

# **Spot Safety Project Evaluation**

Project Log # 200512158

Spot Safety Project # 05-99-204

**Spot Safety Project Evaluation of the Traffic Signal Installation  
At the Intersection of SR 1375 (Lake Wheeler Rd) and SR 1393 (Hilltop-Needmore Rd)  
Wake County**

Documents Prepared By:

Safety Evaluation Group  
Traffic Safety Systems Management Section  
Traffic Engineering and Safety Systems Branch  
North Carolina Department of Transportation

**Principal Investigator**

\_\_\_\_\_  
Brad Robinson, EI

Traffic Safety Project Engineer

12/7/2006  
Date

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

## **Subject Location**

Evaluation of Spot Safety Project Number 05-99-204 – The Intersection of SR 1375 (Lake Wheeler Rd) and SR 1393 (Hilltop-Needmore Rd) in Wake County.

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

The spot safety project improvement countermeasure chosen for the subject location was the installation of a traffic signal. SR 1375 (Lake Wheeler Rd) and SR 1393 (Hilltop-Needmore Rd) are both 2-lane roads with no turn lanes and speed limits of 45 mph in the study area. The subject location is a four-leg intersection, which had a flasher in the before period and was controlled by oversized stop signs on SR 1375.

The original statement of problem was that vehicles on SR 1393 could not safely cross or enter the intersection due to insufficient gaps in traffic. Several private citizens submitted requests for a signal at the intersection. There was a fatal accident at the intersection on November 23, 1998. After an investigation, it was determined that the intersection met traffic signal warrant 11.

The initial crash analysis was completed from November 1, 1995 to October 31, 1998 with 16 reported crashes, including 13 Angle Crashes that were considered correctable by the chosen countermeasure. Three class “A”, six class “B” and 18 class “C” injuries resulted from the correctable accidents. The final completion date for the improvement at the subject intersection was on May 16, 2000 with a total cost of \$35,000.00.

## **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 April 1, 2000 to June 30, 2000. The before period consisted of reported crashes from May 1, 1994 through March 31, 2000 (5 years and 11 months) and the after period consisted of reported crashes from July 1, 2000 through May 31, 2006 (5 years and 11 months). The ending date for this analysis was determined by the available crash data at the time the analysis was completed.

The treatment data consisted of all crashes within 150 feet of the subject intersection. *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 Frontal Impact Crashes were the target crashes for the applied countermeasure. The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle. One Ran-Off-Road Crash was included as a target crash in the before period that involved a driver swerving to avoid a Frontal Impact Crash.

<b>Treatment Information</b>			
	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total crashes	31	20	-35.5
Total Severity Index	10.90	7.75	-28.9
Target Crashes	28	14	-50.0
Target Crash Severity Index	11.17	8.53	-23.6
Volume	8,100	9,500	17.3
<b>Injury Summary</b>			
Fatal injuries	1	0	-100.0
Class A injuries	3	2	-33.3
Class B injuries	11	4	-63.6
Class C Injuries	31	12	-61.3
Total Non-Fatal Injuries	45	18	-60.0
Total Injuries	46	18	-60.9

The naive before and after analysis at the treatment location resulted in a 36 percent decrease in Total Crashes, a 50 percent decrease in Target Crashes, a 29 percent decrease in the Total Severity Index, and a 17 percent increase in Average Daily Traffic (ADT). The before period ADT year was 1997 and the after period ADT year was 2003.

## **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 36 percent decrease in Total Crashes and a 50 percent decrease in Target Crashes, with a 17 percent increase in ADT. The Total Severity Index decreased by 29 percent and the Target Crash Severity Index decreased by 24 percent. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have decreased at the treatment location from the before to the after period.

Referencing the *Collision Diagrams*, the installation of the signal greatly reduced the crash pattern between southbound SR 1375 vehicles and westbound SR 1393 vehicles (from 12 to 1), although Angle Crashes between southbound SR 1375 vehicles and eastbound SR 1393 vehicles increased by 40 percent (from 5 to 7). After conducting a field investigation it was observed that there is plenty of sight distance from both the southbound and eastbound approaches to the intersection. Referencing the *Collision Diagram, After Period*, 4 of the 7 after period crashes between southbound and eastbound vehicles involved an eastbound driver running the signal. There are no other signals within 3 miles west of the intersection, which might contribute to drivers not expecting a traffic signal at this location.

Rear-End collisions increased 200 percent at the intersection from the before to the after period (from 2 to 6).

Please see the attached *Treatment Site Photos*. Photos are provided for all approaches to the treatment intersection.

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.





