): 12

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 4,400

Advance warning sign: Speed Limit 35 ↑

Presence of horizontal curve: Yes

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: Traffic signal downstream

Area type: Rural

Land use: Fields

Land use change: Yes - more developed at end of zone

Before speed limit (mph): 55

After speed limit (mph): 35

Before mean speed (mph): 61.6

After mean speed (mph): 55.6

Before 85th percentile speed (mph): 69.0

After 85th percentile speed (mph): 63.0

Before night mean speed (mph): 61.1

After night mean speed (mph): 55.0

Before night 85th percentile speed (mph): 71.0

After night 85th percentile speed (mph): 63.0

Before day mean speed (mph): 60.8

After day mean speed (mph): 55.2

Before day 85th percentile speed (mph): 68.0

After day 85th percentile speed (mph): 63.0

Percent of vehicles exceeding speed limit in the before period (mph): 88.1

Percent of vehicles exceeding speed limit in the after period (mph): 98.6

Data collection method: Tubes



Figure 52: Site 29 (before)



Figure 53: Site 29 (after)



Figure 54: Speed sign at Site 29 in June 2023



Figure 55: Advance warning sign at Site 29

Site number: 37

Speed data source: Probe

Speed data collection date and time range (before after combined): 08/16/2022 12:00:00 AM
to 08/18/2022 11:55:00 PM

Roadway name: US 74

Route: US

County: Union

Speed limit sign -Latitude: 34.98448

Speed limit sign – Longitude: -80.397261

Length (miles): 0.4

Left shoulder width (feet): 4

Right shoulder width (feet): 12

Lane width (feet): 12

Number of lanes in both directions: 6

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 20,000

Advance warning sign: Speed Limit 45 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: Yes, sag

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: Traffic signal downstream

Area type: Rural

Land use: Fields

Land use change: Yes - more industrial at end of zone

Before speed limit (mph): 65

After speed limit (mph): 45

Before mean speed (mph): 65.3

After mean speed (mph): 52.6

Before 85th percentile speed (mph): 68.4

After 85th percentile speed (mph): 56.2

Before night mean speed (mph): 62.2

After night mean speed (mph): 51.6

Before night 85th percentile speed (mph): 65.7

After night 85th percentile speed (mph): 55.0

Before day mean speed (mph): 67.2

After day mean speed (mph): 52.8

Before day 85th percentile speed (mph): 68.8

After day 85th percentile speed (mph): 56.6

Percent of vehicles exceeding speed limit in the before period (mph): 62.0

Percent of vehicles exceeding speed limit in the after period (mph): 95.3



Figure 56: Speed sign at Site 37 in December 2021



Figure 57: Advance warning sign at Site 37

Site number: 38

Speed data source: Field

Speed data collection date and time range (before after combined): 08/02/2022 12:00:00 AM
to 08/03/2022 11:59:00 PM

Roadway name: US 52

Route: US

County: Stanly

Speed limit sign -Latitude: 35.20993

Speed limit sign – Longitude: -80.112082

Length (miles): 0.12

Left shoulder width (feet): 1

Right shoulder width (feet): 1

Lane width (feet): 10

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 3,500

Advance warning sign: Speed Limit 35 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Fields

Land use change: Yes - more developed at end of zone

Before speed limit (mph): 55

After speed limit (mph): 35

Before mean speed (mph): 50.7

After mean speed (mph): 44.7

Before 85th percentile speed (mph): 57.0

After 85th percentile speed (mph): 52.0

Before night mean speed (mph): 52.5

After night mean speed (mph): 46.8

Before night 85th percentile speed (mph): 59.7

After night 85th percentile speed (mph): 56.0

Before day mean speed (mph): 50.0

After day mean speed (mph): 44.4

Before day 85th percentile speed (mph): 56.0

After day 85th percentile speed (mph): 52.0

Percent of vehicles exceeding speed limit in the before period (mph): 22.1

Percent of vehicles exceeding speed limit in the after period (mph): 90.2

Data collection method: Tubes



Figure 58: Speed sign at Site 38 in July 2022



Figure 59: Advance warning sign at Site 38

Site number: 39

Speed data source: Field

Speed data collection date and time range (before after combined): 08/16/2022 12:00:00 AM
to 08/17/2022 11:59:00 PM

Roadway name: NC 62

Route: NC

County: Caswell

Speed limit sign -Latitude: 36.398862

Speed limit sign – Longitude: -79.329364

Length (miles): 0.12

Left shoulder width (feet): 1

Right shoulder width (feet): 1

Lane width (feet): 10

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 2,400

Advance warning sign: Speed Limit 35 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: Yes, crest

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Residential

Land use change: Yes - more developed at end of zone

Before speed limit (mph): 55

After speed limit (mph): 35

Before mean speed (mph): 51.5

After mean speed (mph): 44.6

Before 85th percentile speed (mph): 57.0

After 85th percentile speed (mph): 52.0

Before night mean speed (mph): 52.2

After night mean speed (mph): 46.1

Before night 85th percentile speed (mph): 58.0

After night 85th percentile speed (mph): 53.0

Before day mean speed (mph): 50.7

After day mean speed (mph): 43.9

Before day 85th percentile speed (mph): 57.0

After day 85th percentile speed (mph): 51.0

Percent of vehicles exceeding speed limit in the before period (mph): 24.8

Percent of vehicles exceeding speed limit in the after period (mph): 92.3

Data collection method: Tubes



Figure 60: Site 39 (before)



Figure 61: Site 39 (after)

Despite the school zone, the after transition mean speed was still approximately 10 mph higher than the after-transition speed limit.



Figure 62: Speed sign at Site 39 in March 2023



Figure 63: Advance warning sign at Site 39

Site number: 41

Speed data source: Field

Speed data collection date and time range (before after combined): 08/09/2022 12:00:00 AM
to 08/10/2022 11:59:00 PM

Roadway name: US 221

Route: US

County: McDowell

Speed limit sign -Latitude: 35.661084

Speed limit sign – Longitude: -81.97609

Length (miles): 0.16

Left shoulder width (feet): 1

Right shoulder width (feet): 1

Lane width (feet): 12

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 6,800

Advance warning sign: Speed Limit 35 ↑

Presence of horizontal curve: Yes

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: Traffic signal downstream

Area type: Rural

Land use: Woodland

Land use change: No

Before speed limit (mph): 55

After speed limit (mph): 35

Before mean speed (mph): 51.0

After mean speed (mph): 45.6

Before 85th percentile speed (mph): 56.0

After 85th percentile speed (mph): 52.0

Before night mean speed (mph): 52.7

After night mean speed (mph): 47.1

Before night 85th percentile speed (mph): 58.0

After night 85th percentile speed (mph): 53.0

Before day mean speed (mph): 50.7

After day mean speed (mph): 45.2
Before day 85th percentile speed (mph): 56.0
After day 85th percentile speed (mph): 51.0
Percent of vehicles exceeding speed limit in the before period (mph): 19.3
Percent of vehicles exceeding speed limit in the after period (mph): 95.0
Data collection method: Tubes



Figure 64: Site 41 (before)



Figure 65: Site 41 (after)



Figure 66: Speed sign at Site 41 in June 2023



Figure 67: Advance warning sign at Site 41

Site number: 48

Speed data source: Field

Speed data collection date and time range (before after combined): 09/28/2022 12:00:00 AM
to 09/29/2022 11:59:00 PM

Roadway name: US 17/NC 140

Route: US/NC

County: New Hanover

Speed limit sign -Latitude: 34.305001

Speed limit sign – Longitude: -77.786501

Length (miles): 0.21

Left shoulder width (feet): 4

Right shoulder width (feet): 10

Lane width (feet): 12

Number of lanes in both directions: 4

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 25,000

Advance warning sign: Speed Limit 55 ↑

Presence of horizontal curve: Yes

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Interchange

Land use change: Yes - more developed at end of zone

Before speed limit (mph): 70

After speed limit (mph): 55

Before mean speed (mph): 68.3

After mean speed (mph): 63.2

Before 85th percentile speed (mph): 73.0

After 85th percentile speed (mph): 71.0

Before night mean speed (mph): 66.9

After night mean speed (mph): 61.4

Before night 85th percentile speed (mph): 73.0

After night 85th percentile speed (mph): 70.0

Before day mean speed (mph): 68.4

After day mean speed (mph): 63.4
Before day 85th percentile speed (mph): 73.0
After day 85th percentile speed (mph): 71.0
Percent of vehicles exceeding speed limit in the before period (mph): 48.3
Percent of vehicles exceeding speed limit in the after period (mph): 92.0
Data collection method: Radar



Figure 68: Speed sign at Site 48 in August 2022



Figure 69: Advance warning sign at Site 48

Site number: 51

Speed data source: Probe

Speed data collection date and time range (before after combined): 08/16/2022 12:00:00 AM
to 08/18/2022 11:55:00 PM

Roadway name: NC 119

Route: NC

County: Alamance

Speed limit sign -Latitude: 36.117818

Speed limit sign – Longitude: -79.27248

Length (miles): 0.11

Left shoulder width (feet): 1

Right shoulder width (feet): 1

Lane width (feet): 10

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 7,200

Advance warning sign: Speed Limit 35 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: Yes, sag

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Woodland

Land use change: No

Before speed limit (mph): 50

After speed limit (mph): 35

Before mean speed (mph): 42.2

After mean speed (mph): 39.0

Before 85th percentile speed (mph): 44.9

After 85th percentile speed (mph): 41.0

Before night mean speed (mph): 41.9

After night mean speed (mph): 39.7

Before night 85th percentile speed (mph): 42.5

After night 85th percentile speed (mph): 42.0

Before day mean speed (mph): 42.3

After day mean speed (mph): 38.1

Before day 85th percentile speed (mph): 45.0

After day 85th percentile speed (mph): 40.5

Percent of vehicles exceeding speed limit in the before period (mph): 0.2

Percent of vehicles exceeding speed limit in the after period (mph): 92.7



Figure 70: Speed sign at Site 51 in March 2023



Figure 71: Advance warning sign at Site 51

Site number: 58

Speed data source: Field

Speed data collection date and time range (before after combined): 08/03/2022 12:00:00 AM
to 08/04/2022 11:59:00 PM

Roadway name: SR 1008 (Reepsville Rd)

Route: SR

County: Lincoln

Speed limit sign -Latitude: 35.478768

Speed limit sign – Longitude: -81.277058

Length (miles): 0.18

Left shoulder width (feet): 0

Right shoulder width (feet): 0

Lane width (feet): 10

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 4,800

Advance warning sign: Speed Limit 35 ↑

Presence of horizontal curve: Yes

Presence of vertical curve and type: Yes, crest

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Commercial

Land use change: Yes - more residential at end of zone

Before speed limit (mph): 55

After speed limit (mph): 35

Before mean speed (mph): 50.5

After mean speed (mph): 44.5

Before 85th percentile speed (mph): 56.0

After 85th percentile speed (mph): 51.0

Before night mean speed (mph): 53.3

After night mean speed (mph): 45.8

Before night 85th percentile speed (mph): 59.0

After night 85th percentile speed (mph): 53.0

Before day mean speed (mph): 49.2

After day mean speed (mph): 44.0

Before day 85th percentile speed (mph): 55.0

After day 85th percentile speed (mph): 50.0

Percent of vehicles exceeding speed limit in the before period (mph): 19.8

Percent of vehicles exceeding speed limit in the after period (mph): 93.0

Data collection method: Tubes



Figure 72: Site 58 (before)



Figure 73: Site 58 (after)



Figure 74: Speed sign at Site 58 in June 2021



Figure 75: Advance warning sign at Site 58

Site number: 59

Speed data source: Probe

Speed data collection date and time range (before after combined): 08/16/2022 12:00:00 AM
to 08/18/2022 11:55:00 PM

Roadway name: US 601

Route: US

County: Yadkin

Speed limit sign -Latitude: 36.112953

Speed limit sign – Longitude: -80.659057

Length (miles): 0.31

Left shoulder width (feet): 2

Right shoulder width (feet): 2

Lane width (feet): 12

Number of lanes in both directions: 3

Presence of two way left turn lane: Yes

Divided facility: No

AADT (vehicles per day): 9,000

Advance warning sign: Reduce Speed Ahead

Presence of horizontal curve: No

Presence of vertical curve and type: Yes, crest

Presence of curb and gutter: Yes

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Residential

Land use change: Yes - more developed at end of zone

Before speed limit (mph): 50

After speed limit (mph): 35

Before mean speed (mph): 51.5

After mean speed (mph): 42.3

Before 85th percentile speed (mph): 54.1

After 85th percentile speed (mph): 44.7

Before night mean speed (mph): 50.0

After night mean speed (mph): 43.4

Before night 85th percentile speed (mph): 51.9

After night 85th percentile speed (mph): 45.9

Before day mean speed (mph): 52.2

After day mean speed (mph): 41.2

Before day 85th percentile speed (mph): 54.5

After day 85th percentile speed (mph): 43.5

Percent of vehicles exceeding speed limit in the before period (mph): 64.8

Percent of vehicles exceeding speed limit in the after period (mph): 98.6



Figure 76: Speed sign at Site 59 in August 2022



Figure 77: Advance warning sign at Site 59

Site number: 71

Speed data source: Field

Speed data collection date and time range (before after combined): 08/16/2022 12:00:00 AM
to 08/17/2022 11:59:00 PM

Roadway name: NC 41

Route: NC

County: Robeson

Speed limit sign -Latitude: 34.515356

Speed limit sign – Longitude: -79.107339

Length (miles): 0.2

Left shoulder width (feet): 2

Right shoulder width (feet): 2

Lane width (feet): 10

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 8,400

Advance warning sign: Speed Limit 35 ↑

Presence of horizontal curve: Yes

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Commercial

Land use change: Yes - more commercial at end of zone

Before speed limit (mph): 55

After speed limit (mph): 35

Before mean speed (mph): 54.0

After mean speed (mph): 38.8

Before 85th percentile speed (mph): 61.0

After 85th percentile speed (mph): 49.0

Before night mean speed (mph): 55.9

After night mean speed (mph): 38.8

Before night 85th percentile speed (mph): 64.0

After night 85th percentile speed (mph): 49.0

Before day mean speed (mph): 53.4

After day mean speed (mph): 38.7
Before day 85th percentile speed (mph): 60.0
After day 85th percentile speed (mph): 49.0
Percent of vehicles exceeding speed limit in the before period (mph): 39.2
Percent of vehicles exceeding speed limit in the after period (mph): 61.6
Data collection method: Tubes



Figure 78: Site 71 (before)



Figure 79: Site 71 (after)



Figure 80: Speed sign at Site 71 in May 2023



Figure 81: Advance warning sign at Site 71

Site number: 74

Speed data source: Field

Speed data collection date and time range (before after combined): 08/16/2022 12:00:00 AM
to 08/17/2022 11:59:00 PM

Roadway name: US 220 Bus

Route: US

County: Rockingham

Speed limit sign -Latitude: 36.422068

Speed limit sign – Longitude: -79.96425

Length (miles): 0.16

Left shoulder width (feet): 1

Right shoulder width (feet): 1

Lane width (feet): 10

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 3,500

Advance warning sign: Speed Limit 35 ↑

Presence of horizontal curve: Yes

Presence of vertical curve and type: Yes, sag

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Woodland

Land use change: No

Before speed limit (mph): 55

After speed limit (mph): 35

Before mean speed (mph): 45.8

After mean speed (mph): 39.0

Before 85th percentile speed (mph): 51.0

After 85th percentile speed (mph): 46.0

Before night mean speed (mph): 44.5

After night mean speed (mph): 39.6

Before night 85th percentile speed (mph): 51.0

After night 85th percentile speed (mph): 45.0

Before day mean speed (mph): 45.8

After day mean speed (mph): 38.5

Before day 85th percentile speed (mph): 51.0

After day 85th percentile speed (mph): 46.0

Percent of vehicles exceeding speed limit in the before period (mph): 2.6

Percent of vehicles exceeding speed limit in the after period (mph): 74.9

Data collection method: Tubes



Figure 82: Site 74 (before)



Figure 83: Site 74 (after)



Figure 84: Speed sign at Site 74 in February 2023

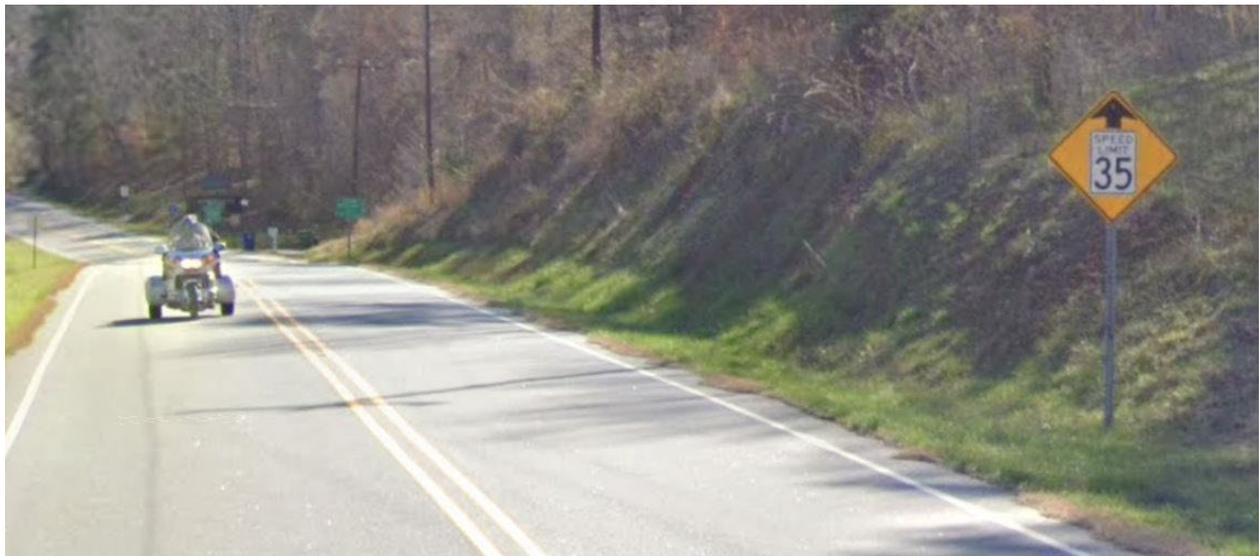


Figure 85: Advance warning sign at Site 74

Site number: 80

Speed data source: Field

Speed data collection date and time range (before after combined): 08/17/2022 12:00:00 AM
to 08/18/2022 11:59:00 PM

