

Spot Safety Project Evaluation

Project Log # 200505099

Spot Safety Project # 05-98-050

Spot Safety Project Evaluation of the Actuated Flasher Installation at the Intersection of SR 1906 (Leesville Rd) and SR 1981 (Shady Grove Rd) in Durham Co.

Documents Prepared By:

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

Principal Investigator

Samuel D. Coleman, EI

4/13/06
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 05-98-050 - Actuated Flasher Installation at the Intersection of SR 1906 (Leesville Rd) and SR 1981 (Shady Grove Rd) in Durham Co.

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

SR 1906 is a two-lane, 45-mph facility without left turn lanes. SR 1981 is a two-lane, 55-mph facility without left turn lanes. The intersection was controlled by a stop condition on SR 1981. The initial crash analysis for this section was completed from August 1, 1995 to July 31, 1998. There were a total of 9 crashes reported at this location. Eight of these crashes were considered correctable by the installation of the actuated flasher. All of the correctable crashes were "Angle" type, yielding 3 class A, 6 class B, and 5 class C injuries with a fatal occurring 3 months after the study. The spot safety project improvement countermeasure chosen for the subject location was the installation of an actuated flasher. The final completion date for the flasher installation at the treatment intersection was on December 22, 1999 at a cost of \$10,000.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes along the subject road, the crash data omitted from this analysis to consider for an adequate construction period was from November 1999 through January 2000. The before period consisted of reported crashes from April 1, 1994 through October 31, 1999 (5 years, 7 Months) and the after period consisted of reported crashes from February 1, 2000 through August 31, 2005 (5 Years, 7 Months). The ending date for this analysis was determined by the four-way stop countermeasure that was installed at this location on September 26, 2005.

The analysis 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 all the intersections from MP 0.922 to MP 3.378. 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	23	20	-13.0
Total Severity Index	19.0	7.4	-61.2
Frontal Impact Crashes	21	17	-19.0
Frontal Severity Index	20.7	8.5	-58.9
Volume	6700	7800	16.4
<u>Comparison Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	4	11	175.0
Total Severity Index	2.9	4.4	53.0
Frontal Impact Crashes	3	1	-66.7
Frontal Severity Index	3.5	8.4	142.1
Volume	4600	5300	15.2
<u>Odds Ratio: Treatment versus Comparison</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Treatment Total Crashes	23	20	-68.4
Comparison Total Crashes	4	11	
Treatment F.I. Crashes	21	17	142.9
Comparison F.I. Crashes	3	1	

Table 1.

The naive before and after analysis at the treatment location resulted in a 13.0 percent decrease in Total Crashes, a 19.0 percent decrease in Frontal Impact Crashes, and a 16.4 percent increase in Average Daily Traffic (ADT). The comparison locations resulted in a 175.0 percent increase in Total Crashes, a 66.7 percent decrease in Frontal Impact Crashes, and a 15.2 percent increase in ADT. The before and after period ADT was estimated using previous traffic counts from 1998 and increased by 3 percent per year to 2003.

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 Intersection 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 68.4 percent decrease in Treatment Intersection crashes and a 142.9 percent increase in Frontal Impact crashes.

