

Project Evaluation

Project Log # 200508181

**Project Evaluation, of the Four-Way Stop Sign Installation,
At the Intersection of SR 1725-County Home Road and SR 1711-Worthington Road
Near Greenville, Pitt 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

Carrie L. Goodrich

08-19-2005
Date

Traffic Safety Project Engineer

Project Evaluation Documentation

Subject Location

The Intersection of SR 1725-County Home Road and SR 1711-Worthington Road,
Near Greenville, Pitt 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 and an Odds Ratio comparison analysis has been completed to measure the effectiveness of the 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

The project improvement countermeasure chosen for the subject location was the installation of a 4-way stop. The 4-way stop was installed and operational in November 1995. Prior to the project improvement, the location was controlled by stop signs located on SR 1711-Worthington Road. Both SR 1725-County Home Road and SR 1711-Worthington Road are two-lane facilities at the treatment intersection with a speed limit of 55 mph.

Comparison Analysis

After reviewing all of the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from October 1, 1995 through December 31, 1995. The before period consisted of reported crashes from January 1, 1990 through September 30, 1995 (5 Years, 9 Months) and the after period consisted of reported crashes from January 1, 1996 through September 30, 2001 (5 Years, 9 Months). The dates for this analysis were limited by the unavailability of crash data prior to 1990.

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 of the intersections of SR 1725-County Home Road at SR 2241-Ayden Golf Club Road; SR 1725-County Home Road at NC 102; and SR 1725-County Home Road at SR 1753-Stokestown Road. Please see attached *Location Map* for further detail. The following data table depicts the Naive Before and After Analysis for the treatment and comparison intersections. 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.

Treatment Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	23	10	- 56.5
Total Severity Index	7.83	4.70	- 40.0
Frontal Impact Crashes	17	10	- 41.2
Frontal Severity Index	8.07	4.70	- 41.8
Volume	5900	8600	45.8

Comparison Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	14	21	50.0
Total Severity Index	13.94	7.43	- 46.7
Frontal Impact Crashes	10	17	70.0
Frontal Severity Index	18.38	8.07	- 56.1
Volume	2400	3100	29.2

Odds Ratio: Treatment versus Comparison

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Treatment Total Crashes	23	10	---
Comparison Total Crashes	14	21	- 71.0 %

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Treatment Frontal Impact Crashes	17	10	---
Comparison Frontal Impact Crashes	10	17	- 65.4 %

The naive before and after analysis at the treatment location resulted in a 56.5 percent decrease in Total Crashes and a 40.0 percent decrease in the Total Severity Index. The comparison locations experienced a 50.0 percent increase in Total Crashes and a 46.7 percent decrease in the Total Severity Index. The before period ADT year was 1992 and the after period ADT year was 1998.

The Odds Ratio is used as another means of calculating the treatment effect. The number of crashes in the before and after period from the comparison locations are used to calculate the percent reduction in crashes for the Treatment Intersection. As shown in the previous table, using the Odds Ratio calculation, there is a 71.0 percent decrease in Total Treatment Intersection crashes and a 65.4 percent decrease in Frontal Impact Treatment Intersection crashes.

The following Table depicts the Naive Before and After Analysis for the treatment information. The data consists of a crash type summary and an injury summary for the treatment intersection. Before period crash data, after period crash data, and the percent change in crashes from the before to the after period are included. As shown below, the number of Angle Crashes decreased by 35.7 percent from the before to the after period. In addition, the number of Total Injuries decreased by 52.2 percent.

Accident Type Summary	Before Period	After Period	Percent Reduction (-)/ Percent Increase (+)
Angle	14	9	-35.7
Fixed Object	1	0	-100.0
Left Turn, Different Roadways	0	1	n/a
Left Turn, Same Roadway	3	0	-100.0
Ran Off Road-Right	2	0	-100.0
Rear End, Slow or Stop	2	0	-100.0
Sideswipe	1	0	-100.0

Injury Summary	Before Period	After Period	Percent Reduction (-)/ Percent Increase (+)
Fatal Injuries	0	0	n/a
Class A Injuries	1	0	-100.0
Class B Injuries	3	0	-100.0
Class C Injuries	19	11	-42.1
Total Non-Fatal Injuries	23	11	-52.2
Total Injuries	23	11	-52.2

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 56.5 percent decrease in Total Crashes and a 41.2 percent decrease in Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 71.0 percent decrease in Total Crashes and a 65.4 percent decrease in Frontal Impact Crashes at the Treatment Intersection. The summary results above demonstrate that the treatment location appears to have had a decrease in the number of crashes from the before to the after period when using both analysis methods.

The treatment location also experienced a substantial decrease in crash severity. The Severity Index for Total Crashes and Frontal Impact Crashes at the treatment intersection decreased by 40.0 percent and 41.2 percent, respectively. In the before period, crashes resulted in one Class A injury, three Class B injuries, and nineteen class C injuries. In the after period, crashes accounted for eleven Class C injuries. Total Injuries decreased by 52.2 percent from the before to the after period.