Roadway name: NC 42

Route: NC

County: Chatham

Speed limit sign -Latitude: 35.574352

Speed limit sign – Longitude: -78.992417

Length (miles): 0.28

Left shoulder width (feet): 2

Right shoulder width (feet): 2

Lane width (feet): 10

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 2,600

Advance warning sign: Reduce Speed Ahead

Presence of horizontal curve: Yes

Presence of vertical curve and type: Yes, crest

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Woodland

Land use change: Yes - more residential at end of zone

Before speed limit (mph): 55

After speed limit (mph): 35

Before mean speed (mph): 55.9

After mean speed (mph): 52.6

Before 85th percentile speed (mph): 62.0

After 85th percentile speed (mph): 59.0

Before night mean speed (mph): 56.8

After night mean speed (mph): 54.2

Before night 85th percentile speed (mph): 63.5

After night 85th percentile speed (mph): 60.0

Before day mean speed (mph): 55.7

After day mean speed (mph): 51.8
Before day 85th percentile speed (mph): 62.0
After day 85th percentile speed (mph): 58.0
Percent of vehicles exceeding speed limit in the before period (mph): 53.7
Percent of vehicles exceeding speed limit in the after period (mph): 99.6
Data collection method: Tubes



Figure 86: Site 80 (before)



Figure 87: Site 80 (after)



Figure 88: Speed sign at Site 80 in May 2023

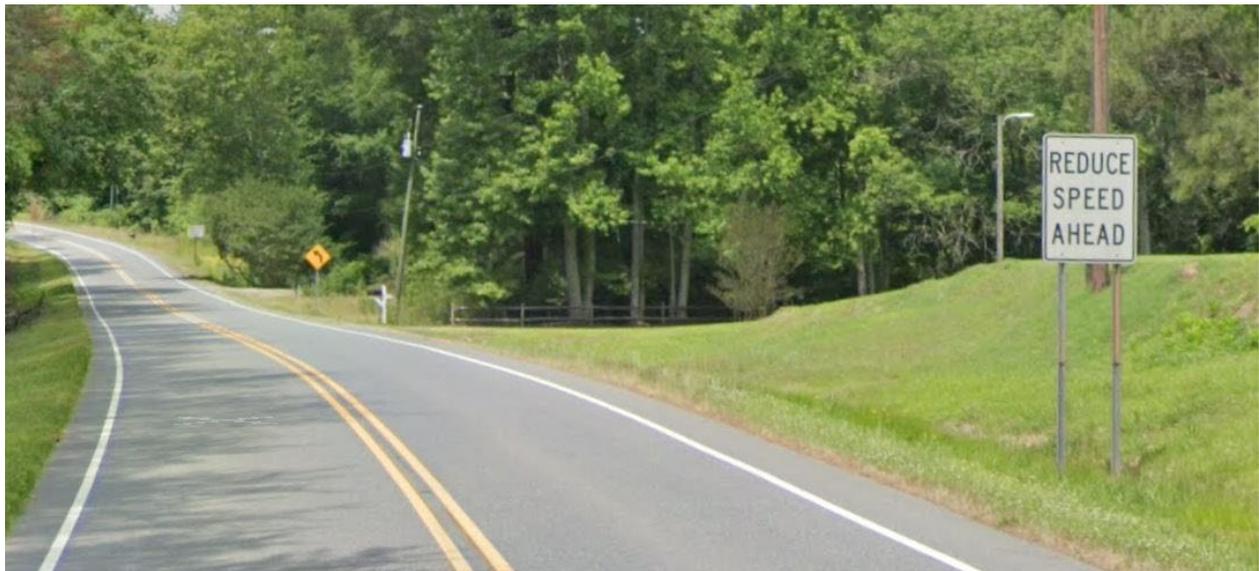


Figure 89: Advance warning sign at Site 80

Site number: 85

Speed data source: Field

Speed data collection date and time range (before after combined): 08/09/2022 12:00:00 AM
to 08/10/2022 11:59:00 PM

Roadway name: US 117

Route: US

County: Wayne

Speed limit sign -Latitude: 35.554665

Speed limit sign – Longitude: -77.974803

Length (miles): 0.11

Left shoulder width (feet): 2

Right shoulder width (feet): 2

Lane width (feet): 10

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 1,600

Advance warning sign: Speed Limit 45 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Residential

Land use change: No

Before speed limit (mph): 55

After speed limit (mph): 45

Before mean speed (mph): 49.1

After mean speed (mph): 48.7

Before 85th percentile speed (mph): 57.0

After 85th percentile speed (mph): 56.0

Before night mean speed (mph): 49.1

After night mean speed (mph): 46.6

Before night 85th percentile speed (mph): 58.6

After night 85th percentile speed (mph): 54.5

Before day mean speed (mph): 48.0

After day mean speed (mph): 48.9

Before day 85th percentile speed (mph): 56.0

After day 85th percentile speed (mph): 55.0

Percent of vehicles exceeding speed limit in the before period (mph): 21.4

Percent of vehicles exceeding speed limit in the after period (mph): 71.0

Data collection method: Tubes



Figure 90: Site 85 (before)



Figure 91: Site 85 (after)



Figure 92: Speed sign at Site 85 in June 2021



Figure 93: Advance warning sign at Site 85

Site number: 94

Speed data source: Field

Speed data collection date and time range (before after combined): 08/10/2022 12:00:00 AM
to 08/11/2022 11:59:00 PM

Roadway name: NC 210

Route: NC

County: Johnston

Speed limit sign -Latitude: 35.517902

Speed limit sign – Longitude: -78.364271

Length (miles): 0.18

Left shoulder width (feet): 1

Right shoulder width (feet): 1

Lane width (feet): 10

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 9,900

Advance warning sign: Speed Limit 35 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: Yes

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Residential

Land use change: Yes - more developed at end of zone

Before speed limit (mph): 45

After speed limit (mph): 35

Before mean speed (mph): 49.9

After mean speed (mph): 40.7

Before 85th percentile speed (mph): 55.0

After 85th percentile speed (mph): 47.0

Before night mean speed (mph): 48.3

After night mean speed (mph): 40.7

Before night 85th percentile speed (mph): 55.0

After night 85th percentile speed (mph): 48.0

Before day mean speed (mph): 50.0

After day mean speed (mph): 40.5

Before day 85th percentile speed (mph): 55.0

After day 85th percentile speed (mph): 47.0

Percent of vehicles exceeding speed limit in the before period (mph): 83.2

Percent of vehicles exceeding speed limit in the after period (mph): 82.8

Data collection method: Tubes



Figure 94: Site 94 (before)



Figure 95: Site 94 (after)



Figure 96: Speed sign at Site 94 in June 2022



Figure 97: Advance warning sign at Site 94

Site number: 108

Speed data source: Field

Speed data collection date and time range (before after combined): 08/02/2022 12:00:00 AM
to 08/03/2022 11:59:00 PM

Roadway name: US74 Westbound

Route: US

County: Anson

Speed limit sign -Latitude: 34.963579

Speed limit sign – Longitude: -80.043338

Length (miles): 0.12

Left shoulder width (feet): 1

Right shoulder width (feet): 1

Lane width (feet): 11

Number of lanes in both directions: 5

Presence of two way left turn lane: Yes

Divided facility: No

AADT (vehicles per day): 23,500

Advance warning sign: Speed Limit 45 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: No

Presence of curb and gutter: Yes

Presence of sidewalk: No

Presence of edgeline marking: No

Proximate traffic control: None

Area type: Rural

Land use: Industrial

Land use change: Yes - more developed at end of zone

Before speed limit (mph): 55

After speed limit (mph): 45

Before mean speed (mph): 54.6

After mean speed (mph): 49.4

Before 85th percentile speed (mph): 61.0

After 85th percentile speed (mph): 55.0

Before night mean speed (mph): 55.3

After night mean speed (mph): 48.6

Before night 85th percentile speed (mph): 62.0

After night 85th percentile speed (mph): 54.0

Before day mean speed (mph): 53.8

After day mean speed (mph): 49.4
Before day 85th percentile speed (mph): 60.0
After day 85th percentile speed (mph): 55.0
Percent of vehicles exceeding speed limit in the before period (mph): 50.6
Percent of vehicles exceeding speed limit in the after period (mph): 78.0
Data collection method: Tubes



Figure 98: Speed sign at Site 108 in December 2020



Figure 99: Advance warning sign at Site 108

Site number: 111

Speed data source: Probe

Speed data collection date and time range (before after combined): 08/16/2022 12:00:00 AM
to 08/18/2022 11:55:00 PM

Roadway name: I-77

Route: I

County: Mecklenburg

Speed limit sign -Latitude: 35.28462

Speed limit sign – Longitude: -80.849099

Length (miles): 0.26

Left shoulder width (feet): 2

Right shoulder width (feet): 12

Lane width (feet): 12

Number of lanes in both directions: 10

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 98,000

Advance warning sign: Speed Limit 55 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Urban

Land use: Woodland

Land use change: No

Before speed limit (mph): 65

After speed limit (mph): 55

Before mean speed (mph): 70.2

After mean speed (mph): 68.7

Before 85th percentile speed (mph): 72.2

After 85th percentile speed (mph): 71.0

Before night mean speed (mph): 69.4

After night mean speed (mph): 68.6

Before night 85th percentile speed (mph): 71.8

After night 85th percentile speed (mph): 71.0

Before day mean speed (mph): 70.5

After day mean speed (mph): 68.3

Before day 85th percentile speed (mph): 72.0

After day 85th percentile speed (mph): 70.4

Percent of vehicles exceeding speed limit in the before period (mph): 97.5

Percent of vehicles exceeding speed limit in the after period (mph): 98.0



Figure 100: Speed sign at Site 111 in September 2022



Figure 101: Advance warning sign at Site 111

Site number: 115

Speed data source: Field

Speed data collection date and time range (before after combined): 08/09/2022 12:00:00 AM
to 08/10/2022 11:59:00 PM

Roadway name: SR 1674 (Sheppard Mill Rd)

Route: SR

County: Stokes

Speed limit sign -Latitude: 36.408769

Speed limit sign – Longitude: -80.197318

Length (miles): 0.24

Left shoulder width (feet): 1

Right shoulder width (feet): 1

Lane width (feet): 9

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 1,000

Advance warning sign: Begin 35 1,000 Feet Ahead

Presence of horizontal curve: No

Presence of vertical curve and type: Yes, sag

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Woodland

Land use change: No

Before speed limit (mph): 55

After speed limit (mph): 35

Before mean speed (mph): 47.3

After mean speed (mph): 37.6

Before 85th percentile speed (mph): 53.0

After 85th percentile speed (mph): 47.0

Before night mean speed (mph): 48.4

After night mean speed (mph): 43.3

Before night 85th percentile speed (mph): 56.0

After night 85th percentile speed (mph): 51.3

Before day mean speed (mph): 47.0

After day mean speed (mph): 36.0

Before day 85th percentile speed (mph): 52.0

After day 85th percentile speed (mph): 45.0

Percent of vehicles exceeding speed limit in the before period (mph): 6.8

Percent of vehicles exceeding speed limit in the after period (mph): 65.0

Data collection method: Tubes



Figure 102: Site 115 (before)



Figure 103: Site 115 (after)



Figure 104: Speed sign at Site 115 in April 2023



Figure 105: Advance warning sign at Site 115

Site number: 117

Speed data source: Field

Speed data collection date and time range (before after combined): 08/03/2022 12:00:00 AM
to 08/04/2022 11:59:00 PM

Roadway name: US 74

Route: US

County: Cleveland

Speed limit sign -Latitude: 35.247191

Speed limit sign – Longitude: -81.42807

Length (miles): 0.34

Left shoulder width (feet): 2

Right shoulder width (feet): 2

Lane width (feet): 12

Number of lanes in both directions: 4

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 40,500

Advance warning sign: Speed Limit 55 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Fields

Land use change: No

Before speed limit (mph): 65

After speed limit (mph): 55

Before mean speed (mph): 68.3

After mean speed (mph): 63.6

Before 85th percentile speed (mph): 75.0

After 85th percentile speed (mph): 71.0

Before night mean speed (mph): 66.5

After night mean speed (mph): 62.4

Before night 85th percentile speed (mph): 73.0

After night 85th percentile speed (mph): 70.0

Before day mean speed (mph): 68.3

After day mean speed (mph): 63.5

Before day 85th percentile speed (mph): 75.0

After day 85th percentile speed (mph): 71.0

Percent of vehicles exceeding speed limit in the before period (mph): 65.1

Percent of vehicles exceeding speed limit in the after period (mph): 91.9

Data collection method: Radar



Figure 106: Site 117 (before)

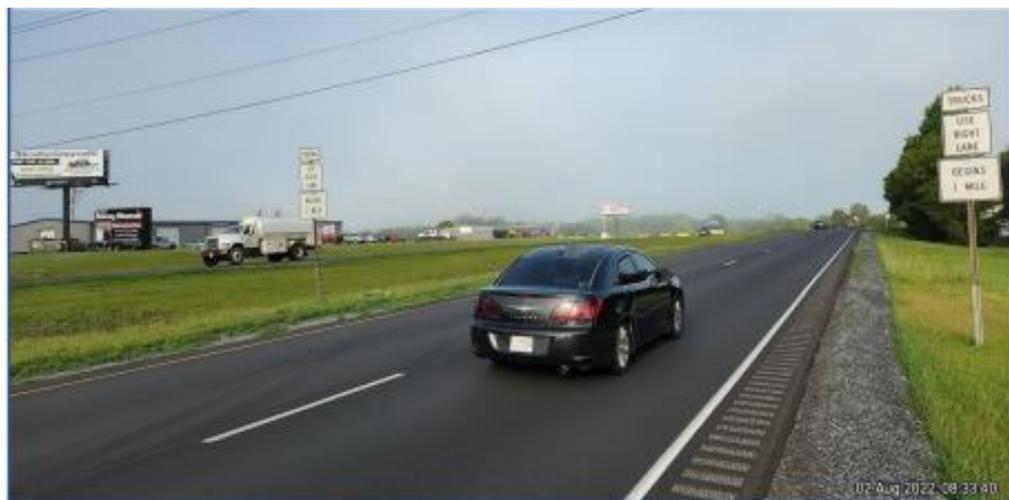


Figure 107: Site 117 (after)



Figure 108: Speed sign at Site 117 in September 2021



Figure 109: Advance warning sign at Site 117

Site number: 121

Speed data source: Field

Speed data collection date and time range (before after combined): 08/03/2022 12:00:00 AM
to 08/04/2022 11:59:00 PM

Roadway name: US 601

Route: US

County: Yadkin

Speed limit sign -Latitude: 36.243855

Speed limit sign – Longitude: -80.71196

Length (miles): 0.19

Left shoulder width (feet): 1

Right shoulder width (feet): 1

Lane width (feet): 10

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 4,100

Advance warning sign: Speed Limit 35 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: Yes, sag

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Fields

Land use change: Yes - more developed at end of zone

Before speed limit (mph): 55

After speed limit (mph): 35

Before mean speed (mph): 51.2

After mean speed (mph): 43.9

Before 85th percentile speed (mph): 57.0

After 85th percentile speed (mph): 52.0

Before night mean speed (mph): 52.7

After night mean speed (mph): 44.1

Before night 85th percentile speed (mph): 57.0

After night 85th percentile speed (mph): 53.0

Before day mean speed (mph): 50.8

After day mean speed (mph): 44.3

Before day 85th percentile speed (mph): 56.0

After day 85th percentile speed (mph): 52.0

Percent of vehicles exceeding speed limit in the before period (mph): 20.3

Percent of vehicles exceeding speed limit in the after period (mph): 85.8

Data collection method: Tubes



Figure 110: Site 121 (before)



Figure 111: Site 121 (after)



Figure 112: Speed sign at Site 121 in March 2023



Figure 113: Advance warning sign at Site 121

Site number: 123

Speed data source: Field

Speed data collection date and time range (before after combined): 08/31/2022 12:00:00 AM
to 09/01/2022 11:59:00 PM

Roadway name: US 52

Route: US

County: Surry

Speed limit sign -Latitude: 36.456007

Speed limit sign – Longitude: -80.556484

Length (miles): 0.21

Left shoulder width (feet): 2

Right shoulder width (feet): 2

Lane width (feet): 12

Number of lanes in both directions: 4

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 15,000

Advance warning sign: Speed Limit 55 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: Yes, crest

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Commercial

Land use change: No

Before speed limit (mph): 65

After speed limit (mph): 55

Before mean speed (mph): 66.7

After mean speed (mph): 64.1

Before 85th percentile speed (mph): 73.0

After 85th percentile speed (mph): 72.0

Before night mean speed (mph): 65.0

After night mean speed (mph): 62.6

Before night 85th percentile speed (mph): 72.0

After night 85th percentile speed (mph): 71.0

Before day mean speed (mph): 66.5

After day mean speed (mph): 63.7

Before day 85th percentile speed (mph): 73.0

After day 85th percentile speed (mph): 71.0

Percent of vehicles exceeding speed limit in the before period (mph): 48.3

Percent of vehicles exceeding speed limit in the after period (mph): 94.7

Data collection method: Radar



Figure 114: Site 123 (before)



