

**Speed Study Evaluation of  
Crosswalk Relocation & Dual Speed Table Installation**

**Order # 4100000250  
SR 1730 (Turkey Farm Road)  
Stoneridge/Sedgefield Swim & Racquet Club  
Orange County**

Documents Prepared By:

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9-28-2010  
Date

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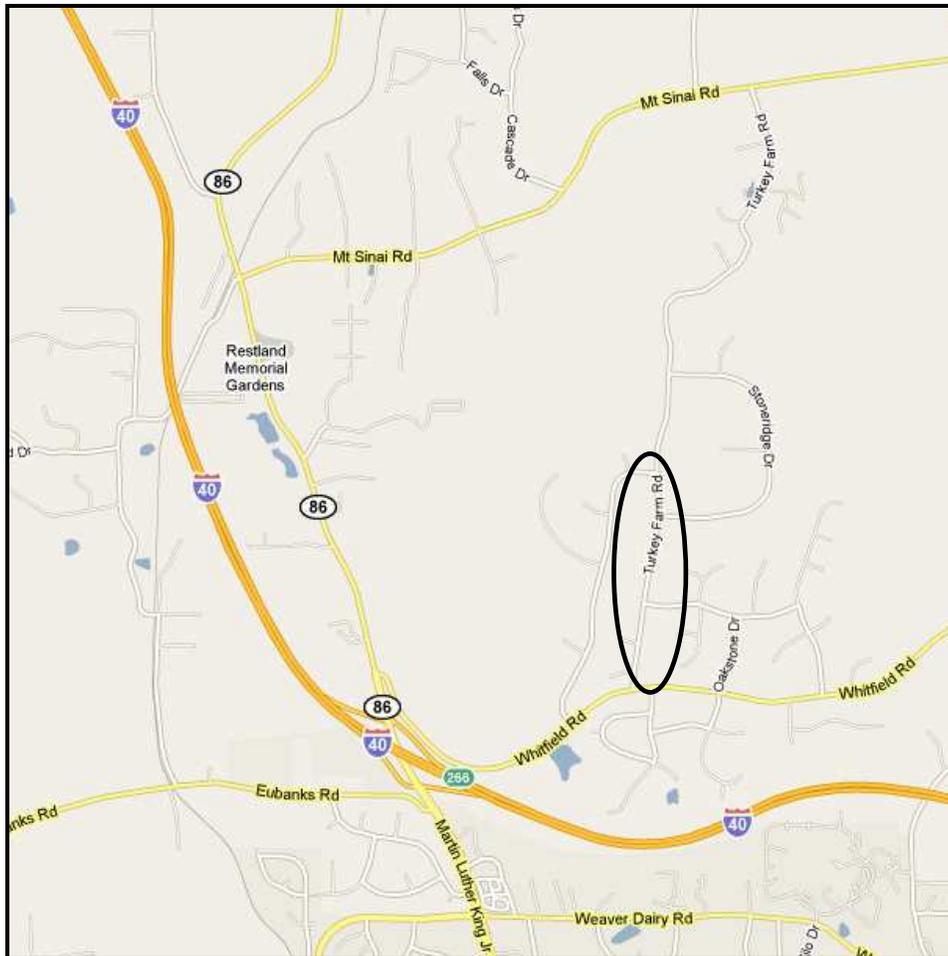
## Introduction

When new traffic safety countermeasures are applied to the transportation system of North Carolina roadways, it is the responsibility of the NCDOT Safety Evaluation Group to determine the effectiveness of these countermeasures. Speed reduction tables have not previously been installed on a Secondary Road within our state's transportation network and for this reason; the following evaluation has been conducted.

The goal of this project is to determine if the use of dual speed tables are effective in creating speed limit compliance and adding safety to crossing pedestrians. The measure of effectiveness for this project will be to collect speed data and review vehicle speeds, average speeds, and percentage of vehicles exceeding the speed limit within the collected data sets.

## Location

Speed Study Evaluation located along SR 1730 (Turkey Farm Road) between Whitfield Road and Stoneridge Drive in Orange County, north of the City of Chapel Hill. Please see the following map, aerial (before period), and photos of the before-after countermeasure.





