

# **Spot Safety Project Evaluation**

Project Log # 200611069

Spot Safety Project # 07-97-205 and 07-99-203

## **Spot Safety Project Evaluation of the Installation of a Traffic signal and Left Turn Lanes on two approaches of SR 1536 (Penny Rd) at SR 1545 (East Fork Rd) Guilford County**

Documents Prepared By:

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**Principal Investigator**

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2-13-2007  
Date

# ***Spot Safety Project Evaluation Documentation***

## **Subject Location**

Evaluation of Spot Safety Project Number 07-97-205 and 07-99-203: SR 1536 (Penny Rd) at SR 1545 (East Fork Rd) in Guilford County.

## **Project Information and Background from the Project File Folder**

The spot safety project improvement countermeasures chosen for the subject location was the installation of a traffic signal and left turn lanes on the southbound approach of SR 1536 (Penny Rd) and the westbound approach of SR 1545 (East Fork Rd). Both roadways are two-lane facilities at the subject location with speed limits of 45 and 40 mph respectively.

The initial statement of problem was the rear-end crash pattern focused on the East Fork Road approach. The subject location is a three-leg intersection which was initially controlled by a stop condition on SR 1545 (East Fork Rd).

The initial crash analysis for the left-turn lane installation (SS# 07-97-205) was conducted from June 1, 1995 to May 31, 1998, which included 14 crashes and a severity index of 4.17. Of the reported crashes during this period, seven of them were deemed correctable by the installation of left turn lanes. The final completion date for the installation of left turn lanes at the subject intersection was on January 8, 2002 with a total cost of \$150,000.00.

After the installation of the left-turn lanes, a citizen requested an examination to see if a signal was warranted at the intersection. The initial crash analysis for the traffic signal (SS# 07-99-203) was conducted from March 1, 1996 to February 28, 1999, which included 9 crashes and a severity index of 4.70. Of the reported crashes during this period, two of them were deemed correctable by the installation of a signal. The concern is that vehicles on westbound SR 1545 and southbound SR 1536 cannot safely enter the intersection due to insufficient gaps in traffic. The signal would benefit in alleviating left-turn same roadway crashes and primarily reduce delay on SR 1545 (East Fork Road). The signal was approved by signal warrants 1, 9, and 11.

The final completion date for the installation of the traffic signal was on April 12, 2002 at a total cost of \$30,000.

## **Naive Before and After Analysis**

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from November 1, 2001 through May 31, 2002. The before period consisted of reported crashes from August 1, 1997 through October 31, 2001 (3 years, 3 months) and the after period consisted of reported crashes from June 1, 2002 through August 31, 2006 (3 years, 3 months). The ending date

for this analysis was determined by the available crash data at the time the crash analysis was completed.

The treatment data consisted of all crashes on a located 150 feet from the intersection in question on all three approaches of SR 1536 and SR 1545. *Please see attached location map and photos for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Rear End Crashes on the southbound approach of SR 1536, westbound approach of SR 1545 and Left Turn – Same Roadway Crashes involving southbound vehicles on SR 1536 (Penny Rd) turning left onto SR 1545 were the target crashes for the applied countermeasure.

<b><u>Treatment Information</u></b>			
	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total crashes	30	19	- 36.67
Total Severity Index	2.73	3.73	36.63
Target Crashes	24	16	- 33.33
Target Crashes Severity Index	1.79	3.18	77.65
Volume	16,600	19,200	15.67

Table 1

<b><u>Injury Crash Summary</u></b>		
	<b>Before</b>	<b>After</b>
Fatal Injury Crashes	0	0
Class A Injury Crashes	0	0
Class B Injury Crashes	2	2
Class C Injury Crashes	5	5
Total Injury Crashes	7	7

Table 2

The naive before and after analysis at the treatment location resulted in a 37 percent decrease in Total Crashes, a 33 percent decrease in Target Crashes, and a 15 percent increase in Average Daily Traffic (ADT). The before period ADT year was 1999 and the after period ADT year was 2004.

## **Results and Discussion**

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 37 percent decrease in Total Crashes and a 33 percent decrease in Target Crashes, while the ADT increased 15 percent. The total severity index increased 36 percent while the target crash severity index increased 78 percent. The summary results above demonstrate that the treatment location appears to have had a decrease in both Total Crashes and Target Crashes from the before to the after period although the target severity great increased.