Figure 115: Site 123 (after)



Figure 116: Speed sign at Site 123 in August 2022



Figure 117: Advance warning sign at Site 123

Site number: 126

Speed data source: Field

Speed data collection date and time range (before after combined): 09/06/2022 12:00:00 AM
to 09/07/2022 11:59:00 PM

Roadway name: US 70

Route: US

County: Jones

Speed limit sign -Latitude: 35.216016

Speed limit sign – Longitude: -77.449091

Length (miles): 0.23

Left shoulder width (feet): 2

Right shoulder width (feet): 2

Lane width (feet): 11

Number of lanes in both directions: 4

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 13,000

Advance warning sign: Reduce Speed Ahead

Presence of horizontal curve: No

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Woodland

Land use change: No

Before speed limit (mph): 70

After speed limit (mph): 60

Before mean speed (mph): 72.6

After mean speed (mph): 67.9

Before 85th percentile speed (mph): 80.0

After 85th percentile speed (mph): 73.0

Before night mean speed (mph): 71.4

After night mean speed (mph): 67.2

Before night 85th percentile speed (mph): 79.0

After night 85th percentile speed (mph): 73.0

Before day mean speed (mph): 72.5

After day mean speed (mph): 67.6

Before day 85th percentile speed (mph): 80.0

After day 85th percentile speed (mph): 73.0

Percent of vehicles exceeding speed limit in the before period (mph): 70.4

Percent of vehicles exceeding speed limit in the after period (mph): 97.6

Data collection method: Radar



Figure 118: Site 126 (before)



Figure 119: Site 126 (after)



Figure 120: Speed sign at Site 126 in July 2022



Figure 121: Advance warning sign at Site 126

Site number: 127

Speed data source: Field

Speed data collection date and time range (before after combined): 08/31/2022 12:00:00 AM
to 09/01/2022 11:59:00 PM

Roadway name: US 264

Route: US

County: Pitt

Speed limit sign -Latitude: 35.659649

Speed limit sign – Longitude: -77.366747

Length (miles): 0.12

Left shoulder width (feet): 3

Right shoulder width (feet): 3

Lane width (feet): 11

Number of lanes in both directions: 4

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 16,500

Advance warning sign: Speed Limit 55 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: Yes, crest

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Urban

Land use: Interchange

Land use change: Yes - more developed at end of zone

Before speed limit (mph): 70

After speed limit (mph): 55

Before mean speed (mph): 70.1

After mean speed (mph): 61.6

Before 85th percentile speed (mph): 75.0

After 85th percentile speed (mph): 72.0

Before night mean speed (mph): 69.0

After night mean speed (mph): 60.9

Before night 85th percentile speed (mph): 75.0

After night 85th percentile speed (mph): 72.0

Before day mean speed (mph): 69.6

After day mean speed (mph): 61.2

Before day 85th percentile speed (mph): 74.0

After day 85th percentile speed (mph): 72.0

Percent of vehicles exceeding speed limit in the before period (mph): 60.4

Percent of vehicles exceeding speed limit in the after period (mph): 76.1

Data collection method: Radar



Figure 122: Site 127 (before)



Figure 123: Site 127 (after)



Figure 124: Speed sign at Site 127 in October 2022



Figure 125: Advance warning sign at Site 127

Site number: 128

Speed data source: Field

Speed data collection date and time range (before after combined): 09/06/2022 12:00:00 AM
to 09/07/2022 11:59:00 PM

Roadway name: US 264

Route: US

County: Pitt

Speed limit sign -Latitude: 35.607744

Speed limit sign – Longitude: -77.43428

Length (miles): 0.11

Left shoulder width (feet): 3

Right shoulder width (feet): 4

Lane width (feet): 11

Number of lanes in both directions: 4

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 28,500

Advance warning sign: Speed Limit 55 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: Traffic signal downstream

Area type: Urban

Land use: Interchange

Land use change: Yes - more developed at end of zone

Before speed limit (mph): 70

After speed limit (mph): 55

Before mean speed (mph): 70.0

After mean speed (mph): 59.3

Before 85th percentile speed (mph): 75.0

After 85th percentile speed (mph): 65.0

Before night mean speed (mph): 69.2

After night mean speed (mph): 59.9

Before night 85th percentile speed (mph): 75.0

After night 85th percentile speed (mph): 67.0

Before day mean speed (mph): 70.1

After day mean speed (mph): 59.6
Before day 85th percentile speed (mph): 75.0
After day 85th percentile speed (mph): 66.0
Percent of vehicles exceeding speed limit in the before period (mph): 60.1
Percent of vehicles exceeding speed limit in the after period (mph): 77.2
Data collection method: Radar



Figure 126: Site 128 (before)



Figure 127: Site 128 (after)



Figure 128: Speed sign at Site 128 in July 2022



Figure 129: Advance warning sign at Site 128

Site number: 130

Speed data source: Field

Speed data collection date and time range (before after combined): 08/17/2022 12:00:00 AM
to 08/18/2022 11:59:00 PM

Roadway name: US 70

Route: US

County: Lenoir

Speed limit sign -Latitude: 35.290351

Speed limit sign – Longitude: -77.766038

Length (miles): 0.11

Left shoulder width (feet): 4

Right shoulder width (feet): 3

Lane width (feet): 11

Number of lanes in both directions: 4

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 23,500

Advance warning sign: Speed Limit 55 ↑

Presence of horizontal curve: Yes

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Commercial

Land use change: Yes - more developed at end of zone

Before speed limit (mph): 70

After speed limit (mph): 55

Before mean speed (mph): 71.8

After mean speed (mph): 64.0

Before 85th percentile speed (mph): 80.0

After 85th percentile speed (mph): 72.0

Before night mean speed (mph): 71.0

After night mean speed (mph): 62.3

Before night 85th percentile speed (mph): 78.0

After night 85th percentile speed (mph): 70.0

Before day mean speed (mph): 71.4

After day mean speed (mph): 63.8

Before day 85th percentile speed (mph): 78.0

After day 85th percentile speed (mph): 71.0

Percent of vehicles exceeding speed limit in the before period (mph): 69.3

Percent of vehicles exceeding speed limit in the after period (mph): 94.5

Data collection method: Radar



Figure 130: Site 130 (before)



Figure 131: Site 130 (after)



Figure 132: Speed sign at Site 130 in July 2022



Figure 133: Advance warning sign at Site 130

Site number: 142

Speed data source: Probe

Speed data collection date and time range (before after combined): 08/16/2022 12:00:00 AM
to 08/18/2022 11:55:00 PM

Roadway name: NC 24

Route: NC

County: Carteret

Speed limit sign -Latitude: 34.734222

Speed limit sign – Longitude: -76.802745

Length (miles): 0.15

Left shoulder width (feet): 3

Right shoulder width (feet): 3

Lane width (feet): 11

Number of lanes in both directions: 5

Presence of two way left turn lane: Yes

Divided facility: No

AADT (vehicles per day): 21,000

Advance warning sign: Speed Limit 45 ↑

Presence of horizontal curve: Yes

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Urban

Land use: Commercial

Land use change: Yes - more developed at end of zone

Before speed limit (mph): 55

After speed limit (mph): 45

Before mean speed (mph): 42.8

After mean speed (mph): 42.5

Before 85th percentile speed (mph): 46.3

After 85th percentile speed (mph): 47.0

Before night mean speed (mph): 44.7

After night mean speed (mph): 44.7

Before night 85th percentile speed (mph): 47.7

After night 85th percentile speed (mph): 48.9

Before day mean speed (mph): 40.8

After day mean speed (mph): 40.0

Before day 85th percentile speed (mph): 42.5

After day 85th percentile speed (mph): 42.8

Percent of vehicles exceeding speed limit in the before period (mph): 0.0

Percent of vehicles exceeding speed limit in the after period (mph): 23.3



Figure 134: Speed sign at Site 142 in July 2022

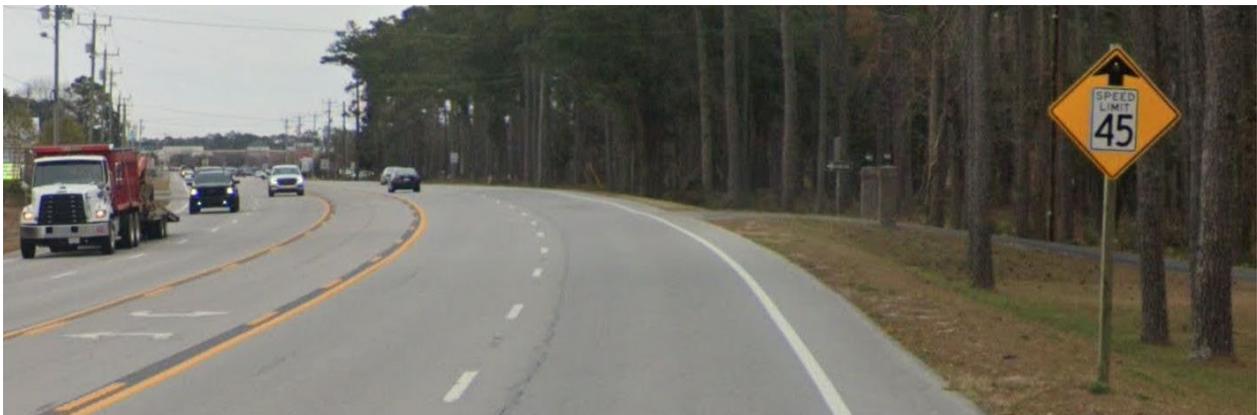


Figure 135: Advance warning sign at Site 142

Site number: 173

Speed data source: Field

Speed data collection date and time range (before after combined): 08/10/2022 12:00:00 AM
to 08/11/2022 11:59:00 PM

Roadway name: SR 1308

Route: SR

County: Onslow

Speed limit sign -Latitude: 34.895547

Speed limit sign – Longitude: -77.541449

Length (miles): 0.13

Left shoulder width (feet): 1

Right shoulder width (feet): 1

Lane width (feet): 10

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 8,700

Advance warning sign: Speed Limit 35 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Fields

Land use change: Yes - more residential at end of zone

Before speed limit (mph): 45

After speed limit (mph): 35

Before mean speed (mph): 43.3

After mean speed (mph): 32.1

Before 85th percentile speed (mph): 48.0

After 85th percentile speed (mph): 37.0

Before night mean speed (mph): 43.9

After night mean speed (mph): 33.0

Before night 85th percentile speed (mph): 49.0

After night 85th percentile speed (mph): 38.0

Before day mean speed (mph): 42.8

After day mean speed (mph): 31.6
Before day 85th percentile speed (mph): 47.0
After day 85th percentile speed (mph): 36.0
Percent of vehicles exceeding speed limit in the before period (mph): 30.5
Percent of vehicles exceeding speed limit in the after period (mph): 19.5
Data collection method: Tubes



Figure 136: Site 173 (before)



Figure 137: Site 173 (after)



Figure 138: Speed sign at Site 173 in August 2022

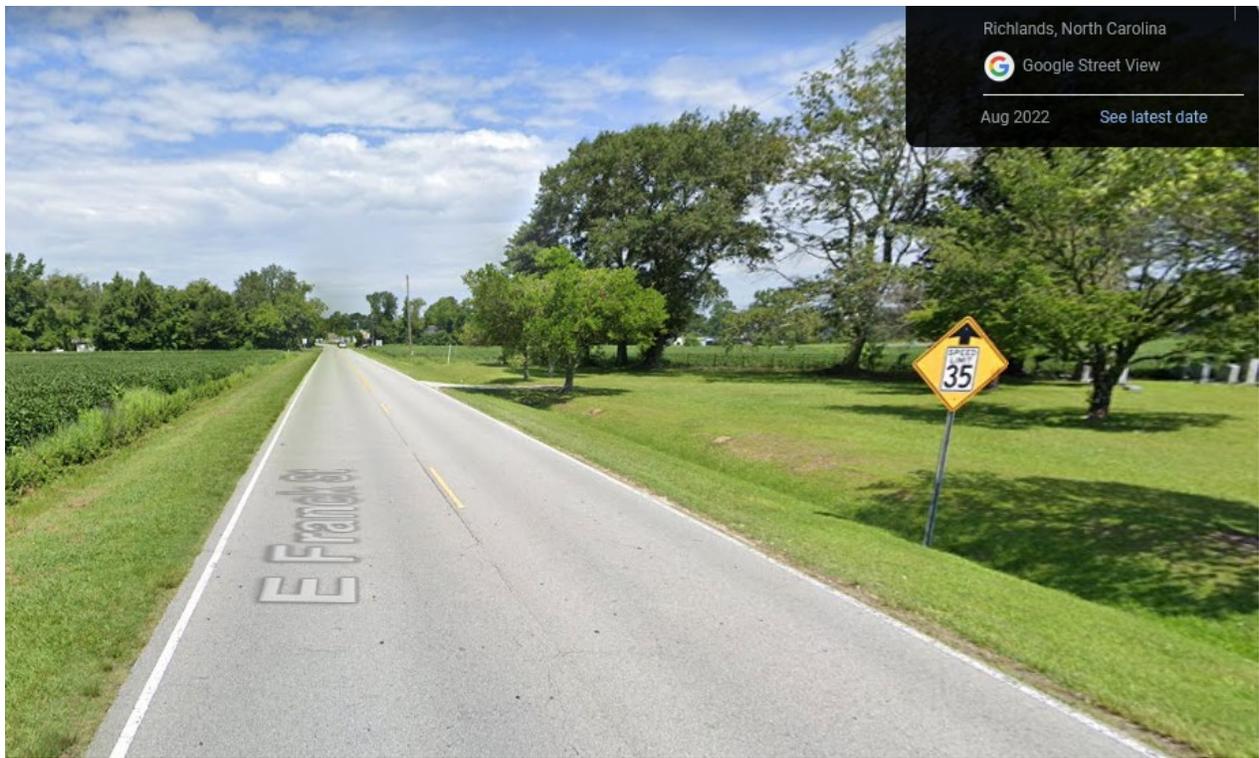


Figure 139: Advance warning sign at Site 173

Site number: 184

Speed data source: Probe

Speed data collection date and time range (before after combined): 08/16/2022 12:00:00 AM
to 08/18/2022 11:55:00 PM

Roadway name: NC210

Route: NC

County: Pender

Speed limit sign -Latitude: 34.377325

Speed limit sign – Longitude: -77.74075

Length (miles): 0.11

Left shoulder width (feet): 1

Right shoulder width (feet): 1

Lane width (feet): 10

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 8,700

Advance warning sign: Speed Limit 45 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Residential

Land use change: Yes - more residential at end of zone

Before speed limit (mph): 55

After speed limit (mph): 45

Before mean speed (mph): 51.9

After mean speed (mph): 52.0

Before 85th percentile speed (mph): 55.2

After 85th percentile speed (mph): 55.2

Before night mean speed (mph): 53.5

After night mean speed (mph): 53.6

Before night 85th percentile speed (mph): 56.0

After night 85th percentile speed (mph): 55.7

Before day mean speed (mph): 49.8

After day mean speed (mph): 49.9

Before day 85th percentile speed (mph): 55.0

After day 85th percentile speed (mph): 54.4

Percent of vehicles exceeding speed limit in the before period (mph): 15.6

Percent of vehicles exceeding speed limit in the after period (mph): 91.8



Figure 140: Speed sign at Site 184 in June 2018



Figure 141: Advance warning sign at Site 184

Site number: 198

Speed data source: Field

Speed data collection date and time range (before after combined): 08/09/2022 12:00:00 AM
to 08/10/2022 11:59:00 PM

Roadway name: NC 43

Route: NC

County: Nash

Speed limit sign -Latitude: 36.041569

Speed limit sign – Longitude: -77.909877

Length (miles): 0.17

Left shoulder width (feet): 2

Right shoulder width (feet): 2

Lane width (feet): 11

Number of lanes in both directions: 3

Presence of two way left turn lane: Yes

Divided facility: No

AADT (vehicles per day): 4,300

Advance warning sign: Speed Limit 35 ↑

Presence of horizontal curve: Yes

Presence of vertical curve and type: No

Presence of curb and gutter: Yes

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: Traffic signal downstream

Area type: Rural

Land use: Residential

Land use change: Yes - more residential at end of zone

Before speed limit (mph): 45

After speed limit (mph): 35

Before mean speed (mph): 50.6

After mean speed (mph): 32.7

Before 85th percentile speed (mph): 56.0

After 85th percentile speed (mph): 38.0

Before night mean speed (mph): 50.1

After night mean speed (mph): 32.8

Before night 85th percentile speed (mph): 56.9

After night 85th percentile speed (mph): 38.0

Before day mean speed (mph): 50.3

After day mean speed (mph): 32.7

Before day 85th percentile speed (mph): 56.0

After day 85th percentile speed (mph): 37.0

Percent of vehicles exceeding speed limit in the before period (mph): 82.8

Percent of vehicles exceeding speed limit in the after period (mph): 26.1

Data collection method: Tubes



Figure 142: Site 198 (before)

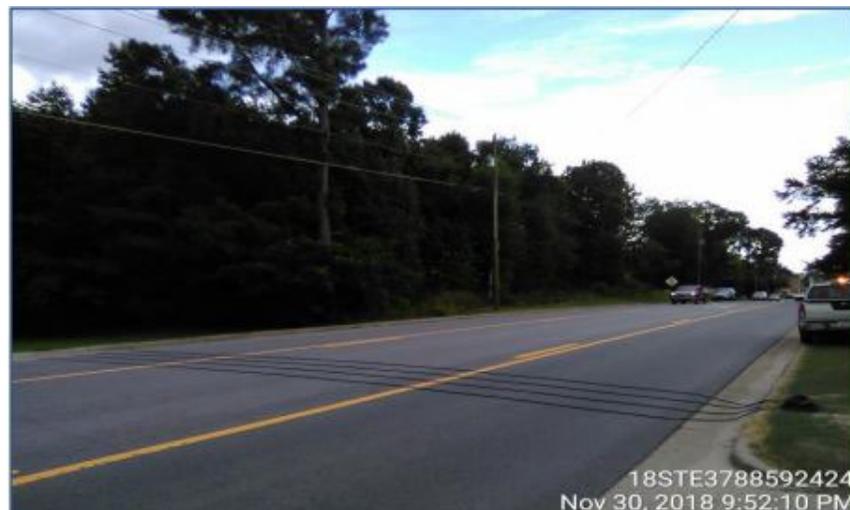


Figure 143: Site 198 (after)