**Before Period Crosswalk Location**

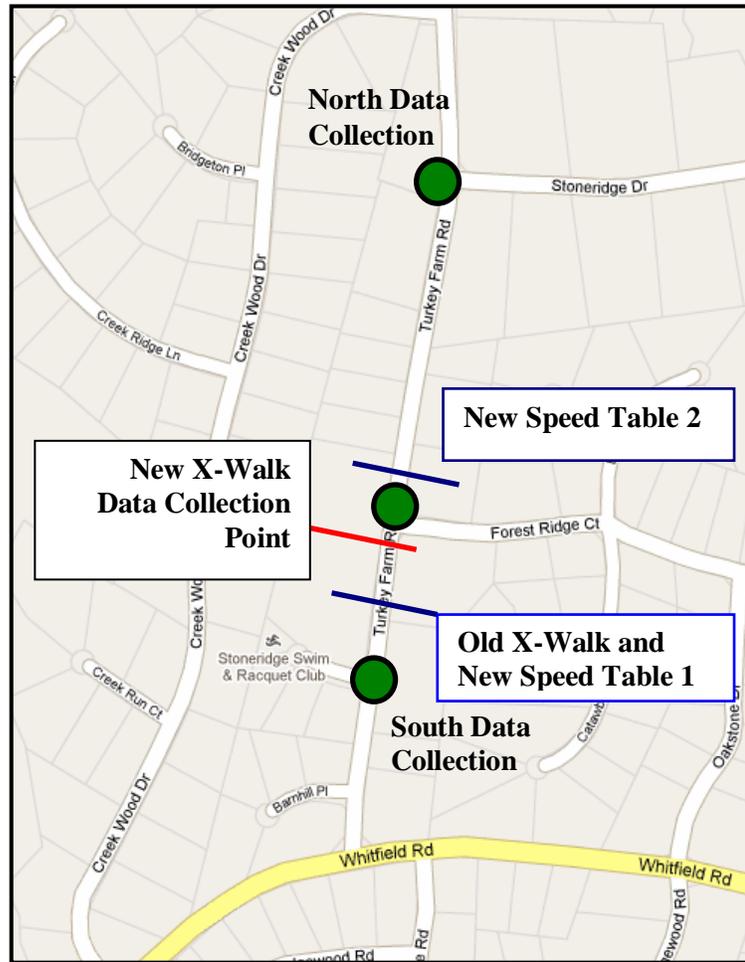


**After Period – Crosswalk Relocation with Speed Tables  
20 MPH Advisory Speed Limit for Speed Tables**

### **Site Characteristics and Improvements**

SR 1730 (Turkey Farm Road) is a two-lane rural through road that connects Whitfield Road and Mt. Sinai Road north of Chapel Hill. This roadway accesses two major neighborhoods (Stoneridge and Sedgefield) with the Swim and Racquet Club located on the southern end of the roadway. This area is heavily wooded with lots of residential driveways and the roadway is designed with multiple vertical curves. Many pedestrians use SR 1730 as a walking / bicycle path and walk / cross the road to access the community center.

For this reason, a crosswalk had previously been installed at the crest of the vertical curve located directly in front of the community center (see aerial map). However, this facility was rarely used due to the fact that it crossed into a resident's private property and did not have sidewalks connecting it to other major facilities. Most pedestrians would rather cut across the grass and cross SR 1730 at the intersection of Forest Ridge Drive. Citizens have been concerned about the speed of vehicles along this roadway and the safety of pedestrians (especially children) crossing the roadway to access the swim and racquet club.



From the diagram above, the countermeasure installed a speed table over top the previous crosswalk at the crest of the vertical curve, relocated the crosswalk north to the Forest Ridge intersection, and installed a second speed table north approximately 200 feet of the Forest Ridge intersection. The diagram also indicates the three locations of our data collection: at the crosswalk, north, and south of the countermeasure.

### **Data Collection**

Data was collected using the Lidar Gun. Before data collection began, the accuracy of the Lidar Gun was tested using standard procedure stated in the user manual. The results indicated that the device’s speed accuracy and distance measurements were exact.

