

Spot Safety Project Evaluation

Project Log # 200501221

Spot Safety Project # 05-99-212

Spot Safety Project Evaluation of the Flashing Traffic Signal Installation at the Intersection of SR 1010-Ten Ten and SR 2727-Crowder Road/Sauls Road in Wake County.

Documents Prepared By:

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08/15/2005
Date

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Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 05-99-212 – The Intersection of SR 1010-Ten Ten and SR 2727-Crowder Road/Sauls Road in Wake County.

Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naive before and after analysis of the treatment versus comparison data has been completed to measure the effectiveness of the spot safety improvement. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

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 flashing traffic signal. SR 1010 is a two-lane facility with no left turn lanes at the intersection with SR 2727-Crowder Road/Sauls Road. SR 2727-Crowder Road/Sauls Road is also a two-lane facility with no left turn lanes. SR 1010-Ten Ten and SR 2727-Crowder Road/Sauls Road both have a speed limit of 45 mph. The intersection is controlled by stop signs on SR 2727. Angle crashes continued to occur at the intersection after previous countermeasures were implemented (including dual stop ahead signs on SR 2727, oversized stop signs, and advance crossroad warning signs with 35-mph advisory speed on SR 1010). The engineer requesting the countermeasures felt motorists were having difficulty identifying the existing traffic control and that a flashing traffic signal would better identify it. The initial crash analysis for this location was completed from December 1, 1995 through November 30, 1998 with a total of 15 reported crashes. There were eleven Angle crashes, one Left-Turn crash, two Ran off Road crashes, and one Backing crash. There were no class A injuries, two class B injuries, and six class C injuries resulted from these accidents. The final completion date for the flashing traffic signal installation at the subject intersection was on February 29, 2000.

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 January 1, 2000 through March 31, 2000. The before period consisted of reported crashes from September 1, 1995 through December 31, 1999 (4 Years, 4 Months) and the after period consisted of reported crashes from April 1, 2000 through July 31, 2004 (4 Years, 4 Months). The ending date

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

The analysis also consisted of two different sets of data, the treatment and the comparison data. The treatment data consisted of all crashes within 150 feet of the subject intersection. The comparison data consisted of all crashes within 150 feet, at the intersections only, from MP 2.328 to MP 5.32 on SR 1010. The following data table depicts the Naive Before and After Analysis for the above information. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. These 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.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	20	21	5.0
Total Severity Index	4.3	4.2	-3.7
Frontal Impact Crashes	15	17	13.3
Frontal Severity Index	5.4	4.5	-17.6
Volume	13000	14000	7.7
<u>Comparison Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	37	36	-2.7
Total Severity Index	11.8	5.5	-53.2
Frontal Impact Crashes	29	29	0.0
Frontal Severity Index	11.7	5.9	-49.8
Volume	12600	13500	7.1
<u>Odds Ratio: Treatment versus Comparison</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Treatment Total Crashes	20	21	-7.9
Comparison Total Crashes	37	36	
Treatment F.I. Crashes	15	17	-13.3
Comparison F.I. Crashes	29	29	

The naive before and after analysis at the treatment location resulted in a 5.0 percent increase in Total Crashes, a 13.3 percent increase in Frontal Impact Crashes, and a 7.7 percent increase in Average Daily Traffic (ADT). The comparison locations resulted in a 2.7 percent decrease in Total Crashes, a 0.0 percent change in Frontal Impact Crashes, and a 7.1 percent increase in ADT. The before period ADT year was 1997 and the after period ADT year was 2002.

The Odds Ratio is used as another means of calculating the treatment effect. The total crashes in the before and after period from the Comparison Strip are used to calculate the percent reduction in total crashes for the Treatment Intersection. As shown in the table above, using the Odds Ratio calculation, there is a 7.9 percent decrease in Treatment Intersection crashes and a 13.3 percent decrease in Frontal Impact Crashes.