Figure 144: Speed sign at Site 198 in April 2022



Figure 145: Advance warning sign at Site 198

Site number: 218

Speed data source: Field

Speed data collection date and time range (before after combined): 08/09/2022 12:00:00 AM
to 08/10/2022 11:59:00 PM

Roadway name: SR 1770

Route: SR

County: Nash

Speed limit sign -Latitude: 35.962041

Speed limit sign – Longitude: -77.83066

Length (miles): 0.08

Left shoulder width (feet): 1

Right shoulder width (feet): 1

Lane width (feet): 11

Number of lanes in both directions: 5

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 16,500

Advance warning sign: Speed Limit 35 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: No

Presence of curb and gutter: Yes

Presence of sidewalk: Yes

Presence of edgeline marking: No

Proximate traffic control: Traffic signals upstream and downstream

Area type: Urban

Land use: Commercial

Land use change: No

Before speed limit (mph): 45

After speed limit (mph): 35

Before mean speed (mph): 38.8

After mean speed (mph): 37.9

Before 85th percentile speed (mph): 46.0

After 85th percentile speed (mph): 44.0

Before night mean speed (mph): 42.0

After night mean speed (mph): 38.9

Before night 85th percentile speed (mph): 48.0

After night 85th percentile speed (mph): 45.0

Before day mean speed (mph): 37.6

After day mean speed (mph): 37.3

Before day 85th percentile speed (mph): 45.0

After day 85th percentile speed (mph): 44.0

Percent of vehicles exceeding speed limit in the before period (mph): 17.3

Percent of vehicles exceeding speed limit in the after period (mph): 69.3

Data collection method: Tubes



Figure 146: Site 218 (before)



Figure 147: Site 218 (after)



Figure 148: Speed sign at Site 218 in May 2022



Figure 149: Advance warning sign at Site 218

Site number: 239

Speed data source: Field

Speed data collection date and time range (before after combined): 08/03/2022 12:00:00 AM
to 08/04/2022 11:59:00 PM

Roadway name: US 421

Route: US

County: Wilkes

Speed limit sign -Latitude: 36.149665

Speed limit sign – Longitude: -81.209681

Length (miles): 0.11

Left shoulder width (feet): 3

Right shoulder width (feet): 3

Lane width (feet): 11

Number of lanes in both directions: 5

Presence of two way left turn lane: Yes

Divided facility: No

AADT (vehicles per day): 23,500

Advance warning sign: Speed Limit 45 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: Yes, crest

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: No

Proximate traffic control: Traffic signals downstream

Area type: Rural

Land use: Commercial

Land use change: Yes - more commercial at end of zone

Before speed limit (mph): 55

After speed limit (mph): 45

Before mean speed (mph): 53.0

After mean speed (mph): 51.7

Before 85th percentile speed (mph): 58.0

After 85th percentile speed (mph): 57.0

Before night mean speed (mph): 53.5

After night mean speed (mph): 51.6

Before night 85th percentile speed (mph): 58.0

After night 85th percentile speed (mph): 57.0

Before day mean speed (mph): 52.3

After day mean speed (mph): 51.1

Before day 85th percentile speed (mph): 56.0

After day 85th percentile speed (mph): 57.0

Percent of vehicles exceeding speed limit in the before period (mph): 72.4

Percent of vehicles exceeding speed limit in the after period (mph): 90.2

Data collection method: Tubes



Figure 150: Site 239 (before)



Figure 151: Site 239 (after)



Figure 152: Speed sign at Site 239 in December 2021



Figure 153: Advance warning sign at Site 239

Site number: 244

Speed data source: Probe

Speed data collection date and time range (before after combined): 08/16/2022 12:00:00 AM
to 08/18/2022 11:55:00 PM

Roadway name: US 321

Route: US

County: Watauga

Speed limit sign -Latitude: 36.254216

Speed limit sign – Longitude: -81.791924

Length (miles): 0.14

Left shoulder width (feet): 1

Right shoulder width (feet): 1

Lane width (feet): 11

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 4,500

Advance warning sign: Speed Limit 35 ↑

Presence of horizontal curve: Yes

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Fields

Land use change: Yes - more developed at end of zone

Before speed limit (mph): 45

After speed limit (mph): 35

Before mean speed (mph): 47.1

After mean speed (mph): 42.9

Before 85th percentile speed (mph): 49.7

After 85th percentile speed (mph): 44.7

Before night mean speed (mph): 46.4

After night mean speed (mph): 44.1

Before night 85th percentile speed (mph): 48.0

After night 85th percentile speed (mph): 44.7

Before day mean speed (mph): 47.6

After day mean speed (mph): 41.9

Before day 85th percentile speed (mph): 50.2

After day 85th percentile speed (mph): 44.0

Percent of vehicles exceeding speed limit in the before period (mph): 0.6

Percent of vehicles exceeding speed limit in the after period (mph): 98.7



Figure 154: Speed sign at Site 244 in August 2022



Figure 155: Advance warning sign at Site 244

Site number: 257

Speed data source: Probe

Speed data collection date and time range (before after combined): 08/16/2022 12:00:00 AM

to 08/18/2022 11:55:00 PM

Roadway name: NC 18

Route: NC

County: Caldwell

Speed limit sign -Latitude: 35.933332

Speed limit sign – Longitude: -81.49273

Length (miles): 0.17

Left shoulder width (feet): 2

Right shoulder width (feet): 2

Lane width (feet): 11

Number of lanes in both directions: 3

Presence of two way left turn lane: Yes

Divided facility: No

AADT (vehicles per day): 7,800

Advance warning sign: Speed Limit 45 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: Yes, crest

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: Traffic signal downstream

Area type: Urban

Land use: Residential

Land use change: Yes - more developed at end of zone

Before speed limit (mph): 55

After speed limit (mph): 45

Before mean speed (mph): 50.1

After mean speed (mph): 48.3

Before 85th percentile speed (mph): 52.8

After 85th percentile speed (mph): 50.5

Before night mean speed (mph): 50.0

After night mean speed (mph): 49.1

Before night 85th percentile speed (mph): 52.0

After night 85th percentile speed (mph): 50.2

Before day mean speed (mph): 50.2

After day mean speed (mph): 47.8

Before day 85th percentile speed (mph): 53.0

After day 85th percentile speed (mph): 50.5

Percent of vehicles exceeding speed limit in the before period (mph): 0.9

Percent of vehicles exceeding speed limit in the after period (mph): 89.1



Figure 156: Speed sign at Site 257 in December 2021



Figure 157: Advance warning sign at Site 257

Site number: 260

Speed data source: Field

Speed data collection date and time range (before after combined): 08/03/2022 12:00:00 AM

to 08/04/2022 11:59:00 PM

Roadway name: SR 1002

Route: SR

County: Caldwell

Speed limit sign -Latitude: 35.863282

Speed limit sign – Longitude: -81.371478

Length (miles): 0.17

Left shoulder width (feet): 1

Right shoulder width (feet): 1

Lane width (feet): 10

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 1,100

Advance warning sign: Speed Limit 35 ↑

Presence of horizontal curve: Yes

Presence of vertical curve and type: Yes, sag

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Woodland

Land use change: Yes - more developed at end of zone

Before speed limit (mph): 45

After speed limit (mph): 35

Before mean speed (mph): 43.9

After mean speed (mph): 41.9

Before 85th percentile speed (mph): 51.0

After 85th percentile speed (mph): 48.0

Before night mean speed (mph): 43.7

After night mean speed (mph): 41.6

Before night 85th percentile speed (mph): 50.5

After night 85th percentile speed (mph): 48.0

Before day mean speed (mph): 43.3

After day mean speed (mph): 41.8

Before day 85th percentile speed (mph): 50.0

After day 85th percentile speed (mph): 48.0

Percent of vehicles exceeding speed limit in the before period (mph): 41.5

Percent of vehicles exceeding speed limit in the after period (mph): 85.6

Data collection method: Tubes



Figure 158: Site 260 (before)



Figure 159: Site 260 (after)



Figure 160: Speed sign at Site 260 in May 2023



Figure 161: Advance warning sign at Site 260

Site number: 267

Speed data source: Field

Speed data collection date and time range (before after combined): 09/06/2022 12:00:00 AM
to 09/07/2022 11:59:00 PM

Roadway name: US 321

Route: US

County: Catawba

Speed limit sign -Latitude: 35.688121

Speed limit sign – Longitude: -81.347917

Length (miles): 0.36

Left shoulder width (feet): 1

Right shoulder width (feet): 11

Lane width (feet): 11

Number of lanes in both directions: 4

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 41,000

Advance warning sign: Speed Limit 55 ↑

Presence of horizontal curve: Yes

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Woodland

Land use change: Yes - more developed at end of zone

Before speed limit (mph): 65

After speed limit (mph): 55

Before mean speed (mph): 68.4

After mean speed (mph): 63.3

Before 85th percentile speed (mph): 73.0

After 85th percentile speed (mph): 72.0

Before night mean speed (mph): 66.3

After night mean speed (mph): 61.8

Before night 85th percentile speed (mph): 73.0

After night 85th percentile speed (mph): 72.0

Before day mean speed (mph): 68.5

After day mean speed (mph): 63.2

Before day 85th percentile speed (mph): 73.0

After day 85th percentile speed (mph): 72.0

Percent of vehicles exceeding speed limit in the before period (mph): 63.8

Percent of vehicles exceeding speed limit in the after period (mph): 88.7

Data collection method: Radar



Figure 162: Site 267 (before)



Figure 163: Site 267 (after)



Figure 164: Speed sign at Site 267 in May 2023



Figure 165: Advance warning sign at Site 267

Site number: 278

Speed data source: Field

Speed data collection date and time range (before after combined): 08/10/2022 12:00:00 AM

to 08/11/2022 11:59:00 PM

Roadway name: NC 18

Route: NC

County: Cleveland

Speed limit sign -Latitude: 35.241932

Speed limit sign – Longitude: -81.5666

Length (miles): 0.2

Left shoulder width (feet): 1

Right shoulder width (feet): 2

Lane width (feet): 11

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 7,400

Advance warning sign: Speed Limit 45 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: Yes, sag

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Residential

Land use change: Yes - more developed at end of zone

Before speed limit (mph): 55

After speed limit (mph): 45

Before mean speed (mph): 55.4

After mean speed (mph): 50.1

Before 85th percentile speed (mph): 61.0

After 85th percentile speed (mph): 56.0

Before night mean speed (mph): 55.0

After night mean speed (mph): 49.9

Before night 85th percentile speed (mph): 61.0

After night 85th percentile speed (mph): 56.0

Before day mean speed (mph): 55.1

After day mean speed (mph): 49.6

Before day 85th percentile speed (mph): 60.0

After day 85th percentile speed (mph): 56.0

Percent of vehicles exceeding speed limit in the before period (mph): 51.3

Percent of vehicles exceeding speed limit in the after period (mph): 79.2

Data collection method: Tubes



Figure 166: Site 278 (before)



Figure 167: Site 278 (after)



Figure 168: Speed sign at Site 278 in July 2021



Figure 169: Advance warning sign at Site 278

Site number: 282

Speed data source: Field

Speed data collection date and time range (before after combined): 08/23/2022 12:00:00 AM
to 08/24/2022 11:59:00 PM

Roadway name: NC 18

Route: NC

County: Cleveland

Speed limit sign -Latitude: 35.438544

Speed limit sign – Longitude: -81.501516

Length (miles): 0.19

Left shoulder width (feet): 1

Right shoulder width (feet): 1

Lane width (feet): 11

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 5,300

Advance warning sign: Speed Limit 45 ↑

Presence of horizontal curve: No

Presence of vertical curve and type: Yes, sag

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Woodland

Land use change: Yes - more residential at end of zone

Before speed limit (mph): 55

After speed limit (mph): 45

Before mean speed (mph): 52.8

After mean speed (mph): 49.8

Before 85th percentile speed (mph): 59.0

After 85th percentile speed (mph): 56.0

Before night mean speed (mph): 54.6

After night mean speed (mph): 50.7

Before night 85th percentile speed (mph): 61.0

After night 85th percentile speed (mph): 57.0

Before day mean speed (mph): 52.6

After day mean speed (mph): 49.4
Before day 85th percentile speed (mph): 59.0
After day 85th percentile speed (mph): 55.0
Percent of vehicles exceeding speed limit in the before period (mph): 36.0
Percent of vehicles exceeding speed limit in the after period (mph): 77.7
Data collection method: Tubes



Figure 170: Site 282 (before)



Figure 171: Site 282 (after)



Figure 172: Speed sign at Site 282 in July 2021

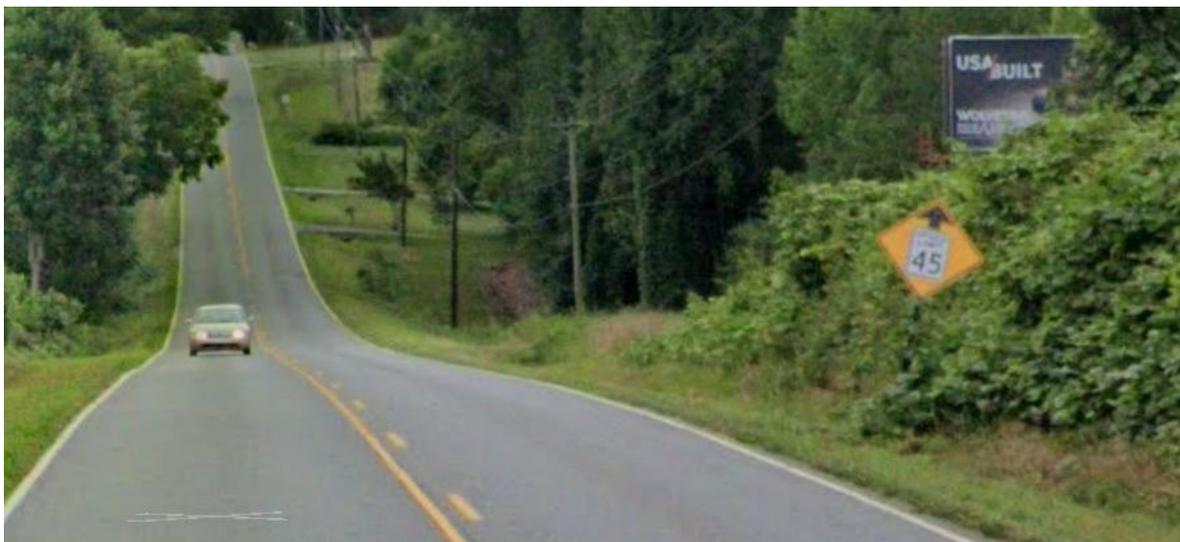


Figure 173: Advance warning sign at Site 282

Site number: 306

Speed data source: Field

Speed data collection date and time range (before after combined): 08/10/2022 12:00:00 AM
to 08/11/2022 11:59:00 PM

Roadway name: NC 42

Route: NC

County: Edgecombe

Speed limit sign -Latitude: 35.789637

Speed limit sign – Longitude: -77.658736

Length (miles): 0.13

Left shoulder width (feet): 1

Right shoulder width (feet): 2

Lane width (feet): 10

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 2,000

Advance warning sign: Reduce Speed Ahead

Presence of horizontal curve: Yes

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Woodland

Land use change: Yes - more residential at end of zone

Before speed limit (mph): 55

After speed limit (mph): 45

Before mean speed (mph): 56.2

After mean speed (mph): 52.0

Before 85th percentile speed (mph): 62.0

After 85th percentile speed (mph): 60.0

Before night mean speed (mph): 55.5

After night mean speed (mph): 50.7

Before night 85th percentile speed (mph): 62.0

After night 85th percentile speed (mph): 58.0

Before day mean speed (mph): 55.7

After day mean speed (mph): 52.1

Before day 85th percentile speed (mph): 62.0

After day 85th percentile speed (mph): 60.0

Percent of vehicles exceeding speed limit in the before period (mph): 58.6

Percent of vehicles exceeding speed limit in the after period (mph): 85.3

Data collection method: Tubes



Figure 174: Site 306 (before)



Figure 175: Site 306 (after)



Figure 176: Speed sign at Site 306 in June 2023



Figure 177: Advance warning sign at Site 306

Site number: 312

Speed data source: Field

Speed data collection date and time range (before after combined): 08/10/2022 12:00:00 AM
to 08/11/2022 11:59:00 PM

Roadway name: SR 1109

Route: SR

County: Edgecombe

Speed limit sign -Latitude: 35.746803

Speed limit sign – Longitude: -77.67061

Length (miles): 0.15

Left shoulder width (feet): 1

Right shoulder width (feet): 1

Lane width (feet): 9

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 900

Advance warning sign: Reduce Speed Ahead

Presence of horizontal curve: No

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Residential

Land use change: Yes - more developed at end of zone

Before speed limit (mph): 45

After speed limit (mph): 35

Before mean speed (mph): 48.7

After mean speed (mph): 36.9

Before 85th percentile speed (mph): 56.0

After 85th percentile speed (mph): 45.0

Before night mean speed (mph): 50.5

After night mean speed (mph): 37.4

Before night 85th percentile speed (mph): 59.9

After night 85th percentile speed (mph): 47.0

Before day mean speed (mph): 48.6

After day mean speed (mph): 37.2

Before day 85th percentile speed (mph): 56.4

After day 85th percentile speed (mph): 45.0

Percent of vehicles exceeding speed limit in the before period (mph): 68.5

Percent of vehicles exceeding speed limit in the after period (mph): 57.6

Data collection method: Tubes



Figure 178: Site 312 (before)