Data was collected at each location for three (3) hours while collecting both directions of travel. Speeds were attempted to be collected in an inconspicuous manner so as not to influence the driver’s speed or behavior. All data collection took place in peak hour time frames, between the hours of 3:00 PM and 6:00 PM, in order to account for the majority of the commuter vehicles in/out of this community. The Safety Evaluation group collected data on Wednesdays and Thursdays for the best representation of commuter vehicles (every day traffic).

Weather was the main factor in maintaining consistent data collection. Required conditions were having a dry roadway with overcast or sunny skies. These conditions also best represented

pedestrian roadway usage and use of the community tennis courts and pool that the crosswalk provided safe passage.

The following measures of effectiveness (MOEs) were collected / analyzed from the data:

- ◆ **Vehicle Speeds** – speed chosen by the lead driver and collected using the Lidar Gun
- ◆ **Average Speed** – speeds collected per location averaged
- ◆ **Percentage of Vehicles Exceeding Speed Limit** – graphed results

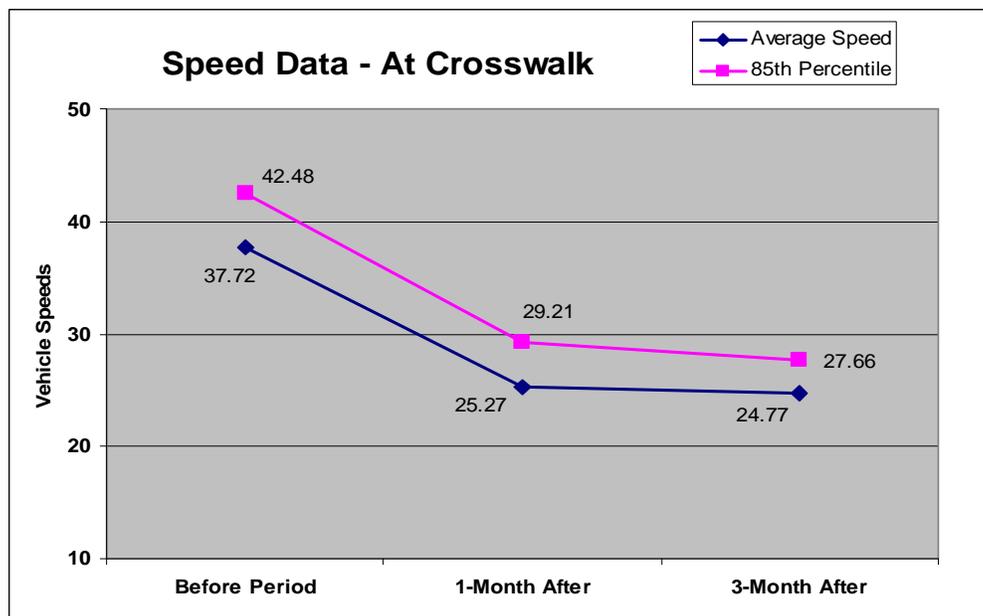
The after period data was collected once the entire project was completed (speed tables, striping, and proper signage) and had been in place for at least four weeks. This was done so that any novelty effect caused by the new roadway geometrics would not impact the data.

### Results

Figures 1 through 3 below show the results of the speed data collected for our analysis at the three different data collection sites. The data in figure 1 is shown with combined northbound and southbound data because the difference between directions was determined to be small and insignificant.

<b>At Crosswalk – Forest Ridge Court</b>			
	Before Period	1 Month After	<b>3 Month After</b>
Total Observations	235	171	<b>109</b>
Average Speed	37.72	25.27	<b>24.77</b>
85 <sup>th</sup> Percentile	42.48	29.21	<b>27.66</b>
% Exceeding Speed Limit	66.8 %	1.2 %	<b>0.92 %</b>