From table 2, we observe the exact same number of injury crashes in the before and after period at this location. Having the same number of injury crashes explains the increase in the severity index by the elimination of more “PDO” crashes after the countermeasures were installed.

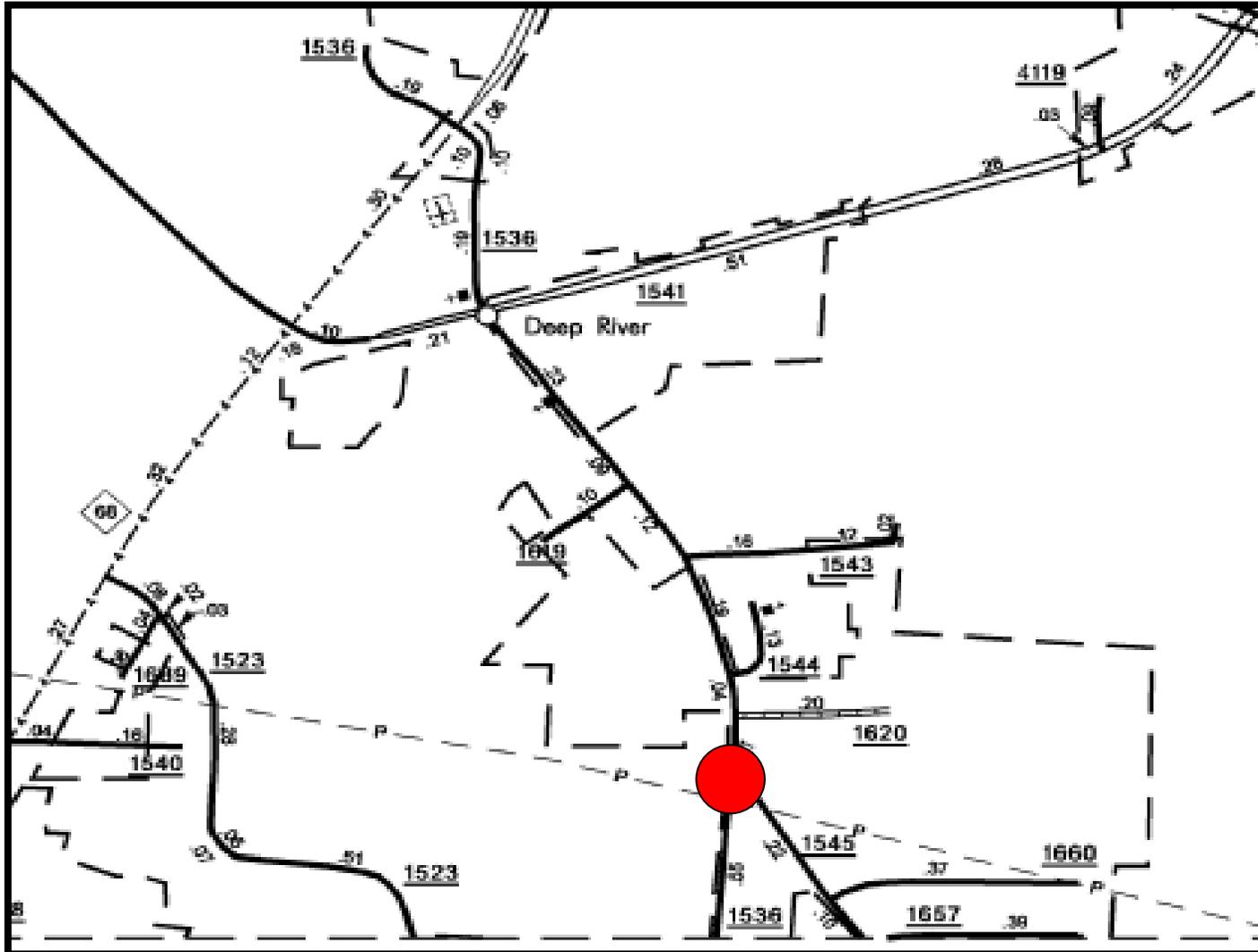
Referencing the *Collision Diagrams*, there appears to be definitive support suggesting that the traffic signal and turn lane on East Fork Rd helped in decreasing rear-end collisions on this approach. The before period consisted of 20 rear-end collisions while the after period had nine (9). The presence of after period rear-end collisions on this approach suggests that the vehicles are being held up by others turning right and not left. The skew of this intersection and the demands of surrounding influences are both key factors that would lead the driver to take their eyes off the roadway in front of them. This intersection is also located within a school zone to the north and would suggest an explained increase in volume for a short period of time throughout the day.