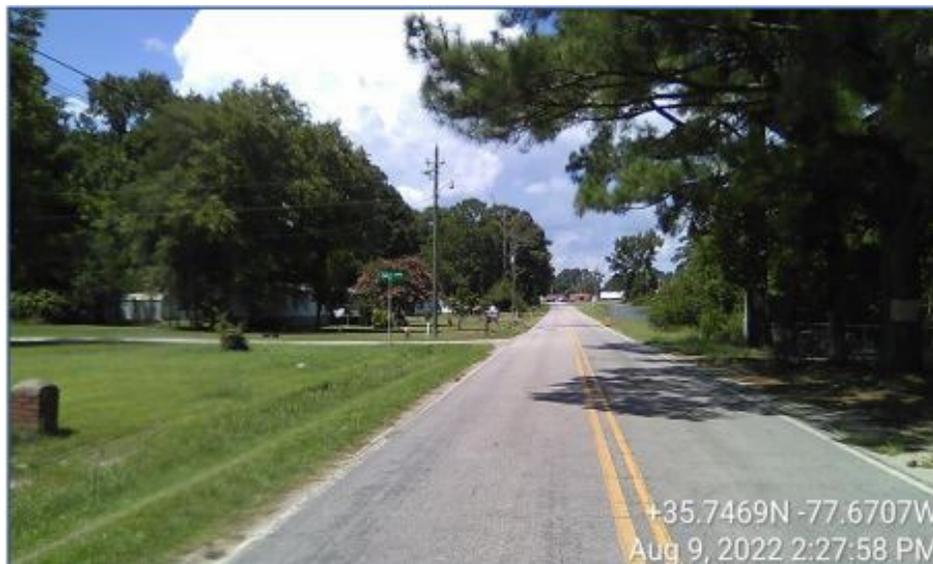


Figure 179: Site 312 (after)



Figure 180: Speed sign at Site 312 in April 2022



Figure 181: Advance warning sign at Site 312

Site number: 321

Speed data source: Field

Speed data collection date and time range (before after combined): 08/10/2022 12:00:00 AM
to 08/11/2022 11:59:00 PM

Roadway name: SR 1008 (Buffalo Road)

Route: SR

County: Johnston

Speed limit sign -Latitude: 35.673619

Speed limit sign – Longitude: -78.356061

Length (miles): 0.12

Left shoulder width (feet): 1

Right shoulder width (feet): 1

Lane width (feet): 10

Number of lanes in both directions: 2

Presence of two way left turn lane: No

Divided facility: No

AADT (vehicles per day): 13,500

Advance warning sign: Speed Limit 45 ↑

Presence of horizontal curve: Yes

Presence of vertical curve and type: Yes - sag

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Residential

Land use change: Yes - more residential at end of zone

Before speed limit (mph): 55

After speed limit (mph): 45

Before mean speed (mph): 46.4

After mean speed (mph): 46.7

Before 85th percentile speed (mph): 51.0

After 85th percentile speed (mph): 52.0

Before night mean speed (mph): 46.5

After night mean speed (mph): 46.3

Before night 85th percentile speed (mph): 54.0

After night 85th percentile speed (mph): 54.0

Before day mean speed (mph): 46.6

After day mean speed (mph): 47.0
Before day 85th percentile speed (mph): 51.0
After day 85th percentile speed (mph): 52.0
Percent of vehicles exceeding speed limit in the before period (mph): 2.9
Percent of vehicles exceeding speed limit in the after period (mph): 62.8
Data collection method: Tubes



Figure 182: Site 321 (before)



Figure 183: Site 321 (after)



Figure 184: Speed sign at Site 321 in March 2022



Figure 185: Advance warning sign at Site 321

Site number: 328

Speed data source: Probe

Speed data collection date and time range (before after combined): 08/16/2022 12:00:00 AM

to 08/18/2022 11:55:00 PM

Roadway name: NC 11

Route: NC

County: Pitt

Speed limit sign -Latitude: 35.460896

Speed limit sign – Longitude: -77.43468

Length (miles): 0.17

Left shoulder width (feet): 2

Right shoulder width (feet): 6

Lane width (feet): 11

Number of lanes in both directions: 4

Presence of two way left turn lane: No

Divided facility: Yes

AADT (vehicles per day): 9,900

Advance warning sign: Speed Limit 60 ↑

Presence of horizontal curve: Yes

Presence of vertical curve and type: No

Presence of curb and gutter: No

Presence of sidewalk: No

Presence of edgeline marking: Yes

Proximate traffic control: None

Area type: Rural

Land use: Field

Land use change: No

Before speed limit (mph): 70

After speed limit (mph): 60

Before mean speed (mph): 69.3

After mean speed (mph): 68.2

Before 85th percentile speed (mph): 72.0

After 85th percentile speed (mph): 70.9

Before night mean speed (mph): 67.0

After night mean speed (mph): 65.9

Before night 85th percentile speed (mph): 69.0

After night 85th percentile speed (mph): 68.0

Before day mean speed (mph): 70.7

After day mean speed (mph): 69.7

Before day 85th percentile speed (mph): 72.4

After day 85th percentile speed (mph): 71.3

Percent of vehicles exceeding speed limit in the before period (mph): 44.2

Percent of vehicles exceeding speed limit in the after period (mph): 97.5



Figure 186: Speed sign at Site 328 in June 2022



Figure 187: Advance warning sign at Site 328

APPENDIX B. ADDITIONAL SUMMARY TABLES

Summary Statistics by Before-After Speed Limit Transitions

Before Speed Limit of 45 mph and 50 mph:

Table 82: Difference between before mean speed and before speed limit (number of sites = 8)

		AFTER SPEED LIMIT
	AVERAGE MEAN SPEED_B - BEFORE SPEED LIMIT	35
BEFORE SPEED LIMIT	45	0.9
	50	-3.1*
	Grand Total	-1.1

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 83: Difference between after mean speed and before speed limit (number of sites = 8)

		AFTER SPEED LIMIT
	AVERAGE MEAN SPEED_A - BEFORE SPEED LIMIT	35
BEFORE SPEED LIMIT	45	-8.0
	50	-9.3*
	Grand Total	-8.6

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 84: Difference between after mean speed and after speed limit (number of sites = 8)

		AFTER SPEED LIMIT
	AVERAGE MEAN SPEED_A - AFTER SPEED LIMIT	35
BEFORE SPEED LIMIT	45	2.0
	50	5.7*
	Grand Total	3.9

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 85: Difference between before 85th percentile speed and before speed limit (number of sites = 6)

		AFTER SPEED LIMIT
BEFORE SPEED LIMIT	AVERAGE 85 PERCENTILE SPEED_B - BEFORE SPEED LIMIT	35
	45	7.0
	50	-
	Grand Total	5.7

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 86: Difference between after 85th percentile speed and before speed limit (number of sites = 6)

		AFTER SPEED LIMIT
BEFORE SPEED LIMIT	AVERAGE 85 PERCENTILE SPEED_A - BEFORE SPEED LIMIT	35
	45	-1.8
	50	-
	Grand Total	-4.5

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 87: Difference between after 85th percentile speed and after speed limit (number of sites = 6)

		AFTER SPEED LIMIT
BEFORE SPEED LIMIT	AVERAGE 85 PERCENTILE SPEED_A - AFTER SPEED LIMIT	35
	45	8.2
	50	-
	Grand Total	8.0

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Before Speed Limit of 55 mph:

Table 88: Difference between before mean speed and before speed limit (number of sites = 25)

		AFTER SPEED LIMIT	
		35	45
BEFORE SPEED LIMIT	AVERAGE MEAN SPEED_B - BEFORE SPEED LIMIT		
	55	-3.5	-1.5

Table 89: Difference between after mean speed and before speed limit (number of sites = 25)

		AFTER SPEED LIMIT	
		35	45
BEFORE SPEED LIMIT	AVERAGE MEAN SPEED_A - BEFORE SPEED LIMIT		
	55	-10.5	-5.3

Table 90: Difference between after mean speed and after speed limit (number of sites = 25)

		AFTER SPEED LIMIT	
		35	45
BEFORE SPEED LIMIT	AVERAGE MEAN SPEED_A - AFTER SPEED LIMIT		
	55	9.5	4.7

Table 91: Difference between before 85th percentile speed and before speed limit (number of sites = 20)

		AFTER SPEED LIMIT	
		35	45
BEFORE SPEED LIMIT	AVERAGE 85 PERCENTILE SPEED_B - BEFORE SPEED LIMIT		
	55	2.9	6.1

Table 92: Difference between after 85th percentile speed and before speed limit (number of sites = 20)

		AFTER SPEED LIMIT	
		AVERAGE 85 PERCENTILE SPEED_A - BEFORE SPEED LIMIT	35 45
BEFORE SPEED LIMIT	55		-2.7 2.0

Table 93: Difference between after 85th percentile speed and after speed limit (number of sites = 20)

		AFTER SPEED LIMIT	
		AVERAGE 85 PERCENTILE SPEED_A - AFTER SPEED LIMIT	35 45
BEFORE SPEED LIMIT	55		17.3 12.0

Before Speed Limit of 65 mph and 70 mph:

Table 94: Difference between before mean speed and before speed limit (number of sites = 17)

		AFTER SPEED LIMIT				
		AVERAGE MEAN SPEED_B - BEFORE SPEED LIMIT	45	50	55	60
BEFORE SPEED LIMIT	65		0.3*		3.4	
	70			-1.0*	-1.0	1.0
	Grand Total		0.3	-1.0	1.2	1.0

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 95: Difference between after mean speed and before speed limit (number of sites = 17)

		AFTER SPEED LIMIT				
		AVERAGE MEAN SPEED_A - BEFORE SPEED LIMIT	45	50	55	60
BEFORE SPEED LIMIT	65		-12.4*		-0.1	
	70			-16.4*	-6.5	-1.9
	Grand Total		-12.4	-16.4	-3.3	-1.9

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 96: Difference between after mean speed and after speed limit (number of sites = 17)

		AFTER SPEED LIMIT				
		AVERAGE MEAN SPEED_A - AFTER SPEED LIMIT	45	50	55	60
BEFORE SPEED LIMIT	65		7.6*		9.9	
	70			3.6*	8.5	8.1
	Grand Total		7.6	3.6	9.2	8.1

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 97: Difference between before 85th percentile speed and before speed limit (number of sites = 11)

		AFTER SPEED LIMIT				
		AVERAGE 85 PERCENTILE SPEED_B - BEFORE SPEED LIMIT	45	50	55	60
BEFORE SPEED LIMIT	65		3.4*		8.7	
	70			1.8*	5.7	6.0
	Grand Total		3.4	1.8	7.2	6.0

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 98: Difference between after 85th percentile speed and before speed limit (number of sites = 11)

		AFTER SPEED LIMIT			
		45	50	55	60
BEFORE SPEED LIMIT	AVERAGE 85 PERCENTILE SPEED_A - BEFORE SPEED LIMIT				
	65	-8.8*		6.7	
	70		-13.2*	1.3	2.0
	Grand Total	-8.8	-13.2	4.0	2.0

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 99: Difference between after 85th percentile speed and after speed limit (number of sites = 11)

		AFTER SPEED LIMIT			
		45	50	55	60
BEFORE SPEED LIMIT	AVERAGE 85 PERCENTILE SPEED_A - AFTER SPEED LIMIT				
	65	11.2*		16.7	
	70		6.8*	16.3	12.0
	Grand Total	11.2	6.8	16.5	12.0

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Summary Statistics by Before-After Speed Limit Transitions Based on the Number of Lanes

Before Speed Limit of 45 mph:

Table 100: Number of sites based on number of lanes (number of sites = 6)

		AFTER SPEED LIMIT		
		NUMBER OF SITES		Grand Total
		2	2+	
BEFORE SPEED LIMIT	45	4	2	6

Table 101: Average before mean speed based on number of lanes (number of sites = 6)

		AFTER SPEED LIMIT		
		AVERAGE MEAN SPEED_B		Grand Total
		2	2+	
BEFORE SPEED LIMIT	45	46.5	44.7	45.6

Table 102: Average after mean speed based on number of lanes (number of sites = 6)

		AFTER SPEED LIMIT		
		AVERAGE MEAN SPEED_A		Grand Total
		2	2+	
BEFORE SPEED LIMIT	45	37.9	35.3	36.6

Table 103: Average before 85th percentile speed based on number of lanes (number of sites = 6)

		AFTER SPEED LIMIT		
		AVERAGE 85 PERCENTILE SPEED_B		Grand Total
		2	2+	
BEFORE SPEED LIMIT	45	52.5	51.0	51.8

Table 104: Average after 85th percentile speed based on number of lanes (number of sites = 6)

		AFTER SPEED LIMIT		Grand Total
		AVERAGE 85 PERCENTILE SPEED_A	35	
		NUMBER OF LANES	2 2+	
BEFORE SPEED LIMIT	45	44.3	41.0	42.6

Table 105: Average before night mean speed based on number of lanes (number of sites = 6)

		AFTER SPEED LIMIT		Grand Total
		AVERAGE NIGHT MEAN SPEED_B	35	
		NUMBER OF LANES	2 2+	
BEFORE SPEED LIMIT	45	46.6	46.0	46.3

Table 106: Average after night mean speed based on number of lanes (number of sites = 6)

		AFTER SPEED LIMIT		Grand Total
		AVERAGE NIGHT MEAN SPEED_A	35	
		NUMBER OF LANES	2 2+	
BEFORE SPEED LIMIT	45	38.2	35.9	37.0

Table 107: Average before night 85th percentile speed based on number of lanes (number of sites = 6)

		AFTER SPEED LIMIT		Grand Total
		AVERAGE NIGHT 85 PERCENTILE SPEED_B	35	
		NUMBER OF LANES	2 2+	
BEFORE SPEED LIMIT	45	53.6	52.5	53.0

Table 108: Average before night 85th percentile speed based on number of lanes (number of sites = 6)

		AFTER SPEED LIMIT		Grand Total
		AVERAGE NIGHT 85 PERCENTILE SPEED_A		
		2	2+	
BEFORE SPEED LIMIT	NUMBER OF LANES	45.3	41.5	43.4
	45			

Table 109: Average before day mean speed based on number of lanes (number of sites = 6)

		AFTER SPEED LIMIT		Grand Total
		AVERAGE DAY MEAN SPEED_B		
		2	2+	
BEFORE SPEED LIMIT	NUMBER OF LANES	46.2	44.0	45.1
	45			

Table 110: Average after day mean speed based on number of lanes (number of sites = 6)

		AFTER SPEED LIMIT		Grand Total
		AVERAGE DAY MEAN SPEED_A		
		2	2+	
BEFORE SPEED LIMIT	NUMBER OF LANES	37.8	35.0	36.4
	45			

Table 111: Average before day 85th percentile speed based on number of lanes (number of sites = 6)

		AFTER SPEED LIMIT		Grand Total
		AVERAGE DAY 85 PERCENTILE SPEED_B		
		2	2+	
BEFORE SPEED LIMIT	NUMBER OF LANES	52.1	50.5	51.3
	45			

Table 112: Average after day 85th percentile speed based on number of lanes (number of sites = 6)

		AFTER SPEED LIMIT		
		35		Grand Total
		2	2+	
BEFORE SPEED LIMIT	AVERAGE DAY 85 PERCENTILE SPEED_A	44.0	40.5	42.3
	NUMBER OF LANES	45		

Table 113: Average before standard deviation of speed based on number of lanes (number of sites = 6)

		AFTER SPEED LIMIT		
		35		Grand Total
		2	2+	
BEFORE SPEED LIMIT	AVERAGE STANDARD DEVIATION OF SPEED_B	6.4	6.7	6.5
	NUMBER OF LANES	45		

Table 114: Average after standard deviation of speed based on number of lanes (number of sites = 6)

		AFTER SPEED LIMIT		
		35		Grand Total
		2	2+	
BEFORE SPEED LIMIT	AVERAGE STANDARD DEVIATION OF SPEED_A	6.5	6.1	6.3
	NUMBER OF LANES	45		

Table 115: Average before standard deviation of night speed based on number of lanes (number of sites = 6)

		AFTER SPEED LIMIT		
		35		Grand Total
		2	2+	
BEFORE SPEED LIMIT	AVERAGE STANDARD DEVIATION OF NIGHT SPEED_B	6.5	6.8	6.7
	NUMBER OF LANES	45		

Table 116: Average after standard deviation of night speed based on number of lanes (number of sites = 6)

		AFTER SPEED LIMIT			
		AVERAGE STANDARD DEVIATION OF NIGHT SPEED_A		35	Grand Total
		NUMBER OF LANES		2	2+
BEFORE SPEED LIMIT	45	6.9	6.9	6.9	

Table 117: Average before standard deviation of day speed based on number of lanes (number of sites = 6)

		AFTER SPEED LIMIT			
		AVERAGE STANDARD DEVIATION OF DAY SPEED_B		35	Grand Total
		NUMBER OF LANES		2	2+
BEFORE SPEED LIMIT	45	6.4	6.6	6.5	

Table 118: Average after standard deviation of day speed based on number of lanes (number of sites = 6)

		AFTER SPEED LIMIT			
		AVERAGE STANDARD DEVIATION OF DAY SPEED_A		35	Grand Total
		NUMBER OF LANES		2	2+
BEFORE SPEED LIMIT	45	6.5	6.1	6.3	

Table 119: Difference between before-after mean speed reduction (number of sites = 6)

		AFTER SPEED LIMIT			
		AVERAGE MEAN SPEED REDUCTION_B-A		35	Grand Total
		NUMBER OF LANES		2	2+
BEFORE SPEED LIMIT	45	8.6	9.4	9.0	