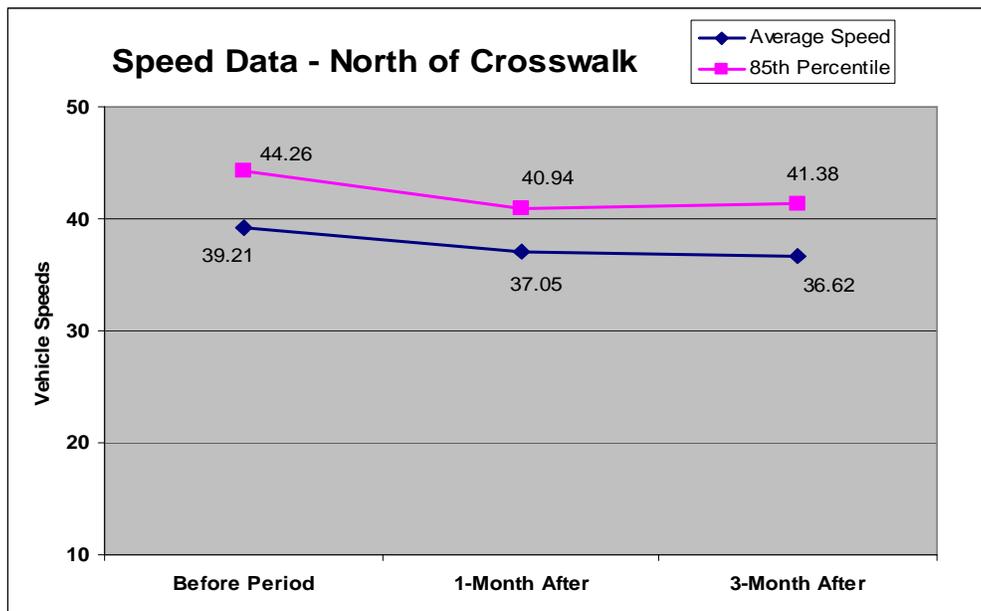
**Figure 1: Crosswalk Data**



The previous chart and graph (Figure 1) represent the speed data for the crosswalk located on SR 1730 (Turkey Farm Road). This data was collected at the crosswalk atop the vertical curve during the before period and was moved approximately 200 feet north during the after period which it was then positioned between the two (2) speed tables. The data shows a sharp decline in all categories with reduction in vehicles speeding from 67 percent to 1 percent through the analysis. The speed tables are posted with a 20-mph advisory speed limit; however the study was based on the 35-mph posted roadway speed limit since the 20-mph speed limit can not be legally enforced.

<b>North of Crosswalk – Stoneridge Drive</b>			
	Before Period	1 Month After	3 Month After
Northbound Observations	58	62	<b>74</b>
NB Average Speed	39.21	37.05	<b>36.62</b>
NB 85 <sup>th</sup> Percentile	44.26	40.94	<b>41.38</b>
% Exceeding Speed Limit	75.9 %	61.3 %	<b>58.1 %</b>