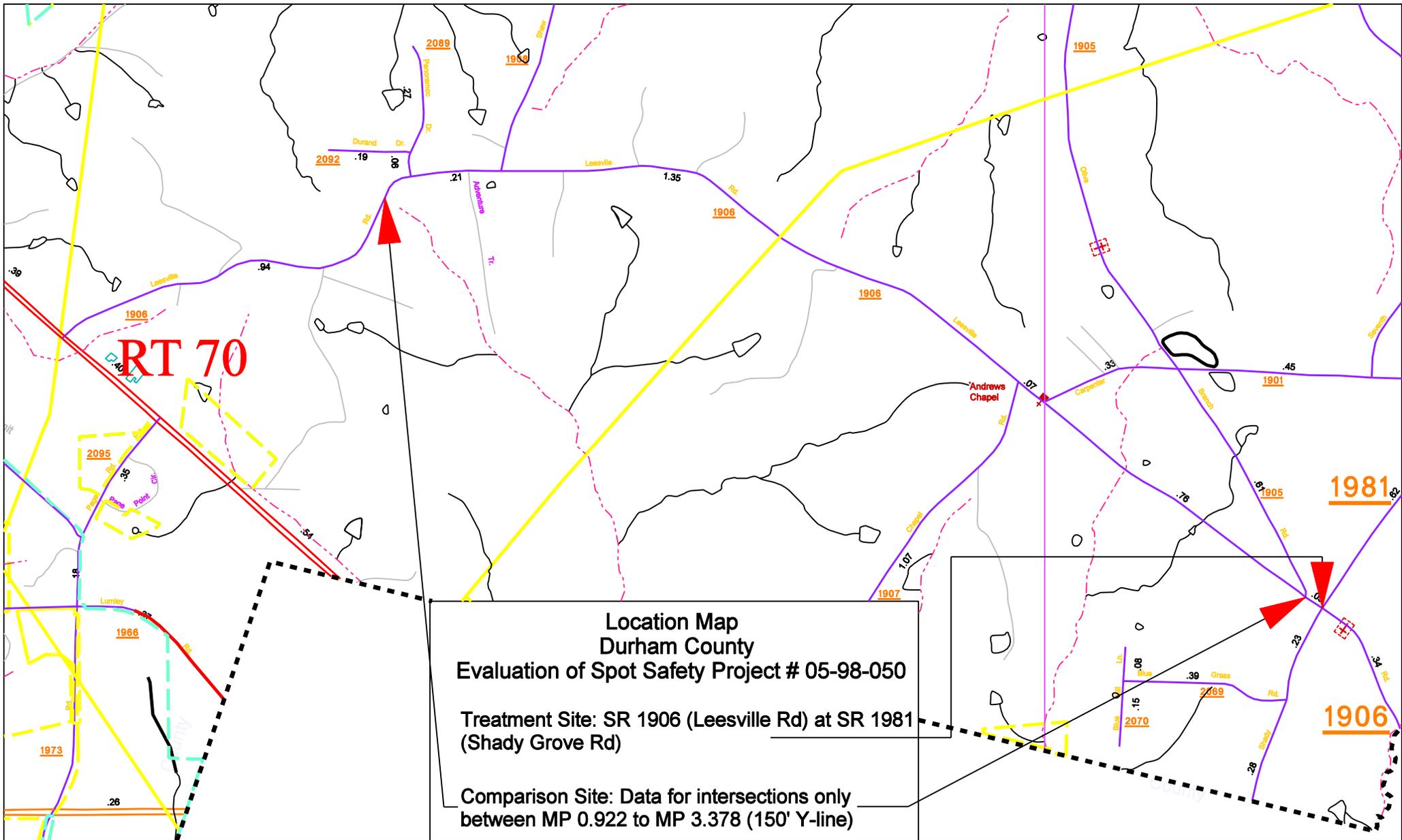
Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 13.0 percent decrease in Total Crashes and a 19.0 percent decrease in Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 68.4 percent decrease in Total Crashes at the Treatment Intersection and a 142.9 percent increase in Frontal Impact crashes. The summary results above demonstrate that the treatment location appears to have had a decrease in the number of Total Crashes and a decrease in the number of Frontal Impact Crashes from the before to the after period.

Referencing the collision diagram there was an injury involved with each crash that was travelling south on SR 1981. After the flasher was installed the injuries were reduced by 66.7 percent (6 to 2). The same trend follows with the northbound vehicles on SR 1981 with a reduction in injuries of 45.5 percent (11 to 6). Please note only injury crashes were included for the previous calculations. This information shows the flasher may have successfully contributed to alerting drivers of the approaching intersection.

Although the severity was significantly reduced at the treatment intersection, the number of crashes still remained fairly consistent. The collision diagram shows a repeat pattern in the before and after period of crashes involving vehicles travelling north on SR 1981. During the field visit on January 9, 2006 it was noted that this problem was addressed in the form of the previously mentioned four-way stop countermeasure. Through observation, the intersection seemed to be under safer operation, meaning there were no 'near misses' observed during the field investigation. The crash database shows no reported collisions at the location from September 1, 2005 through December 31, 2005. We plan to complete an additional evaluation of the four-way stop countermeasure in the future.

The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of a 13.0 to a 68.4 percent decrease in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection can be in the range of a 19.0 percent decrease to a 142.9 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.



Treatment Site Photos Taken January 9, 2006



Facing east on SR 1906



Facing east on SR 1906



Facing north on SR 1981



Facing north on SR 1981



Facing west on SR 1906



Facing west on SR 1906



Driving east on SR 1906



Driving south on SR 1981



Driving west on SR 1906



Driving west on SR 1906