Table 120: Difference between before-after 85th percentile speed reduction (number of sites = 6)

		AFTER SPEED LIMIT		
		35		Grand Total
		2	2+	
BEFORE SPEED LIMIT	AVERAGE 85 PERCENTILE SPEED REDUCTION_B-A			
	NUMBER OF LANES			
	45	8.3	10.0	9.1

Table 121: Difference between before-after night mean speed reduction (number of sites = 6)

		AFTER SPEED LIMIT		
		35		Grand Total
		2	2+	
BEFORE SPEED LIMIT	AVERAGE NIGHT MEAN SPEED REDUCTION_B-A			
	NUMBER OF LANES			
	45	8.4	10.1	9.3

Table 122: Difference between before-after night 85th percentile speed reduction (number of sites = 6)

		AFTER SPEED LIMIT		
		35		Grand Total
		2	2+	
BEFORE SPEED LIMIT	AVERAGE NIGHT 85 PERCENTILE SPEED REDUCTION_B-A			
	NUMBER OF LANES			
	45	8.4	11.0	9.7

Table 123: Difference between before-after day mean speed reduction (number of sites = 6)

		AFTER SPEED LIMIT		
		35		Grand Total
		2	2+	
BEFORE SPEED LIMIT	AVERAGE DAY MEAN SPEED REDUCTION_B-A			
	NUMBER OF LANES			
	45	8.4	9.0	8.7

Table 124: Difference between before-after day 85th percentile speed reduction (number of sites = 6)

		AFTER SPEED LIMIT		Grand Total
		35		
		AVERAGE DAY 85 PERCENTILE SPEED REDUCTION_B-A		
		NUMBER OF LANES		
BEFORE SPEED LIMIT	45	8.1	10.0	9.0

Table 125: Difference between before-after standard deviation of speed reduction (number of sites = 6)

		AFTER SPEED LIMIT		Grand Total
		35		
		AVERAGE STANDARD DEVIATION OF SPEED REDUCTION_B-A		
		NUMBER OF LANES		
BEFORE SPEED LIMIT	45	-0.1	0.5	0.2

Table 126: Difference between before-after standard deviation of night speed reduction (number of sites = 6)

		AFTER SPEED LIMIT		Grand Total
		35		
		AVERAGE STANDARD DEVIATION OF NIGHT SPEED REDUCTION_B-A		
		NUMBER OF LANES		
BEFORE SPEED LIMIT	45	-0.4	-0.1	-0.3

Table 127: Difference between before-after standard deviation of day speed reduction (number of sites = 6)

		AFTER SPEED LIMIT		Grand Total
		35	2+	
		AVERAGE STANDARD DEVIATION OF DAY SPEED REDUCTION_B-A		
BEFORE SPEED LIMIT	45	-0.1	0.5	0.2

Table 128: Difference between before mean speed and before speed limit (number of sites = 6)

		AFTER SPEED LIMIT	
		35	2+
		AVERAGE MEAN SPEED_B - BEFORE SPEED LIMIT	
		NUMBER OF LANES	
BEFORE SPEED LIMIT	45	1.5	-0.3

Table 129: Difference between after mean speed and before speed limit (number of sites = 6)

		AFTER SPEED LIMIT	
		35	2+
		AVERAGE MEAN SPEED_A - BEFORE SPEED LIMIT	
		NUMBER OF LANES	
BEFORE SPEED LIMIT	45	-7.1	-9.7

Table 130: Difference between after mean speed and after speed limit (number of sites = 6)

		AFTER SPEED LIMIT	
		35	2+
		AVERAGE MEAN SPEED_A - AFTER SPEED LIMIT	
		NUMBER OF LANES	
BEFORE SPEED LIMIT	45	2.9	0.3

Table 131: Difference between before 85th percentile speed and before speed limit (number of sites = 6)

		AFTER SPEED LIMIT	
		35	
		2	2+
BEFORE SPEED LIMIT	AVERAGE 85 PERCENTILE SPEED_B - BEFORE SPEED LIMIT	7.5	6.0
	NUMBER OF LANES		
	45		

Table 132: Difference between after 85th percentile speed and before speed limit (number of sites = 6)

		AFTER SPEED LIMIT	
		35	
		2	2+
BEFORE SPEED LIMIT	AVERAGE 85 PERCENTILE SPEED_A - BEFORE SPEED LIMIT	-0.8	-4.0
	NUMBER OF LANES		
	45		

Table 133: Difference between after 85th percentile speed and after speed limit (number of sites = 6)

		AFTER SPEED LIMIT	
		35	
		2	2+
BEFORE SPEED LIMIT	AVERAGE 85 PERCENTILE SPEED_A - AFTER SPEED LIMIT	9.3	6.0
	NUMBER OF LANES		
	45		

Before Speed Limit of 50 mph:

Table 134: Number of sites based on number of lanes (number of sites = 2)

		AFTER SPEED LIMIT		Grand Total
		35		
		2	2+	
BEFORE SPEED LIMIT	50	1*	1*	2

Note: Asterisks () are added to indicate the speed transition categories with only probe sites*

Table 135: Average before mean speed based on number of lanes (number of sites = 2)

		AFTER SPEED LIMIT		Grand Total
		35		
		2	2+	
BEFORE SPEED LIMIT	50	42.2*	51.5*	46.9

Note: Asterisks () are added to indicate the speed transition categories with only probe sites*

Table 136: Average after mean speed based on number of lanes (number of sites = 2)

		AFTER SPEED LIMIT		Grand Total
		35		
		2	2+	
BEFORE SPEED LIMIT	50	39.0*	42.3*	40.7

Note: Asterisks () are added to indicate the speed transition categories with only probe sites*

For both sites of speed transition category of 50 mph to 35 mph speed limit, data were obtained from INRIX. Hence, no further analysis is carried out involving the 85th percentile speed data for this transition category.

Table 137: Average before night mean speed based on number of lanes (number of sites = 2)

		AFTER SPEED LIMIT		Grand Total
		35		
		NUMBER OF LANES		
		2	2+	
BEFORE SPEED LIMIT	AVERAGE NIGHT MEAN SPEED_B	41.9*	50.0*	46.0
	NUMBER OF LANES	50		

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 138: Average after night mean speed based on number of lanes (number of sites = 2)

		AFTER SPEED LIMIT		Grand Total
		35		
		NUMBER OF LANES		
		2	2+	
BEFORE SPEED LIMIT	AVERAGE NIGHT MEAN SPEED_A	39.7*	43.4*	41.6
	NUMBER OF LANES	50		

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 139: Average before day mean speed based on number of lanes (number of sites = 2)

		AFTER SPEED LIMIT		Grand Total
		35		
		NUMBER OF LANES		
		2	2+	
BEFORE SPEED LIMIT	AVERAGE DAY MEAN SPEED_B	42.3*	52.2*	47.3
	NUMBER OF LANES	50		

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 140: Average after day mean speed based on number of lanes (number of sites = 2)

		AFTER SPEED LIMIT		Grand Total
		35		
		NUMBER OF LANES		
		2	2+	
BEFORE SPEED LIMIT	AVERAGE DAY MEAN SPEED_A	38.1*	41.2*	39.7
	NUMBER OF LANES	50		

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 141: Average before standard deviation of speed based on number of lanes (number of sites = 2)

		AFTER SPEED LIMIT		Grand Total
		35		
		NUMBER OF LANES		
		2	2+	
BEFORE SPEED LIMIT	AVERAGE STANDARD DEVIATION OF SPEED_B	2.9*	2.5*	2.8
	50			

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 142: Average after standard deviation of speed based on number of lanes (number of sites = 2)

		AFTER SPEED LIMIT		Grand Total
		35		
		NUMBER OF LANES		
		2	2+	
BEFORE SPEED LIMIT	AVERAGE STANDARD DEVIATION OF SPEED_A	3.0*	2.5*	2.8
	50			

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 143: Average before standard deviation of night speed based on number of lanes (number of sites = 2)

		AFTER SPEED LIMIT		Grand Total
		35		
		NUMBER OF LANES		
		2	2+	
BEFORE SPEED LIMIT	AVERAGE STANDARD DEVIATION OF NIGHT SPEED_B	2.5*	2.1*	2.3
	50			

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 144: Average after standard deviation of night speed based on number of lanes (number of sites = 2)

		AFTER SPEED LIMIT			
		AVERAGE STANDARD DEVIATION OF NIGHT SPEED_A		35	Grand Total
		NUMBER OF LANES		2	2+
BEFORE SPEED LIMIT	50	2.4*	2.4*	2.4	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 145: Average before standard deviation of day speed based on number of lanes (number of sites = 2)

		AFTER SPEED LIMIT			
		AVERAGE STANDARD DEVIATION OF DAY SPEED_B		35	Grand Total
		NUMBER OF LANES		2	2+
BEFORE SPEED LIMIT	50	3.0*	2.1*	2.6	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 146: Average after standard deviation of day speed based on number of lanes (number of sites = 2)

		AFTER SPEED LIMIT			
		AVERAGE STANDARD DEVIATION OF DAY SPEED_A		35	Grand Total
		NUMBER OF LANES		2	2+
BEFORE SPEED LIMIT	50	3.0*	2.3*	2.7	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 147: Difference between before-after mean speed reduction (number of sites = 2)

BEFORE SPEED LIMIT	AVERAGE MEAN SPEED REDUCTION_B-A	AFTER SPEED LIMIT		Grand Total
		35		
	NUMBER OF LANES	2	2+	
	50	3.2*	9.1*	6.2

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 148: Difference between before-after night mean speed reduction (number of sites = 2)

BEFORE SPEED LIMIT	AVERAGE NIGHT MEAN SPEED REDUCTION_B-A	AFTER SPEED LIMIT		Grand Total
		35		
	NUMBER OF LANES	2	2+	
	50	2.2*	6.7*	4.5

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 149: Difference between before-after day mean speed reduction (number of sites = 2)

BEFORE SPEED LIMIT	AVERAGE DAY MEAN SPEED REDUCTION_B-A	AFTER SPEED LIMIT		Grand Total
		35		
	NUMBER OF LANES	2	2+	
	50	4.2*	11.0*	7.6

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 150: Difference between before-after standard deviation of speed reduction (number of sites = 2)

		AFTER SPEED LIMIT		
		35		Grand Total
		2	2+	
BEFORE SPEED LIMIT	AVERAGE STANDARD DEVIATION OF SPEED REDUCTION_B-A			
	NUMBER OF LANES			
	50	-0.1*	0.0*	-0.1

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 151: Difference between before-after standard deviation of night speed reduction (number of sites = 2)

		AFTER SPEED LIMIT		
		35		Grand Total
		2	2+	
BEFORE SPEED LIMIT	AVERAGE STANDARD DEVIATION OF NIGHT SPEED REDUCTION_B-A			
	NUMBER OF LANES			
	50	0.1*	-0.3*	-0.1

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 152: Difference between before-after standard deviation of day speed reduction (number of sites = 2)

		AFTER SPEED LIMIT		
		35		Grand Total
		2	2+	
BEFORE SPEED LIMIT	AVERAGE STANDARD DEVIATION OF DAY SPEED REDUCTION_B-A			
	NUMBER OF LANES			
	50	0.0*	-0.2*	-0.1

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 153: Difference between before mean speed and before speed limit (number of sites = 2)

		AFTER SPEED LIMIT	
	AVERAGE MEAN SPEED_B - BEFORE SPEED LIMIT	35	
	NUMBER OF LANES	2	2+
BEFORE SPEED LIMIT	50	-7.8*	1.5*

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 154: Difference between after mean speed and before speed limit (number of sites = 2)

		AFTER SPEED LIMIT	
	AVERAGE MEAN SPEED_A - BEFORE SPEED LIMIT	35	
	NUMBER OF LANES	2	2+
BEFORE SPEED LIMIT	50	-11.0*	-7.7*

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 155: Difference between after mean speed and after speed limit (number of sites = 2)

		AFTER SPEED LIMIT	
	AVERAGE MEAN SPEED_A - AFTER SPEED LIMIT	35	
	NUMBER OF LANES	2	2+
BEFORE SPEED LIMIT	50	4.0*	7.3*

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Before Speed Limit of 55 mph:

Table 156: Number of sites based on number of lanes (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total
		NUMBER OF SITES	35	45	
BEFORE SPEED LIMIT	NUMBER OF LANES	2	2	2+	25
	55	11	6	8	

Table 157: Average before mean speed based on number of lanes (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total
		AVERAGE MEAN SPEED_B	35	45	
BEFORE SPEED LIMIT	NUMBER OF LANES	2	2	2+	52.7
	55	51.5	52.0	54.6	

Table 158: Average after mean speed based on number of lanes (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total
		AVERAGE MEAN SPEED_A	35	45	
BEFORE SPEED LIMIT	NUMBER OF LANES	2	2	2+	48.0
	55	44.5	49.9	49.6	

Table 159: Average before 85th percentile speed based on number of lanes (number of sites = 20)

		AFTER SPEED LIMIT			Grand Total
		AVERAGE 85 PERCENTILE SPEED_B	35	45	
BEFORE SPEED LIMIT	NUMBER OF LANES	2	2	2+	60.0
	55	57.9	58.0	64.2	

Table 160: Average after 85th percentile speed based on number of lanes (number of sites = 20)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE 85 PERCENTILE SPEED_A	2	2	2+
		NUMBER OF LANES	2	2	2+
BEFORE SPEED LIMIT	55	52.3	56.0	58.0	55.4

Table 161: Average before night mean speed based on number of lanes (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE NIGHT MEAN SPEED_B	2	2	2+
		NUMBER OF LANES	2	2	2+
BEFORE SPEED LIMIT	55	52.4	52.4	54.4	53.1

Table 162: Average after night mean speed based on number of lanes (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE NIGHT MEAN SPEED_A	2	2	2+
		NUMBER OF LANES	2	2	2+
BEFORE SPEED LIMIT	55	45.9	49.6	50.0	48.5

Table 163: Average before night 85th percentile speed based on number of lanes (number of sites = 20)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE NIGHT 85 PERCENTILE SPEED_B	2	2	2+
		NUMBER OF LANES	2	2	2+
BEFORE SPEED LIMIT	55	59.7	59.3	64.8	61.3

Table 164: Average before night 85th percentile speed based on number of lanes (number of sites = 20)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE NIGHT 85 PERCENTILE SPEED_A	2	2	2+
		NUMBER OF LANES	2	2	2+
BEFORE SPEED LIMIT	55	53.6	55.9	58.2	55.9

Table 165: Average before day mean speed based on number of lanes (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE DAY MEAN SPEED_B	2	2	2+
		NUMBER OF LANES	2	2	2+
BEFORE SPEED LIMIT	55	51.1	51.3	54.7	52.4

Table 166: Average after day mean speed based on number of lanes (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE DAY MEAN SPEED_A	2	2	2+
		NUMBER OF LANES	2	2	2+
BEFORE SPEED LIMIT	55	44.0	49.5	49.2	47.6

Table 167: Average before day 85th percentile speed based on number of lanes (number of sites = 20)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE DAY 85 PERCENTILE SPEED_B	2	2	2+
		NUMBER OF LANES	2	2	2+
BEFORE SPEED LIMIT	55	57.3	57.6	63.4	59.4

Table 168: Average after day 85th percentile speed based on number of lanes (number of sites = 20)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE DAY 85 PERCENTILE SPEED_A			
		NUMBER OF LANES	2	2	2+
BEFORE SPEED LIMIT	55	51.7	55.6	57.8	55.0

Table 169: Average before standard deviation of speed based on number of lanes (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE STANDARD DEVIATION OF SPEED_B			
		NUMBER OF LANES	2	2	2+
BEFORE SPEED LIMIT	55	6.5	6.7	6.2	6.5

Table 170: Average after standard deviation of speed based on number of lanes (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE STANDARD DEVIATION OF SPEED_A			
		NUMBER OF LANES	2	2	2+
BEFORE SPEED LIMIT	55	7.2	6.5	6.2	6.6

Table 171: Average before standard deviation of night speed based on number of lanes (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE STANDARD DEVIATION OF NIGHT SPEED_B			
		NUMBER OF LANES	2	2	2+
BEFORE SPEED LIMIT	55	7.3	6.9	5.8	6.7

Table 172: Average after standard deviation of night speed based on number of lanes (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE STANDARD DEVIATION OF NIGHT SPEED_A			
		NUMBER OF LANES	2	2 2+	
BEFORE SPEED LIMIT	55	7.3	6.8 5.4		6.5

Table 173: Average before standard deviation of day speed based on number of lanes (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE STANDARD DEVIATION OF DAY SPEED_B			
		NUMBER OF LANES	2	2 2+	
BEFORE SPEED LIMIT	55	6.4	7.0 5.6		6.3

Table 174: Average after standard deviation of day speed based on number of lanes (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE STANDARD DEVIATION OF DAY SPEED_A			
		NUMBER OF LANES	2	2 2+	
BEFORE SPEED LIMIT	55	7.1	6.8 6.0		6.6

Table 175: Difference between before-after mean speed reduction (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE MEAN SPEED REDUCTION_B-A			
		NUMBER OF LANES	2	2 2+	
BEFORE SPEED LIMIT	55	7.0	2.1 5.1		4.7

Table 176: Difference between before-after 85th percentile speed reduction (number of sites = 20)

		AFTER SPEED LIMIT			Grand Total	
		35	45			
		NUMBER OF LANES			Grand Total	
		2	2	2+		
BEFORE SPEED LIMIT	AVERAGE 85 PERCENTILE SPEED REDUCTION_B-A	55	5.6	2.0	6.2	4.6
BEFORE SPEED LIMIT	55	5.6	2.0	6.2	4.6	