**Figure 2: North of Crosswalk Data**

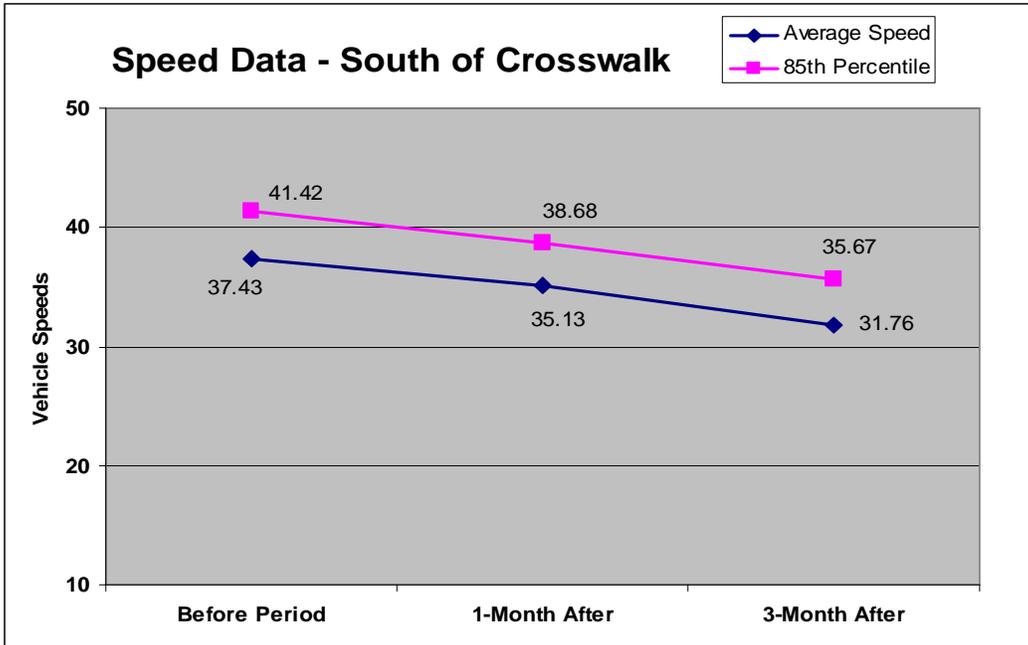


The previous chart and graph (Figure 2) represent the speed data for SR 1730 (Turkey Farm Road) located north of the crosswalk. This data was collected at the intersection of Turkey Farm Road and Stoneridge Drive in free-flow traffic conditions for northbound vehicles only. The Safety Evaluation Group wanted to verify that installation of the speed tables had not caused motorists to change their upstream driving behaviors. We anticipated that vehicles would accelerate and speed following the speed table installation in order to compensate for time lost.

However, the data above shows that the vehicle speeds north of the crosswalk actually reduced slightly (by 2.5 miles per hour) and have been maintained through the 3-month period. The percentage of vehicles exceeding the posted 35 mph speed limit also decreased by more than 15 percent through our evaluation.

<b>South of Crosswalk – Hollowood Court</b>			
	Before Period	1 Month After	<b>3 Month After</b>
SB Total Observations	65	64	<b>71</b>
SB Average Speed	37.43	35.13	<b>31.76</b>
SB 85 <sup>th</sup> Percentile	41.42	38.68	<b>35.67</b>
% Exceeding Speed Limit	63.1 %	51.6 %	<b>19.7 %</b>

**Figure 3: South of Crosswalk Data**



The previous chart and graph (Figure 3) represent the speed data for SR 1730 (Turkey Farm Road) located south of the crosswalk. This data was collected at the intersection of Turkey Farm Road and Hollowood Court in free-flow traffic conditions for southbound vehicles only. The Safety Evaluation Group wanted to verify that installation of the speed tables had not caused motorists to change their downstream driving behaviors. We anticipated that vehicles would accelerate and speed following the speed table installation in order to compensate for time lost.

However, the data above shows that the vehicle speeds south of the crosswalk actually reduced slightly (by 4 miles per hour of the 85<sup>th</sup> percentile speeds at the 1-month mark) and have been maintained and reduced further through the 3-month period. The percentage of vehicles exceeding the posted 35 mph speed limit at this location also decreased by more than 40 percent through our evaluation. Since the distance between the speed tables and the stop sign at Whitfield Road was minimal, we discovered that motorists drove conservatively through this segment from the necessity for speed reduction due to crossing speed tables as well as slowing to stop at the stop sign.