**Treatment Site Photos Taken October 11, 2006**



Looking North on SR 1375 (Lake Wheeler Rd)



Looking South on SR 1375 (Lake Wheeler Rd)



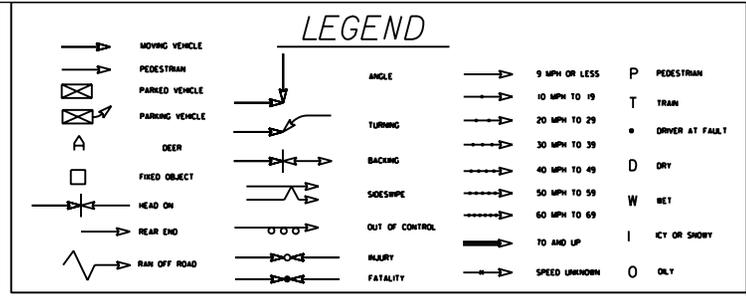
Looking East on SR 1393 (Hilltop-Needmore Rd)



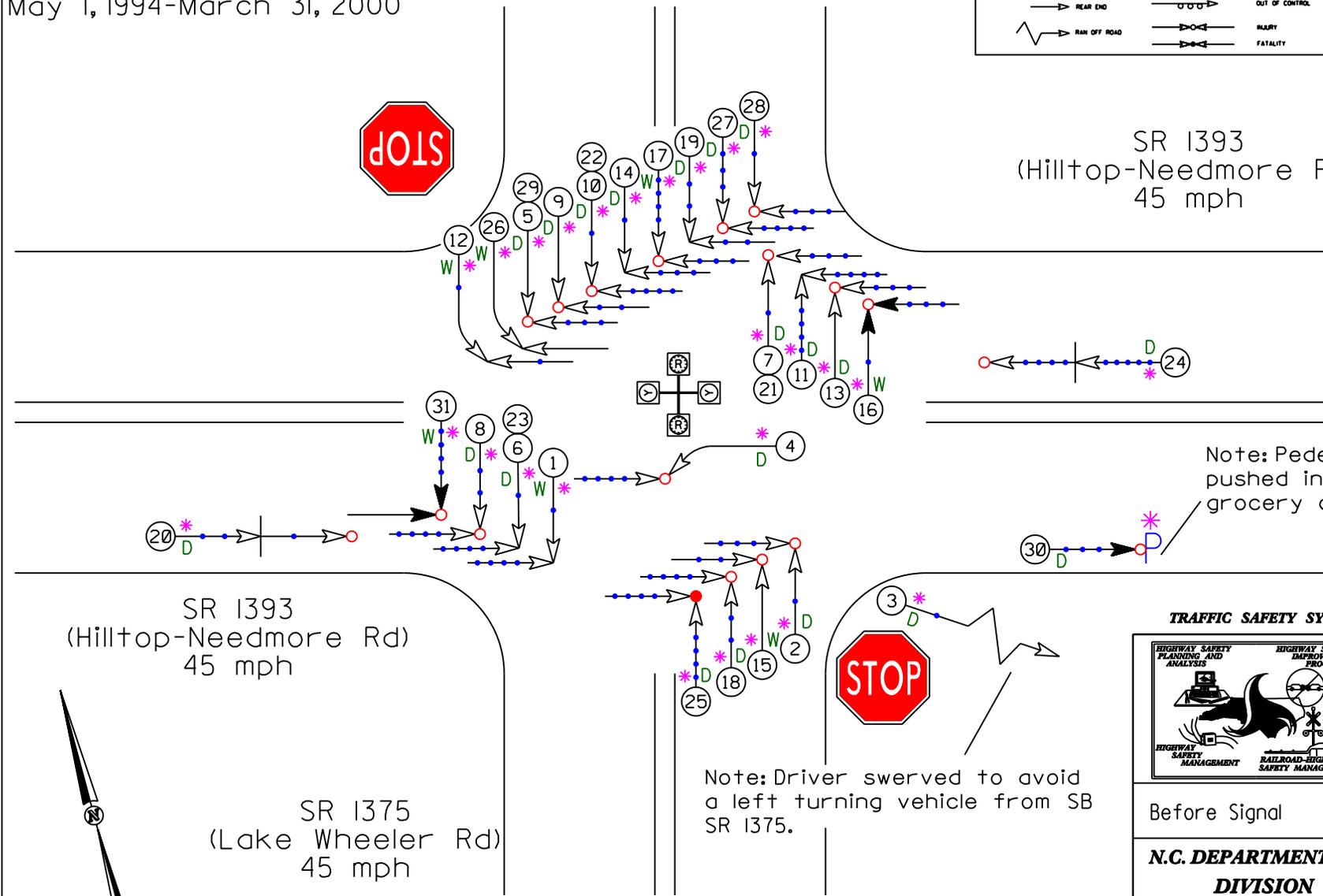
Looking West on SR 1393 (Hilltop-Needmore Rd)

Wake County  
 SR 1375 (Lake Wheeler Rd) at  
 SR 1393 (Hilltop-Needmore Rd)  
 Treatment Site in the  
 Before Period  
 May 1, 1994-March 31, 2000

SR 1375  
 (Lake Wheeler Rd)  
 45 mph



SR 1393  
 (Hilltop-Needmore Rd)  
 45 mph



Note: Pedestrian was being pushed in the road on a grocery cart

Note: Driver swerved to avoid a left turning vehicle from SB SR 1375.

**TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT**



COLLISION DIAGRAM	
DIVISION: 5	AREA:
STUDY PERIOD: 5/1/94 - 3/31/00	
DISTANCE: Y-LINE = 150 ft	
ANALYSIS PREPARED BY: B Robinson	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: B Robinson	
DIAGRAM REVIEWED BY:	
SCALE: NOT TO SCALE	
DATE: September 2006	
LOG NUMBER: 2005258	

Before Signal

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