Table 177: Difference between before-after night mean speed reduction (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total	
		35	45			
		NUMBER OF LANES			Grand Total	
		2	2	2+		
BEFORE SPEED LIMIT	AVERAGE NIGHT MEAN SPEED REDUCTION_B-A	55	6.5	2.7	4.3	4.5
BEFORE SPEED LIMIT	55	6.5	2.7	4.3	4.5	

Table 178: Difference between before-after night 85th percentile speed reduction (number of sites = 20)

		AFTER SPEED LIMIT			Grand Total	
		35	45			
		NUMBER OF LANES			Grand Total	
		2	2	2+		
BEFORE SPEED LIMIT	AVERAGE NIGHT 85 PERCENTILE SPEED REDUCTION_B-A	55	6.1	3.4	6.6	5.4
BEFORE SPEED LIMIT	55	6.1	3.4	6.6	5.4	

Table 179: Difference between before-after day mean speed reduction (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total	
		35	45			
		NUMBER OF LANES			Grand Total	
		2	2	2+		
BEFORE SPEED LIMIT	AVERAGE DAY MEAN SPEED REDUCTION_B-A	55	7.1	1.8	5.5	4.8
BEFORE SPEED LIMIT	55	7.1	1.8	5.5	4.8	

Table 180: Difference between before-after day 85th percentile speed reduction (number of sites = 20)

		AFTER SPEED LIMIT			Grand Total
		35	45	2+	
AVERAGE DAY 85 PERCENTILE SPEED REDUCTION_B-A		35	45		Grand Total
NUMBER OF LANES		2	2	2+	
BEFORE SPEED LIMIT	55	5.6	2.0	5.6	4.4

Table 181: Difference between before-after standard deviation of speed reduction (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total
		35	45	2+	
AVERAGE STANDARD DEVIATION OF SPEED REDUCTION_B-A		35	45		Grand Total
NUMBER OF LANES		2	2	2+	
BEFORE SPEED LIMIT	55	-0.7	0.2	0.0	-0.2

Table 182: Difference between before-after standard deviation of night speed reduction (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total
		35	45	2+	
AVERAGE STANDARD DEVIATION OF NIGHT SPEED REDUCTION_B-A		35	45		Grand Total
NUMBER OF LANES		2	2	2+	
BEFORE SPEED LIMIT	55	0.0	0.0	0.4	0.1

Table 183: Difference between before-after standard deviation of day speed reduction (number of sites = 25)

		AFTER SPEED LIMIT			Grand Total
		35	45		
		AVERAGE STANDARD DEVIATION OF DAY SPEED REDUCTION_B-A			
		2	2	2+	
BEFORE SPEED LIMIT	55	-0.7	0.2	-0.4	-0.3

Table 184: Difference between before mean speed and before speed limit (number of sites = 25)

		AFTER SPEED LIMIT			
		35	45		
		AVERAGE MEAN SPEED_B - BEFORE SPEED LIMIT			
		NUMBER OF LANES			
		2	2	2+	
BEFORE SPEED LIMIT	55	-3.5	-3.0	-0.4	

Table 185: Difference between after mean speed and before speed limit (number of sites = 25)

		AFTER SPEED LIMIT			
		35	45		
		AVERAGE MEAN SPEED_A - BEFORE SPEED LIMIT			
		NUMBER OF LANES			
		2	2	2+	
BEFORE SPEED LIMIT	55	-10.5	-5.1	-5.4	

Table 186: Difference between after mean speed and after speed limit (number of sites = 25)

		AFTER SPEED LIMIT			
		35	45		
		AVERAGE MEAN SPEED_A - AFTER SPEED LIMIT			
		NUMBER OF LANES			
		2	2	2+	
BEFORE SPEED LIMIT	55	9.5	4.9	4.6	

Table 187: Difference between before 85th percentile speed and before speed limit (number of sites = 20)

		AFTER SPEED LIMIT			
		AVERAGE 85 PERCENTILE SPEED_B - BEFORE SPEED LIMIT	35	45	
		NUMBER OF LANES	2	2	2+
BEFORE SPEED LIMIT	55		2.9	3.0	9.2

Table 188: Difference between after 85th percentile speed and before speed limit (number of sites = 20)

		AFTER SPEED LIMIT			
		AVERAGE 85 PERCENTILE SPEED_A - BEFORE SPEED LIMIT	35	45	
		NUMBER OF LANES	2	2	2+
BEFORE SPEED LIMIT	55		-2.7	1.0	3.0

Table 189: Difference between after 85th percentile speed and after speed limit (number of sites = 20)

		AFTER SPEED LIMIT			
		AVERAGE 85 PERCENTILE SPEED_A - AFTER SPEED LIMIT	35	45	
		NUMBER OF LANES	2	2	2+
BEFORE SPEED LIMIT	55		17.3	11.0	13.0

Before Speed Limit of 65 mph:

Table 190: Number of sites based on number of lanes (number of sites = 5)

		AFTER SPEED LIMIT		
		45	55	Grand Total
NUMBER OF SITES		45	55	Grand Total
NUMBER OF LANES		2+	2+	
BEFORE SPEED LIMIT	65	1*	4	5

Note: Asterisks () are added to indicate the speed transition categories with only probe sites*

Table 191: Average before mean speed based on number of lanes (number of sites = 5)

		AFTER SPEED LIMIT		
		45	55	Grand Total
AVERAGE MEAN SPEED_B		45	55	Grand Total
NUMBER OF LANES		2+	2+	
BEFORE SPEED LIMIT	65	65.3*	68.4	66.9

Note: Asterisks () are added to indicate the speed transition categories with only probe sites*

Table 192: Average after mean speed based on number of lanes (number of sites = 5)

		AFTER SPEED LIMIT		
		45	55	Grand Total
AVERAGE MEAN SPEED_A		45	55	Grand Total
NUMBER OF LANES		2+	2+	
BEFORE SPEED LIMIT	65	52.6*	64.9	58.8

Note: Asterisks () are added to indicate the speed transition categories with only probe sites*

Table 193: Average before 85th percentile speed based on number of lanes (number of sites = 3)

		AFTER SPEED LIMIT		Grand Total	
		45	55		
		AVERAGE 85 PERCENTILE SPEED_B	45	55	Grand Total
		NUMBER OF LANES	2+	2+	
BEFORE SPEED LIMIT	65	-	73.7	73.7	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 194: Average after 85th percentile speed based on number of lanes (number of sites = 3)

		AFTER SPEED LIMIT		Grand Total	
		45	55		
		AVERAGE 85 PERCENTILE SPEED_A	45	55	Grand Total
		NUMBER OF LANES	2+	2+	
BEFORE SPEED LIMIT	65	-	71.7	71.7	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 195: Average before night mean speed based on number of lanes (number of sites = 5)

		AFTER SPEED LIMIT		Grand Total	
		45	55		
		AVERAGE NIGHT MEAN SPEED_B	45	55	Grand Total
		NUMBER OF LANES	2+	2+	
BEFORE SPEED LIMIT	65	62.2*	66.8	64.5	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 196: Average after night mean speed based on number of lanes (number of sites = 5)

		AFTER SPEED LIMIT		Grand Total	
		45	55		
		AVERAGE NIGHT MEAN SPEED_A	45	55	Grand Total
		NUMBER OF LANES	2+	2+	
BEFORE SPEED LIMIT	65	51.6*	63.9	57.8	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 197: Average before night 85th percentile speed based on number of lanes (number of sites = 3)

		AFTER SPEED LIMIT		Grand Total	
		45	55		
		AVERAGE NIGHT 85 PERCENTILE SPEED_B	45	55	Grand Total
		NUMBER OF LANES	2+	2+	
BEFORE SPEED LIMIT	65	-	72.7	72.7	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 198: Average before night 85th percentile speed based on number of lanes (number of sites = 3)

		AFTER SPEED LIMIT		Grand Total	
		45	55		
		AVERAGE NIGHT 85 PERCENTILE SPEED_A	45	55	Grand Total
		NUMBER OF LANES	2+	2+	
BEFORE SPEED LIMIT	65	-	71.0	71.0	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 199: Average before day mean speed based on number of lanes (number of sites = 5)

		AFTER SPEED LIMIT		Grand Total	
		45	55		
		AVERAGE DAY MEAN SPEED_B	45	55	Grand Total
		NUMBER OF LANES	2+	2+	
BEFORE SPEED LIMIT	65	67.2*	68.5	67.9	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 200: Average after day mean speed based on number of lanes (number of sites = 5)

		AFTER SPEED LIMIT		Grand Total	
		45	55		
		AVERAGE DAY MEAN SPEED_A	45	55	Grand Total
		NUMBER OF LANES	2+	2+	
BEFORE SPEED LIMIT	65	52.8*	64.7	58.8	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 201: Average before day 85th percentile speed based on number of lanes (number of sites = 3)

		AFTER SPEED LIMIT			
		AVERAGE DAY 85 PERCENTILE SPEED_B	45	55	Grand Total
		NUMBER OF LANES	2+	2+	
BEFORE SPEED LIMIT	65	-	73.7	73.7	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 202: Average after day 85th percentile speed based on number of lanes (number of sites = 3)

		AFTER SPEED LIMIT			
		AVERAGE DAY 85 PERCENTILE SPEED_A	45	55	Grand Total
		NUMBER OF LANES	2+	2+	
BEFORE SPEED LIMIT	65	-	71.3	71.3	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 203: Average before standard deviation of speed based on number of lanes (number of sites = 5)

		AFTER SPEED LIMIT			
		AVERAGE STANDARD DEVIATION OF SPEED_B	45	55	Grand Total
		NUMBER OF LANES	2+	2+	
BEFORE SPEED LIMIT	65	3.5*	6.5	5.0	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 204: Average after standard deviation of speed based on number of lanes (number of sites = 5)

		AFTER SPEED LIMIT		Grand Total	
		45	55		
		AVERAGE STANDARD DEVIATION OF SPEED_A	45	55	Grand Total
		NUMBER OF LANES	2+	2+	
BEFORE SPEED LIMIT	65	3.6*	6.4	5.0	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 205: Average before standard deviation of night speed based on number of lanes (number of sites = 5)

		AFTER SPEED LIMIT		Grand Total	
		45	55		
		AVERAGE STANDARD DEVIATION OF NIGHT SPEED_B	45	55	Grand Total
		NUMBER OF LANES	2+	2+	
BEFORE SPEED LIMIT	65	3.5*	6.7	5.1	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 206: Average after standard deviation of night speed based on number of lanes (number of sites = 5)

		AFTER SPEED LIMIT		Grand Total	
		45	55		
		AVERAGE STANDARD DEVIATION OF NIGHT SPEED_A	45	55	Grand Total
		NUMBER OF LANES	2+	2+	
BEFORE SPEED LIMIT	65	3.4*	6.6	5.0	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 207: Average before standard deviation of day speed based on number of lanes (number of sites = 5)

		AFTER SPEED LIMIT		Grand Total
		45	55	
AVERAGE STANDARD DEVIATION OF DAY SPEED_B		45	55	Grand Total
NUMBER OF LANES		2+	2+	
BEFORE SPEED LIMIT	65	1.7*	6.3	4.0

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 208: Average after standard deviation of day speed based on number of lanes (number of sites = 5)

		AFTER SPEED LIMIT		Grand Total
		45	55	
AVERAGE STANDARD DEVIATION OF DAY SPEED_A		45	55	Grand Total
NUMBER OF LANES		2+	2+	
BEFORE SPEED LIMIT	65	3.9*	6.6	5.3

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 209: Difference between before-after mean speed reduction (number of sites = 5)

		AFTER SPEED LIMIT		Grand Total
		45	55	
AVERAGE MEAN SPEED REDUCTION_B-A		45	55	Grand Total
NUMBER OF LANES		2+	2+	
BEFORE SPEED LIMIT	65	12.7*	3.5	8.1

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 210: Difference between before-after 85th percentile speed reduction (number of sites = 3)

		AFTER SPEED LIMIT		Grand Total
		45	55	
		AVERAGE 85 PERCENTILE SPEED REDUCTION_B-A	45	55
		NUMBER OF LANES	2+	2+
BEFORE SPEED LIMIT	65	-	2.0	2.0

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 211: Difference between before-after night mean speed reduction (number of sites = 5)

		AFTER SPEED LIMIT		Grand Total
		45	55	
		AVERAGE NIGHT MEAN SPEED REDUCTION_B-A	45	55
		NUMBER OF LANES	2+	2+
BEFORE SPEED LIMIT	65	10.6*	2.9	6.8

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 212: Difference between before-after night 85th percentile speed reduction (number of sites = 3)

		AFTER SPEED LIMIT		Grand Total
		45	55	
		AVERAGE NIGHT 85 PERCENTILE SPEED REDUCTION_B-A	45	55
		NUMBER OF LANES	2+	2+
BEFORE SPEED LIMIT	65	-	1.7	1.7

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 213: Difference between before-after day mean speed reduction (number of sites = 5)

		AFTER SPEED LIMIT		Grand Total
		45	55	
BEFORE SPEED LIMIT	AVERAGE DAY MEAN SPEED REDUCTION_B-A	45	55	Grand Total
	NUMBER OF LANES	2+	2+	
	65	14.4*	3.8	9.1

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 214: Difference between before-after day 85th percentile speed reduction (number of sites = 3)

		AFTER SPEED LIMIT		Grand Total
		45	55	
BEFORE SPEED LIMIT	AVERAGE DAY 85 PERCENTILE SPEED REDUCTION_B-A	45	55	Grand Total
	NUMBER OF LANES	2+	2+	
	65	-	2.3	2.3

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 215: Difference between before-after standard deviation of speed reduction (number of sites = 5)

		AFTER SPEED LIMIT		Grand Total
		45	55	
BEFORE SPEED LIMIT	AVERAGE STANDARD DEVIATION OF SPEED REDUCTION_B-A	45	55	Grand Total
	NUMBER OF LANES	2+	2+	
	65	-0.1*	0.0	0.0

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 216: Difference between before-after standard deviation of night speed reduction (number of sites = 5)

		AFTER SPEED LIMIT		Grand Total
		45	55	
AVERAGE STANDARD DEVIATION OF NIGHT SPEED REDUCTION_B-A		45	55	Grand Total
NUMBER OF LANES		2+	2+	
BEFORE SPEED LIMIT	65	0.1*	0.1	0.1

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 217: Difference between before-after standard deviation of day speed reduction (number of sites = 5)

		AFTER SPEED LIMIT		Grand Total
		45	55	
AVERAGE STANDARD DEVIATION OF DAY SPEED REDUCTION_B-A		2+	2+	Grand Total
NUMBER OF LANES		2+	2+	
BEFORE SPEED LIMIT	65	-2.2*	-0.2	-1.2

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 218: Difference between before mean speed and before speed limit (number of sites = 5)

		AFTER SPEED LIMIT	
		45	55
AVERAGE MEAN SPEED_B - BEFORE SPEED LIMIT		45	55
NUMBER OF LANES		2+	2+
BEFORE SPEED LIMIT	65	0.3*	3.4

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 219: Difference between after mean speed and before speed limit (number of sites = 5)

		AFTER SPEED LIMIT		
		AVERAGE MEAN SPEED_A - BEFORE SPEED LIMIT	45	55
		NUMBER OF LANES	2+	2+
BEFORE SPEED LIMIT	65		-12.4*	-0.1

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 220: Difference between after mean speed and after speed limit (number of sites = 5)

		AFTER SPEED LIMIT		
		AVERAGE MEAN SPEED_A - AFTER SPEED LIMIT	45	55
		NUMBER OF LANES	2+	2+
BEFORE SPEED LIMIT	65		7.6*	9.9

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 221: Difference between before 85th percentile speed and before speed limit (number of sites = 3)

		AFTER SPEED LIMIT		
		AVERAGE 85 PERCENTILE SPEED_B - BEFORE SPEED LIMIT	45	55
		NUMBER OF LANES	2+	2+
BEFORE SPEED LIMIT	65		-	8.7

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 222: Difference between after 85th percentile speed and before speed limit (number of sites = 3)

		AFTER SPEED LIMIT		
		AVERAGE 85 PERCENTILE SPEED_A - BEFORE SPEED LIMIT	45	55
		NUMBER OF LANES	2+	2+
BEFORE SPEED LIMIT	65		-	6.7

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 223: Difference between after 85th percentile speed and after speed limit (number of sites = 3)

		AFTER SPEED LIMIT		
		AVERAGE 85 PERCENTILE SPEED_A - AFTER SPEED LIMIT	45	55
		NUMBER OF LANES	2+	2+
BEFORE SPEED LIMIT	65	-	16.7	

Note: Asterisks () are added to indicate the speed transition categories with only probe sites*

Before Speed Limit of 70 mph:

Table 224: Number of sites based on number of lanes (number of sites = 12)

		AFTER SPEED LIMIT			Grand Total	
		NUMBER OF SITES	50	55		60
		NUMBER OF LANES	2+	2+	2+	
BEFORE SPEED LIMIT	70	2*	8	2	12	

Note: Asterisks () are added to indicate the speed transition categories with only probe sites*

Table 225: Average before mean speed based on number of lanes (number of sites = 12)

		AFTER SPEED LIMIT			Grand Total	
		AVERAGE MEAN SPEED_B	50	55		60
		NUMBER OF LANES	2+	2+	2+	
BEFORE SPEED LIMIT	70	69.0*	69.0	71.0	69.7	

Note: Asterisks () are added to indicate the speed transition categories with only probe sites*

Table 226: Average after mean speed based on number of lanes (number of sites = 12)

		AFTER SPEED LIMIT			Grand Total	
		AVERAGE MEAN SPEED_A	50	55		60
		NUMBER OF LANES	2+	2+	2+	
BEFORE SPEED LIMIT	70	53.6*	63.5	68.1	61.7	

Note: Asterisks () are added to indicate the speed transition categories with only probe sites*

Table 227: Average before 85th percentile speed based on number of lanes (number of sites = 8)