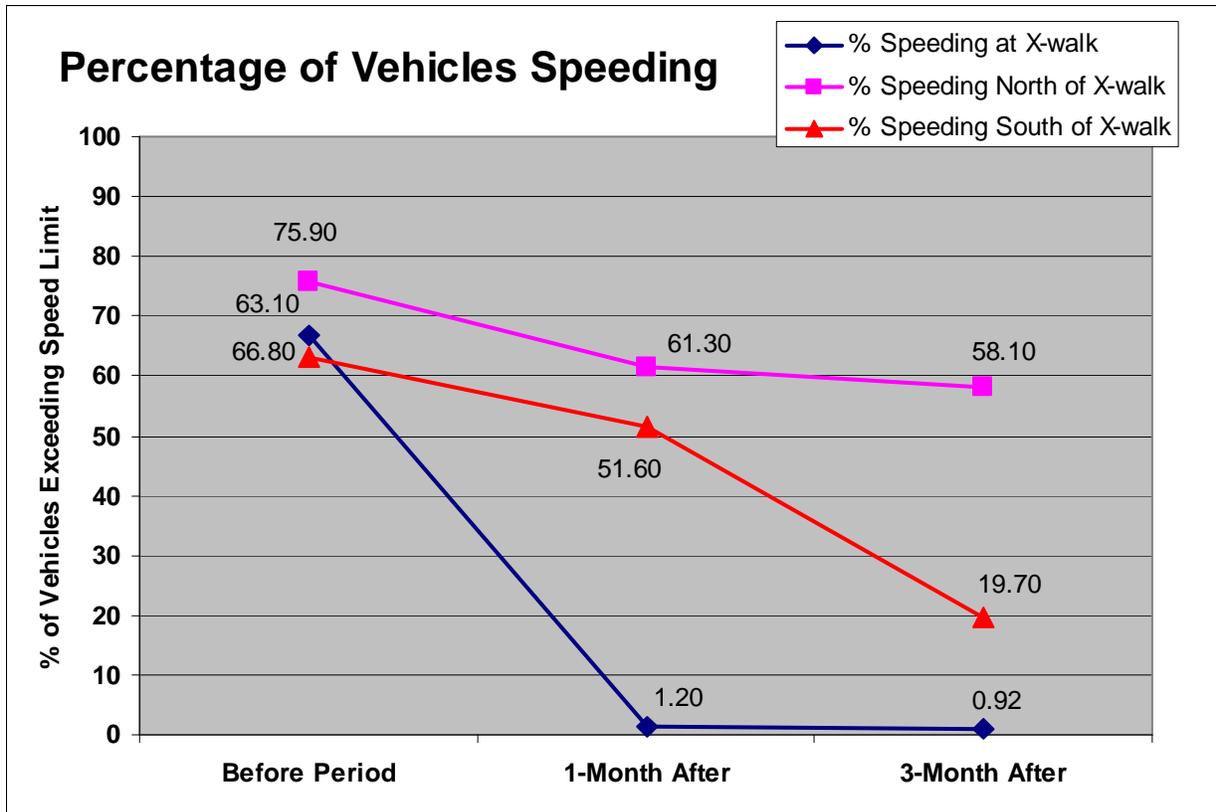


Figure 4: Graph of Percentage Exceeding Speed Limit

The previous graph (Figure 4) compares the reduction in the percentage of vehicles exceeding the speed limit of the three different data locations. We would anticipate much higher speed compliance at the crosswalk location since the roadway is forcing motorists to reduce below the 35 mph posted speed limit to safely traverse the speed tables. However, the data indicates that higher compliance is still yet achieved at the 3-month mark at all three locations.

The Safety Evaluation Group also collected observation pedestrian crossing, pedestrian walking roadway, and bicycle counts at the crosswalk location during our speed data collection periods. The following table (Figure 5) lists the results. The pedestrian count data is a small representation of actual counts since the collection was limited to one day (3-hour period) with unknown information about organized community events or local school calendars. Even then, the roadway appears to be heavily used by the community for pedestrian accessibility and also as an exercise route.

	Before Aug 2009	1-Month June 2010	3-Month Aug 2010
<b>Ped Crossing</b>	14	1	3
<b>Ped Walking</b>	11	0	2
<b>Bicycle</b>	19	5	6

Figure 5: Table of Pedestrian Observation

## Final Comments

Speed compliance on our roadways is a key strategic goal of the NCDOT. From an initial glance of the evaluation data associated with the installation of these speed tables, speed reduction was achieved across the board. The average traveling speed, 85<sup>th</sup> percentile speeds, and even the percentage of vehicles exceeding the posted 35-mph speed limit were all reduced at this location. The speed tables also appeared to have a lingering and lasting effect on the entire roadway including driver behavior north and south of the countermeasure area.

While conducting our evaluation, the Safety Evaluation Group observed multiple wildlife (deer) crossing this roadway as well. With speed reduction, not only is the roadway safety improved for pedestrians but it also allows motorists more reaction time for other outside nature events. This improvement has the potential to additionally reduce crashes along this segment of roadway.



In completing our 3-month after analysis, multiple interviews were conducted with near-by residents. The community is very pleased with the results of this countermeasure and the enhanced safety they feel in using the SR 1730 facility for accessing their community center.