Referencing the *Collision Diagrams* and the previous table, it is also observed the development of a new crash pattern in the intersection. The before period presented one (1) same roadway left turn collision involving vehicles on Penny Rd. The after period showed three (3) crashes of this type. Explanation is not definitive for the cause of this pattern but the realignment for left-turn lane installation of SR 1536 (Penny Rd) and accurately judging sight distance are core factors.

Please see the attached *Treatment Site Photos*. Photos are provided for all three approaches to the subject location.

As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of intersection.

**Location Map  
Guilford County  
Evaluation of Spot Safety Project # 07-97-205**



**Treatment Location: SR 1536 (Penny Road) at SR 1545 (East Fork Road)**

**TREATMENT SITE PHOTO TAKEN 12/19/2006**



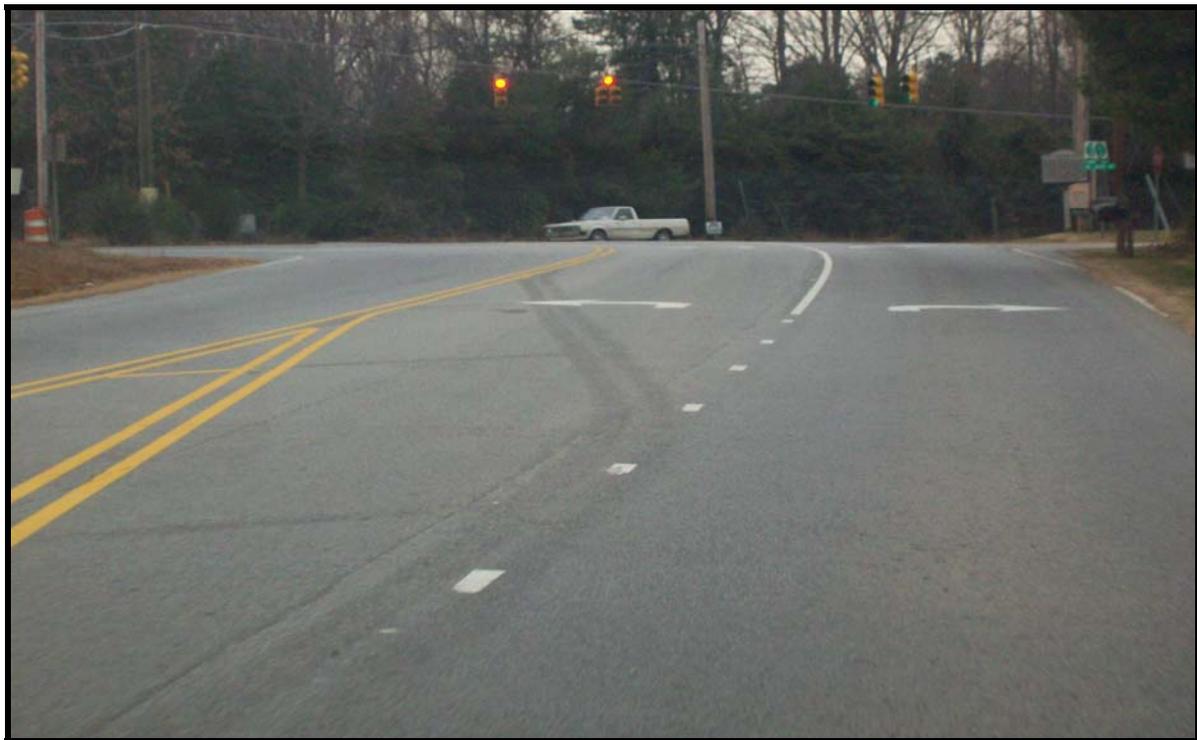
Traveling South on SR 1536 (Penny Rd)