		AFTER SPEED LIMIT			Grand Total
		AVERAGE 85 PERCENTILE SPEED_B	50	55	
		NUMBER OF LANES	2+	2+	2+
BEFORE SPEED LIMIT	70	-	75.7	76.0	75.9

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 228: Average after 85th percentile speed based on number of lanes (number of sites = 8)

		AFTER SPEED LIMIT			Grand Total
		AVERAGE 85 PERCENTILE SPEED_A	50	55	
		NUMBER OF LANES	2+	2+	2+
BEFORE SPEED LIMIT	70	-	71.3	72.0	71.7

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 229: Average before night mean speed based on number of lanes (number of sites = 12)

		AFTER SPEED LIMIT			Grand Total
		AVERAGE NIGHT MEAN SPEED_B	50	55	
		NUMBER OF LANES	2+	2+	2+
BEFORE SPEED LIMIT	70	66.9*	68.5	69.2	68.2

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 230: Average after night mean speed based on number of lanes (number of sites = 12)

		AFTER SPEED LIMIT			Grand Total
		AVERAGE NIGHT MEAN SPEED_A	50	55	
		NUMBER OF LANES	2+	2+	2+
BEFORE SPEED LIMIT	70	53.6*	63.1	66.6	61.1

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 231: Average before night 85th percentile speed based on number of lanes (number of sites = 8)

		AFTER SPEED LIMIT			Grand Total
		50	55	60	
AVERAGE NIGHT 85 PERCENTILE SPEED_B		50	55	60	Grand Total
NUMBER OF LANES		2+	2+	2+	
BEFORE SPEED LIMIT	70	-	75.3	74.0	74.7

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 232: Average before night 85th percentile speed based on number of lanes (number of sites = 8)

		AFTER SPEED LIMIT			Grand Total
		50	55	60	
AVERAGE NIGHT 85 PERCENTILE SPEED_A		50	55	60	Grand Total
NUMBER OF LANES		2+	2+	2+	
BEFORE SPEED LIMIT	70	-	70.4	70.5	70.5

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 233: Average before day mean speed based on number of lanes (number of sites = 12)

		AFTER SPEED LIMIT			Grand Total
		50	55	60	
AVERAGE DAY MEAN SPEED_B		50	55	60	Grand Total
NUMBER OF LANES		2+	2+	2+	
BEFORE SPEED LIMIT	70	70.4*	69.1	71.6	70.4

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 234: Average after day mean speed based on number of lanes (number of sites = 12)

		AFTER SPEED LIMIT			Grand Total
		50	55	60	
AVERAGE DAY MEAN SPEED_A		50	55	60	Grand Total
NUMBER OF LANES		2+	2+	2+	
BEFORE SPEED LIMIT	70	53.3*	63.6	68.6	61.8

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 235: Average before day 85th percentile speed based on number of lanes (number of sites = 8)

BEFORE SPEED LIMIT	AVERAGE DAY 85 PERCENTILE SPEED_B	AFTER SPEED LIMIT			Grand Total
		50	55	60	
		NUMBER OF LANES	2+	2+	
70	-	75.3	76.2	75.8	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 236: Average after day 85th percentile speed based on number of lanes (number of sites = 8)

BEFORE SPEED LIMIT	AVERAGE DAY 85 PERCENTILE SPEED_A	AFTER SPEED LIMIT			Grand Total
		50	55	60	
		NUMBER OF LANES	2+	2+	
70	-	71.3	72.2	71.8	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 237: Average before standard deviation of speed based on number of lanes (number of sites = 12)

BEFORE SPEED LIMIT	AVERAGE STANDARD DEVIATION OF SPEED_B	AFTER SPEED LIMIT			Grand Total
		50	55	60	
		NUMBER OF LANES	2+	2+	
70	3.0*	8.1	5.3	5.5	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 238: Average after standard deviation of speed based on number of lanes (number of sites = 12)

		AFTER SPEED LIMIT			Grand Total
		50	55	60	
AVERAGE STANDARD DEVIATION OF SPEED_A		50	55	60	Grand Total
NUMBER OF LANES		2+	2+	2+	
BEFORE SPEED LIMIT	70	3.4*	8.7	4.9	5.7

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 239: Average before standard deviation of night speed based on number of lanes (number of sites = 12)

		AFTER SPEED LIMIT			Grand Total
		50	55	60	
AVERAGE STANDARD DEVIATION OF NIGHT SPEED_B		50	55	60	Grand Total
NUMBER OF LANES		2+	2+	2+	
BEFORE SPEED LIMIT	70	3.0*	7.1	5.2	5.1

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 240: Average after standard deviation of night speed based on number of lanes (number of sites = 12)

		AFTER SPEED LIMIT			Grand Total
		50	55	60	
AVERAGE STANDARD DEVIATION OF NIGHT SPEED_A		50	55	60	Grand Total
NUMBER OF LANES		2+	2+	2+	
BEFORE SPEED LIMIT	70	3.6*	7.1	4.6	5.1

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 241: Average before standard deviation of day speed based on number of lanes (number of sites = 12)

		AFTER SPEED LIMIT			Grand Total
AVERAGE STANDARD DEVIATION OF DAY SPEED_B		50	55	60	
NUMBER OF LANES		2+	2+	2+	
BEFORE SPEED LIMIT	70	1.9*	7.6	4.6	4.7

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 242: Average after standard deviation of day speed based on number of lanes (number of sites = 12)

		AFTER SPEED LIMIT			Grand Total
AVERAGE STANDARD DEVIATION OF DAY SPEED_A		50	55	60	
NUMBER OF LANES		2+	2+	2+	
BEFORE SPEED LIMIT	70	3.2*	8.4	4.4	5.3

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 243: Difference between before-after mean speed reduction (number of sites = 12)

		AFTER SPEED LIMIT			Grand Total
AVERAGE MEAN SPEED REDUCTION_B-A		50	55	60	
NUMBER OF LANES		2+	2+	2+	
BEFORE SPEED LIMIT	70	15.5*	5.5	2.9	8.0

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 244: Difference between before-after 85th percentile speed reduction (number of sites = 8)

		AFTER SPEED LIMIT			Grand Total	
		50	55	60		
		AVERAGE 85 PERCENTILE SPEED REDUCTION_B-A	50	55	60	Grand Total
		NUMBER OF LANES	2+	2+	2+	
BEFORE SPEED LIMIT	70	-	4.4	4.1	4.3	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 245: Difference between before-after night mean speed reduction (number of sites = 12)

		AFTER SPEED LIMIT			Grand Total	
		50	55	60		
		AVERAGE NIGHT MEAN SPEED REDUCTION_B-A	50	55	60	Grand Total
		NUMBER OF LANES	2+	2+	2+	
BEFORE SPEED LIMIT	70	13.3*	5.3	2.6	7.1	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 246: Difference between before-after night 85th percentile speed reduction (number of sites = 8)

		AFTER SPEED LIMIT			Grand Total	
		50	55	60		
		AVERAGE NIGHT 85 PERCENTILE SPEED REDUCTION_B-A	50	55	60	Grand Total
		NUMBER OF LANES	2+	2+	2+	
BEFORE SPEED LIMIT	70	-	4.9	3.5	4.2	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 247: Difference between before-after day mean speed reduction (number of sites = 12)

		AFTER SPEED LIMIT			Grand Total	
		50	55	60		
		AVERAGE DAY MEAN SPEED REDUCTION_B-A	50	55	60	Grand Total
		NUMBER OF LANES	2+	2+	2+	
BEFORE SPEED LIMIT	70	17.1*	5.4	3.0	8.5	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 248: Difference between before-after day 85th percentile speed reduction (number of sites = 8)

		AFTER SPEED LIMIT			Grand Total	
		50	55	60		
		AVERAGE DAY 85 PERCENTILE SPEED REDUCTION_B-A	50	55	60	Grand Total
		NUMBER OF LANES	2+	2+	2+	
BEFORE SPEED LIMIT	70	-	4.0	4.1	4.1	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 249: Difference between before-after standard deviation of speed reduction (number of sites = 12)

		AFTER SPEED LIMIT			Grand Total	
		50	55	60		
		AVERAGE STANDARD DEVIATION OF SPEED REDUCTION_B-A	50	55	60	Grand Total
		NUMBER OF LANES	2+	2+	2+	
BEFORE SPEED LIMIT	70	-0.4*	-0.6	0.3	-0.2	

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 250: Difference between before-after standard deviation of night speed reduction (number of sites = 12)

		AFTER SPEED LIMIT			Grand Total
		50	55	60	
AVERAGE STANDARD DEVIATION OF NIGHT SPEED REDUCTION_B-A		50	55	60	Grand Total
NUMBER OF LANES		2+	2+	2+	
BEFORE SPEED LIMIT	70	-0.5*	0.0	0.6	0.0

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 251: Difference between before-after standard deviation of day speed reduction (number of sites = 12)

		AFTER SPEED LIMIT			Grand Total
		50	55	60	
AVERAGE STANDARD DEVIATION OF DAY SPEED REDUCTION_B-A		2+	2+	2+	Grand Total
NUMBER OF LANES		2+	2+	2+	
BEFORE SPEED LIMIT	70	-1.3*	-0.8	0.2	-0.6

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 252: Difference between before mean speed and before speed limit (number of sites = 12)

		AFTER SPEED LIMIT		
		50	55	60
AVERAGE MEAN SPEED_B - BEFORE SPEED LIMIT		50	55	60
NUMBER OF LANES		2+	2+	2+
BEFORE SPEED LIMIT	70	-1.0*	-1.0	1.0

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 253: Difference between after mean speed and before speed limit (number of sites = 12)

		AFTER SPEED LIMIT		
		50	55	60
AVERAGE MEAN SPEED_A - BEFORE SPEED LIMIT		50	55	60
NUMBER OF LANES		2+	2+	2+
BEFORE SPEED LIMIT	70	-16.4*	-6.5	-1.9

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 254: Difference between after mean speed and after speed limit (number of sites = 12)

		AFTER SPEED LIMIT		
		50	55	60
AVERAGE MEAN SPEED_A - AFTER SPEED LIMIT		50	55	60
NUMBER OF LANES		2+	2+	2+
BEFORE SPEED LIMIT	70	3.6*	8.5	8.1

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 255: Difference between before 85th percentile speed and before speed limit (number of sites = 8)

		AFTER SPEED LIMIT		
		50	55	60
AVERAGE 85 PERCENTILE SPEED_B - BEFORE SPEED LIMIT		50	55	60
NUMBER OF LANES		2+	2+	2+
BEFORE SPEED LIMIT	70	-	5.7	6.0

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 256: Difference between after 85th percentile speed and before speed limit (number of sites = 8)

		AFTER SPEED LIMIT		
		50	55	60
AVERAGE 85 PERCENTILE SPEED_A - BEFORE SPEED LIMIT		50	55	60
NUMBER OF LANES		2+	2+	2+
BEFORE SPEED LIMIT	70	-	1.3	2.0

Note: Asterisks (*) are added to indicate the speed transition categories with only probe sites

Table 257: Difference between after 85th percentile speed and after speed limit (number of sites = 8)

		AFTER SPEED LIMIT		
AVERAGE 85 PERCENTILE SPEED_A - AFTER SPEED LIMIT		50	55	60
NUMBER OF LANES		2+	2+	2+
BEFORE SPEED LIMIT	70	-	16.3	12.0

Note: Asterisks () are added to indicate the speed transition categories with only probe sites*

APPENDIX C. REGRESSION MODEL RESULTS

Ordinary least square regression models were estimated to examine the relationship between reduction in speed and site characteristics including the difference between the before and after speed limits, and before speed limit alone. One model was estimated for reduction in mean speed and another model was estimated for the reduction in the 85th percentile speed. One objective of the model estimation was to determine if specific site characteristics are associated with a larger reduction in speed after the transition. The results of the regression models are provided following the Tables (Table 259 through Table 260).

Table 258: Linear model results for mean speed reduction

Dependent Variable = Before-after Mean Speed Reduction (<i>number of sites = 50</i>)				
Parameter	Estimate	Standard Error	t-value	p-value
Intercept	22.458	6.182	3.633	<0.001****
Before-After Speed Limit Difference	0.728	0.147	4.939	<0.001****
Before Speed Limit	-0.522	0.128	-4.085	<0.001****
Divided Facility	9.619	2.193	4.386	<0.001****
Horizontal Curve Presence	-2.307	1.158	-1.993	0.053*
Vertical Curve Presence	-2.293	1.178	-1.947	0.058*
Land Use Change (to more developed)	3.013	1.259	2.393	0.021**
AIC	284.518			
Multiple R-squared	0.440			
Adjusted R-squared	0.362			

p-value significance: '****' = <0.001; '***' = <0.01; '**' = <0.05; '*' = <0.1.

Table 259: Linear model results for 85th percentile speed reduction

Dependent Variable = Before-after 85 Percentile Speed Reduction (<i>number of sites = 37</i>)				
Parameter	Estimate	Standard Error	t-value	p-value
Intercept	32.406	6.420	5.047	<0.001****
Before-After Speed Limit Difference	0.321	0.141	2.272	0.031**
Before Speed Limit	-0.614	0.134	-4.590	<0.001****
Left Shoulder Width	0.691	0.305	2.263	0.032**
Right Shoulder Width	-0.599	0.255	-2.352	0.026**
Divided Facility	9.409	2.761	3.407	0.002***
Vertical Curve Presence	-2.811	1.092	-2.574	0.016**
Sidewalk Presence	-4.560	2.512	-1.815	0.080*
Land Use Change (to more developed)	2.927	1.241	2.359	0.026**
AIC	196.563			
Multiple R-squared	0.527			
Adjusted R-squared	0.392			

p-value significance: '****' = <0.001; '***' = <0.01; '**' = <0.05; '*' = <0.1.

Interpretation of Model Results

- In the model development process by elimination of variables that were statistically insignificant, the following variables were eliminated (the respective model type is included in the parentheses):
 - AADT (for both mean and 85th percentile speeds),
 - Left shoulder width (for only mean speeds),
 - Right shoulder width (for only mean speeds),
 - Lane width (for both mean and 85th percentile speeds),
 - A binary indicator variable indicating if the sites have more than 2 lanes (for both mean and 85th percentile speeds),
 - Presence of horizontal curves (for only 85th percentile speeds),
 - Presence of sidewalk (for only mean speeds),
 - Curb and gutter (for both mean and 85th percentile speeds),
 - Edgelines (for both mean and 85th percentile speeds),
 - Rural land use type (for both mean and 85th percentile speeds).
- As expected, a larger reduction in speed limits is associated with a larger reduction in speeds, for both mean speed and 85th percentile speed changes.
- A higher before speed limit is found to be associated with a lower speed reduction in both models.

- Divided facilities are shown to have a greater speed reduction for both mean and 85th percentile speeds.
- Shoulder width (both left and right) go away in the elimination process for the mean speed model. However, wider left shoulder is positively associated with a greater 85th percentile reduction, while counterintuitively, a wider right shoulder width is associated with a lower 85th percentile speed reduction. This could be due to the fact that the site characteristics are considerably different for wider right shoulder width sites. For instance, majority of the sites with right shoulder width ≤ 2 feet have mostly 2 lanes (22 out of 31), mostly undivided facilities (27 out of 31), average AADT approximately 5,100 vpd, and average before speed limit of ≤ 55 mph (includes 45 mph, 50 mph, and 55 mph) and average after speed limit of ≤ 45 mph for majority of the sites (28 out of 31), and include SR routes (and doesn't include interstates). Whereas, for the sites with right shoulder width > 2 feet, all have more than 2 lanes, are mostly divided facilities (17 out of 19 sites), average AADT is much higher, approximately 32,500 vpd, and before speed limit is ≥ 55 mph, and include interstates, and does not include any SR routes.
- The presence of a horizontal curve is associated with a smaller reduction in mean speed, and this is not consistent with the results from Cruzado and Donnell (2010).
- The presence of vertical curves is associated with a smaller reduction in mean and 85th percentile speeds.
- Land use change to more developed areas is associated with greater driver mean speed and 85th percentile speed reduction.
- The presence of a sidewalk is associated with lower 85th speed reduction, but this variable does not have a statistically significant effect on the mean speed reduction.

APPENDIX D. SPEED SIGNS

This section outlines the different speed signs and advance warning signs used at the speed transition zones with examples.

Examples of After-Transition Speed Signs

The most common type of after-transition speed sign was conventional speed limit sign on the right-hand side of the roadway as can be seen in Figure 184. This type of signing is present at 31 out of 50 sites after the speed transition.



Figure 188: Conventional speed limit sign

At several other sites, the conventional signings are present on both sides of the road (i.e., double indicated signs) as Figure 185. This type of signing is present at 13 out of 50 sites.



Figure 189: Double indicated speed limit signs

At 6 sites, the after-speed signs were different than the aforementioned types as can be seen in Figure 186 through Figure 190.



Figure 190: Alternative speed sign 1



Figure 191: Alternative speed sign 2



Figure 192: Alternative speed sign 3



Figure 193: Alternative speed sign 4



Figure 194: Alternative speed sign 5

Examples of Advance Warning Speed Signs

The most common type of advance warning signs at these sites were those with reduced limit speed mentioned in the yellow diamonds and an arrow in it. While these are mostly present (at 31 sites out of 50 sites) at one side of the road, at 14 sites they are present on both sides of the road. These signs are shown in Figure 191 through Figure 192.



Figure 195: Advance warning sign 1



Figure 196: Double indicated advance warning sign 2

At 2 sites, alternative advance warning signs are present as shown in Figure 193 through Figure 194.



Figure 197: Alternative advance warning sign 1



Figure 198: Alternative advance warning sign 2

There were only 4 sites at which an advance warning sign with “Reduced Speed Ahead” text were present as shown in Figure 195 through Figure 196. These signs were present either at one side or both sides of the road.



Figure 199: Alternative advance warning sign 3



Figure 200: Alternative advance warning sign 4