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 5.0 percent increase in Total Crashes and a 13.3 percent increase in Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 7.9 percent decrease in Total Crashes at the Treatment Intersection and a 13.33 percent decrease in Frontal Impact crashes. The summary results above demonstrate that the treatment location appears to have had an increase in the number of Total Crashes and an increase in the number of Frontal Impact Crashes from the before to the after period.

As previously mentioned, the flashing traffic signal was installed to help motorists better identify the existing traffic control. However, analysis of the crash data in the before and after period reveals that only 4 out of 14 crashes (28.5 percent) and 4 out of 15 (26.6 percent) respectively, at the treatment intersection were caused by a vehicle running through the stop signs located on SR 2727-Sauls Road. The crash problem at this intersection appears to be a lack of sight distance.

Peak distribution for the crash data in the after period occurred from 4pm to 7pm (4 crashes, 4:00p-5:00p; 4 crashes, 5:00p-6:00p; 3 crashes, 6:00p-7:00p). For the 4 and 5 o'clock hour, 3 of the 4 crashes were a result of the southbound vehicle failing to stop. For the 6 o'clock hour, all 3 of the crashes were a result of the southbound vehicle failing to stop. As a result 9 out of the 11 crashes (81.8 percent) from 4p to 7p were from a southbound error. A total of 15 after crashes were angle types, 12 of them occurred from southbound error (80.0 percent). A total of 14 before crashes were angle types, 11 of them occurred from southbound error (78.5 percent).

More specifically southbound/eastbound combinations were prominent in both study periods (11 in the before period and 10 in the after period). These facts suggest that there is a problem with drivers making a sound judgement when crossing SR 1010 southbound on SR 2727. In the pictures attached, the intersection sits on a vertical crest at a skew with eastbound traffic approaching while in a curve, if positioned southbound on SR 2727 at SR 1010. These physical attributes may make it difficult to distinguish a passable gap in the traffic on SR 1010.

The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of a 7.9 percent decrease to a 5.0 percent increase in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection can be in the range of a 13.3 percent decrease to a 13.3 percent increase in crashes. 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.



Williams Crossroads

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1010

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Crowder Rd.

1010

2727

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Location Map
 Wake County
 Evaluation of Spot Safety Project # 05-99-212

Treatment Site: SR 1010 (Ten Ten) at SR 2727
 (Crowder Road/Sauls Road)

Comparison Site: Data for intersections only
 between MP 2.328 to MP 5.32 (150' Y-line)