Analysis of the crash data in the after period reveals that eight out of the ten crashes at the treatment intersection were caused by a vehicle travelling on SR 1725-County Home Road failing to yield the right of way to a vehicle travelling on SR 1711-Worthington Road. In addition, six of these crashes involved the vehicle at fault running through the stop signs located on SR 1725-County Home Road. Motorists travelling on SR 1725-County Home Road may require additional help to better identify the existing traffic control. Although a considerable number of crashes involved stop sign runners in the after period, vehicle speeds at impact decreased. Due to the four-way stop condition, vehicles with the right of way were travelling less than 10 mph at impact in all after period crashes. The reduced vehicle speeds at impact helps to explain the decrease in crash severity at the Treatment Intersection.

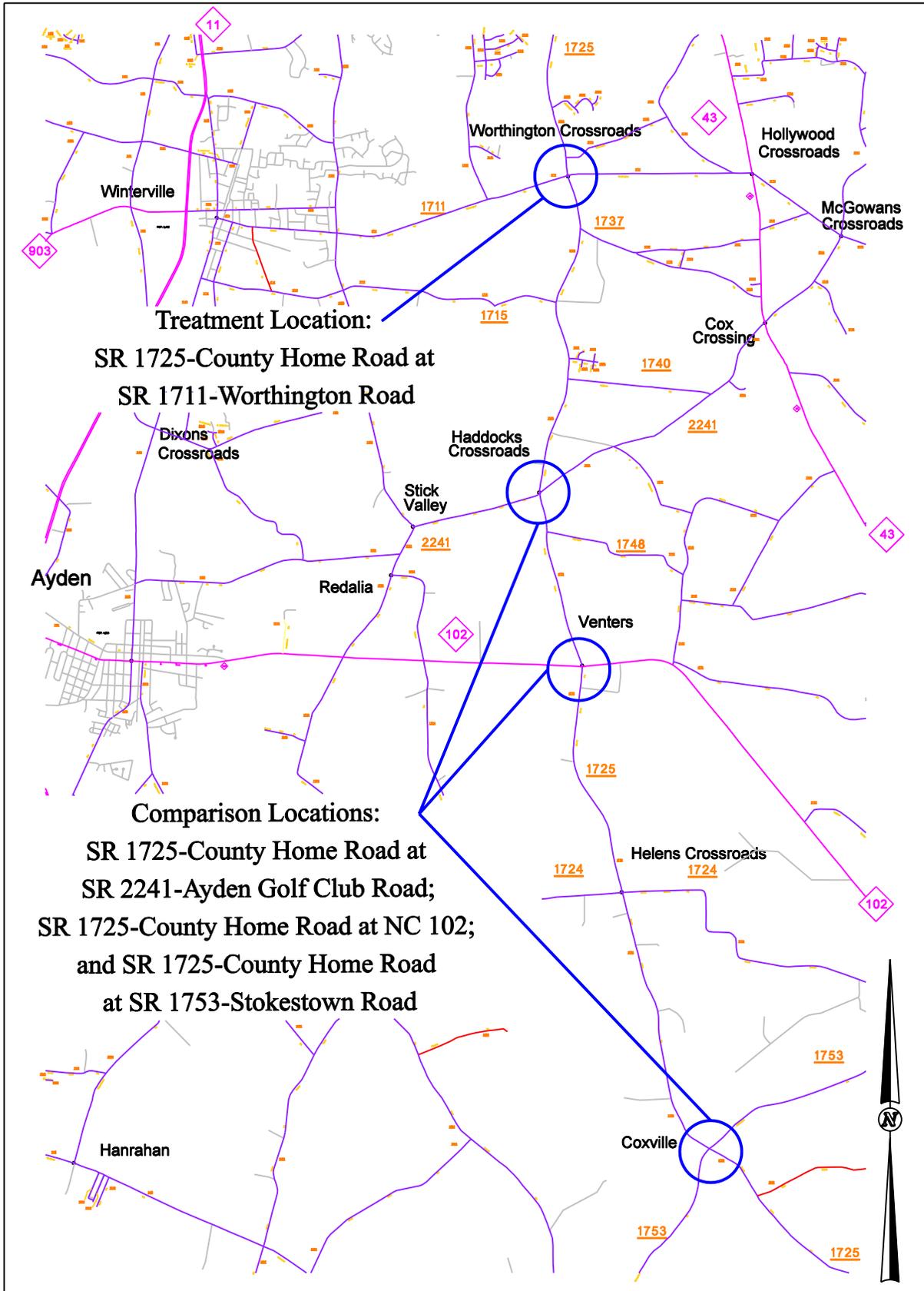
The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of a 56.5 percent decrease to a 71.0 percent decrease in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection can be in the range of a 41.2 percent decrease to a 65.4 percent decrease 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.

Additional analysis of the crash data at the treatment location from October 1, 2001 through February 28, 2005 (3 years, 5 months) reveals that five crashes occurred within this time subsequent to the after period. All of the crashes were Angle Crashes, and resulted in four class C injuries.