Traveling North on SR 1536



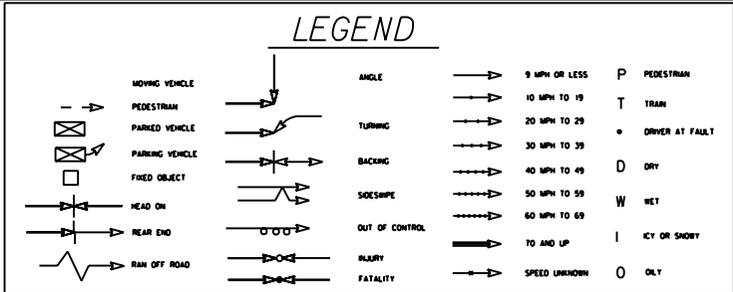
Traveling West on SR 1545 (East Fork Rd)



Traveling West on East Fork Road

SR 1536  
Penny Road  
45 MPH

SCHOOL  
SZ Times:  
7:25-8:25am  
2:05-3:05pm



Private Drive

Mc Deer Rd

BEFORE PERIOD  
GUILFORD COUNTY  
8/1/1997 - 10/31/2001  
SR 1536 (PENNY RD)  
at  
SR 1545 (E. FORK RD)

40 MPH

SR 1545  
East Fork Road

SR 1536  
Penny Road

NOTE: Intersection located  
in SchoolZone



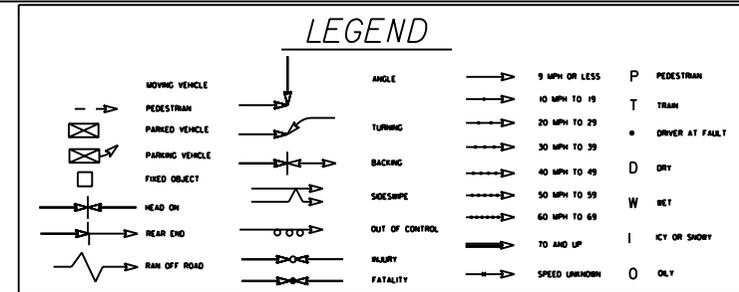
**TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT**

	COLLISION DIAGRAM	
	DIVISION: 7	AREA:
STUDY PERIOD: 8/1/1997 TO 10/31/2001		
DISTANCE: Y-LINE + 150FT		
ANALYSIS PREPARED BY: JBS		
ANALYSIS CHECKED BY: CS		
DIAGRAM PREPARED BY: JBS		
DIAGRAM REVIEWED BY:		
SCALE: NOT TO SCALE		
DATE: 8-28-2006		
LOG NUMBER: 55* 07-97-205		

**N.C. DEPARTMENT of TRANSPORTATION**  
**DIVISION of HIGHWAYS**  
**TRAFFIC ENGINEERING AND SAFETY**  
**SYSTEMS BRANCH**

SR 1536  
Penny Road  
45 MPH

SCHOOL  
SZ Times:  
7:25 - 8:25am  
2:05 - 3:05pm



AFTER PERIOD  
GUILFORD COUNTY  
6/1/2002 - 8/31/2006  
SR 1536 (PENNY RD)  
at  
SR 1545 (E. FORK RD)

NOTE: Intersection located within School Zone

Private Driveway

Mc Deer Rd

40 MPH

SR 1545  
East Fork Road

SR 1536  
Penny Road  
45 MPH

Countermeasures:  
SS# 07-97-205: Left Turn Lanes  
(Completed 1/8/2002)  
SS# 07-99-203: Traffic Signal  
(Completed 4/12/2002)



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM	
DIVISION: 7	AREA:
STUDY PERIOD: 6/1/2002 TO 8/31/2006	
DISTANCE: Y-LINE = 150FT	
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: CS	
DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY:	
SCALE:	NOT TO SCALE
DATE:	8-28-2006
LOG NUMBER:	SS* 07-97-205

N.C. DEPARTMENT of TRANSPORTATION  
DIVISION of HIGHWAYS  
TRAFFIC ENGINEERING AND SAFETY  
SYSTEMS BRANCH