Looking West



Looking East

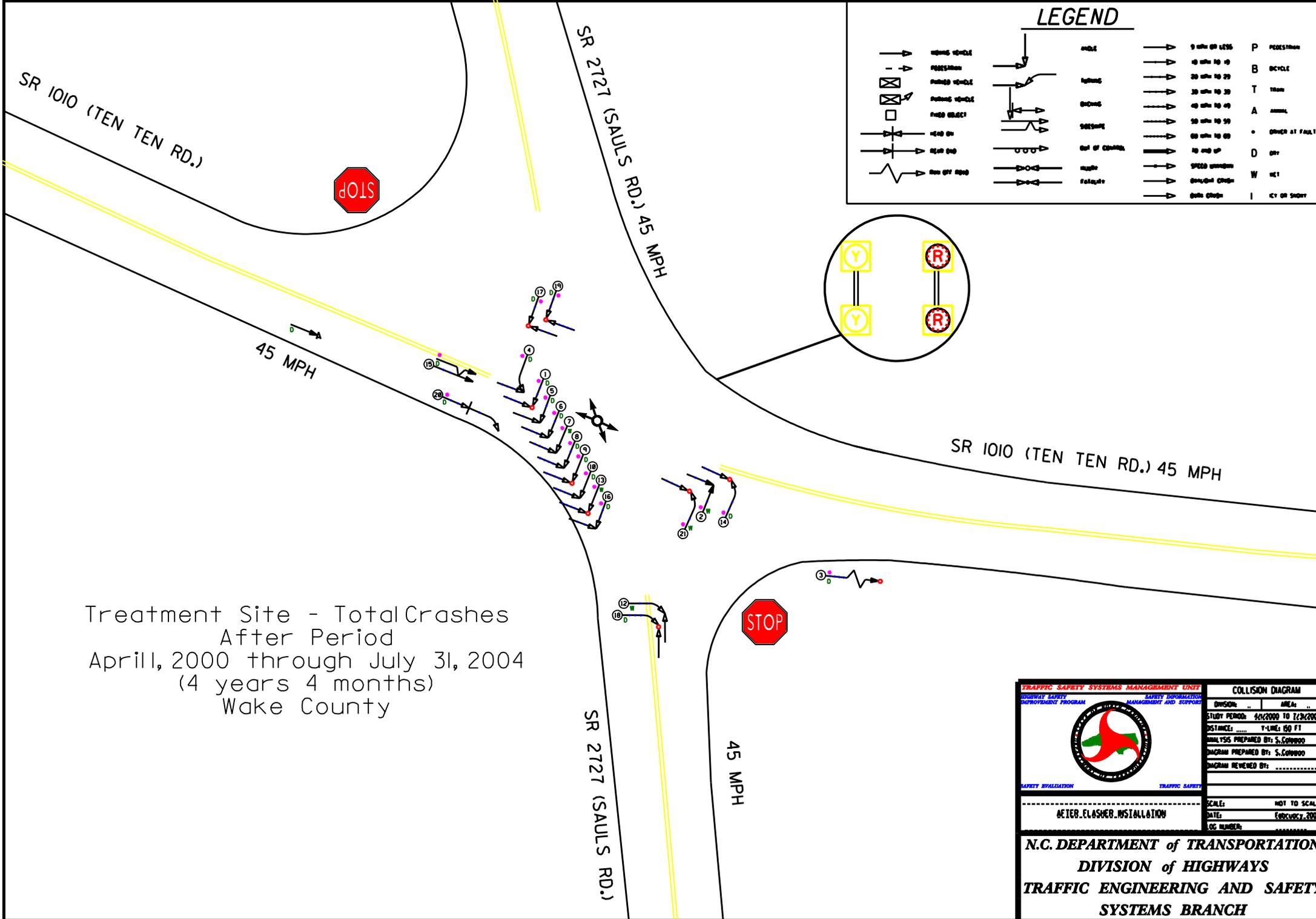


Looking South



Looking North





LEGEND

	MOVING VEHICLE		VEHICLE		0 mph or less		P PEDESTRIAN
	PEDESTRIAN		10 mph to 19		20 mph to 29		B BICYCLE
	PAKED VEHICLE		30 mph to 39		40 mph to 49		T TRUCK
	PAKED VEHICLE DRIVER AT FAULT		50 mph to 59		60 mph to 69		A ANIMAL
	PAKED VEHICLE DRIVER AT FAULT		70 mph or more		80 mph or more		• DRIVER AT FAULT
	HEAD ON		OUT OF CONTROL		90 mph or more		D DEER
	REAR END		NIGHT		SPEED WARNING		W WET
	RUN OFF ROAD		FOG/VISIBILITY		DOUBLE CHANGE		I ICY OR SNOWY

Treatment Site - TotalCrashes
 After Period
 April, 2000 through July 31, 2004
 (4 years 4 months)
 Wake County

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT		COLLISION DIAGRAM	
SAFETY INVESTIGATION	SAFETY REPAIRS	DIVISION:	AREA:
		STUDY PERIOD:	4/1/2000 TO 7/31/2004
		DISTANCE:	Y-LINE: 150 FT
METER FLASHER INSTALLATION		ANALYSIS PREPARED BY:	S. CONWOOD
		DIAGRAM PREPARED BY:	S. CONWOOD
		DIAGRAM REVIEWED BY:	
		SCALE:	NOT TO SCALE
		DATE:	FEBRUARY, 2005
		LOG NUMBER:	

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