Location Map

4 Way Stop Treatment

Near Greenville, Pitt County



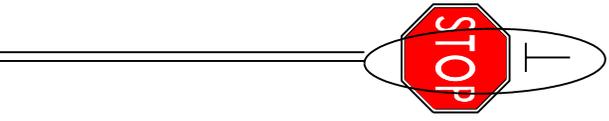
Treatment Site - TotalCrashes
 Before Period
 1/1/1990 - 9/30/1995
 (5 years, 9 months)

LEGEND

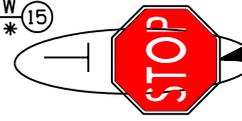
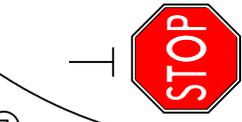
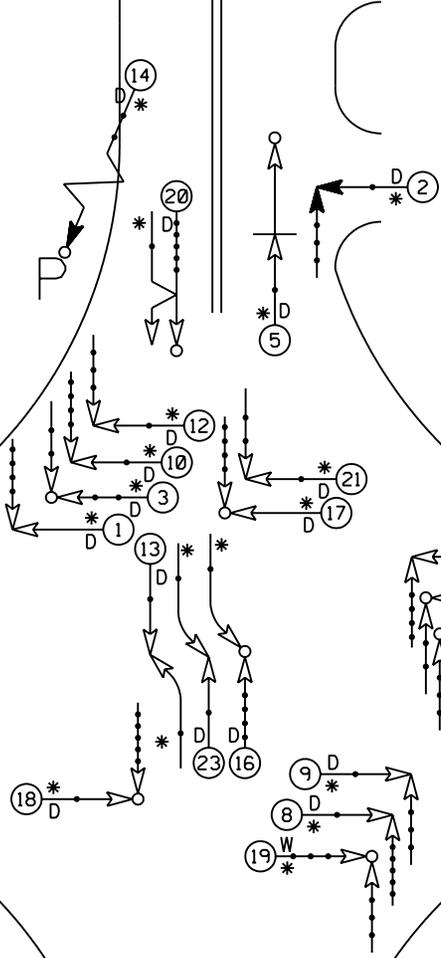
	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PAKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PAKED VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
	DEER		OUT OF CONTROL		40 MPH TO 49		WET
	FIXED OBJECT		HILARY		50 MPH TO 59		ICY OR SNOW
	HEAD ON		FATALITY		60 MPH TO 69		TO AND LP
	REAR END		SPEED UNKNOWN		OTHER		
	RAN OFF ROAD						

CHARLIES GRILL

SR 1711 (WORTHINGTON ROAD)
 55 MPH



SR 1725 (COUNTY HOME ROAD)
 55 MPH



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT



COLLISION DIAGRAM	
DIVISION:	AREA:
STUDY PERIOD: 1/1/1990 - 9/30/1995	
DISTANCE: Y-LINE = 150 ft	
ANALYSIS PREPARED BY: CLG	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: CLG	
DIAGRAM REVIEWED BY:	
SCALE: NOT TO SCALE	
DATE: 8/17/2005	
LOG NUMBER:	

SR 1725 at SR 1711
 Before Period

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

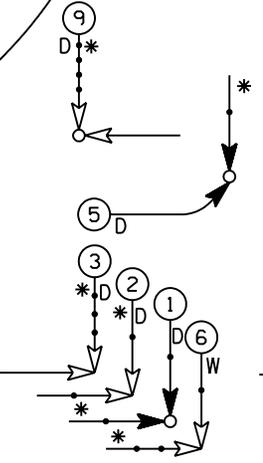
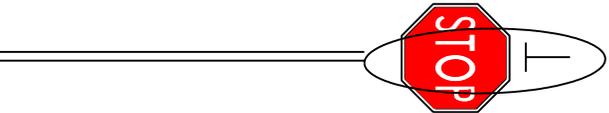
Treatment Site - TotalCrashes
 After Period
 1/1/1996 - 9/30/2001
 (5 years, 9 months)

LEGEND

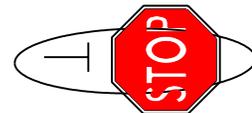
	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAM
	PAKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
	DEER		OUT OF CONTROL		40 MPH TO 49		WET
	FIXED OBJECT		INJURY		50 MPH TO 59		ICY OR SNOW
	HEAD ON		FATALITY		60 MPH TO 69		TO AND UP
	REAR END		SPEED UNKNOWN		9 MPH OR LESS		PEDESTRIAN
	RAN OFF ROAD						TRAM

CHARLIES GRILL

SR 1711 (WORTHINGTON ROAD)
 55 MPH



SR 1725 (COUNTY HOME ROAD)
 55 MPH



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION:	AREA:
	STUDY PERIOD: 1/1/1996 - 9/30/2001	
	DISTANCE: Y-LINE = 150 ft	
	ANALYSIS PREPARED BY: CLG	
ANALYSIS CHECKED BY:		
DIAGRAM PREPARED BY: CLG		
DIAGRAM REVIEWED BY:		

SR 1725 at SR 1711
 After Period

SCALE: NOT TO SCALE
 DATE: 8/17/2005
 LOG NUMBER:

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