

Project Evaluation

Project Log # 200508180

**Project Evaluation, of the Four-Way Stop Sign Installation,
At the Intersection of SR 1700-Old Tar Road and SR 1711-Cooper Street-Worthington Road
Near Greenville, Pitt County**

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
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Principal Investigator

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08/19/2005
Date

Traffic Safety Project Engineer

Project Evaluation Documentation

Subject Location

The Intersection of SR 1700-Old Tar Road and SR 1711-Cooper Street-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 July 2001. Prior to the project improvement, the location was controlled by stop signs located on SR 1700-Old Tar Road. Both SR 1700-Old Tar Road and SR 1711-Cooper Street-Worthington Road are two-lane facilities at the treatment intersection. SR 1711-Cooper Street-Worthington Road has a speed limit of 35 mph and SR 1700-Old Tar Road has a speed limit of 45 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 June 1, 2001 through August 31, 2001. The before period consisted of reported crashes from December 1, 1997 through May 31, 2001 (3 Years, 6 Months) and the after period consisted of reported crashes from September 1, 2001 through February 28, 2005 (3 Years, 6 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 of the intersections of: SR 1700-Old Tar Road at SR 1713-Laurie Ellis Road; 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 1724-Emma Cannon 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	7	9	28.6
Total Severity Index	5.23	3.47	- 33.7
Frontal Impact Crashes	3	8	166.7
Frontal Severity Index	5.93	3.77	- 36.4
Volume	11,100	12,100	9.0

Comparison Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	7	18	157.1
Total Severity Index	15.00	9.73	- 35.1
Frontal Impact Crashes	7	15	114.3
Frontal Severity Index	15.00	10.00	- 33.3
Volume	3400	3200	- 5.9

Odds Ratio: Treatment versus Comparison

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Treatment Total Crashes	7	9	---
Comparison Total Crashes	7	18	- 50.0 %

The naive before and after analysis at the treatment location resulted in a 28.6 percent increase in Total Crashes and a 33.7 percent decrease in the Total Severity Index. The comparison locations experienced a 157.1 percent increase in Total Crashes and a 35.1 percent decrease in the Total Severity Index. The before period ADT year was 1999 and the after period ADT year was 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 locations are used to calculate the percent reduction in total crashes for the Treatment Intersection. As shown in the previous table, using the Odds Ratio calculation, there is a 50.0 percent decrease in 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, although the number of Angle Crashes increased by 200.0 percent at the treatment location, the number of Total Injuries decreased by 62.5 percent from the before to the after period.

Accident Type Summary	Before Period	After Period	Percent Reduction (-)/ Percent Increase (+)
Angle	2	6	200.0
Fixed Object	1	1	0.0
Left Turn, Different Roadways	1	2	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	0	0	N/A
Class B Injuries	3	0	- 100.0
Class C Injuries	5	3	- 40.0
Total Non-Fatal Injuries	8	3	- 62.5
Total Injuries	8	3	- 62.5

Results and Discussion

The naïve before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 28.6 percent increase in Total Crashes and a 166.7 percent increase in Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 50.0 percent decrease in Total Crashes at the Treatment Intersection. The summary results above demonstrate that the treatment location appears to have had an increase in the number of crashes from the before to the after period when using the naïve analysis method. However, when using the Odds Ratio to measure the treatment effect, there appears to be a decrease in Total Crashes from the before to the after period at the treatment location.

Although there was an increase in the number of crashes, the treatment location experienced a decrease in crash severity. The Severity Index for Total Crashes and Frontal Impact Crashes at the treatment intersection decreased by 33.7 percent and 36.4 percent, respectively. In the before period, crashes resulted in three Class B injuries and five class C injuries. In the after period, crashes accounted for three Class C injuries. Total Injuries decreased by 62.5 percent from the before to the after period.

Analysis of the crash data in the after period reveals that six out of the nine crashes at the treatment intersection were caused by a vehicle failing to yield the right of way. Five of these crashes involved the vehicle at fault running through the stop signs at the intersection. Due to the four-way stop condition, vehicles with the right of way were travelling at or less than 20 mph at impact in all after period crashes. The low vehicle speeds at impact may help to explain the decrease in crash severity at the Treatment Intersection.

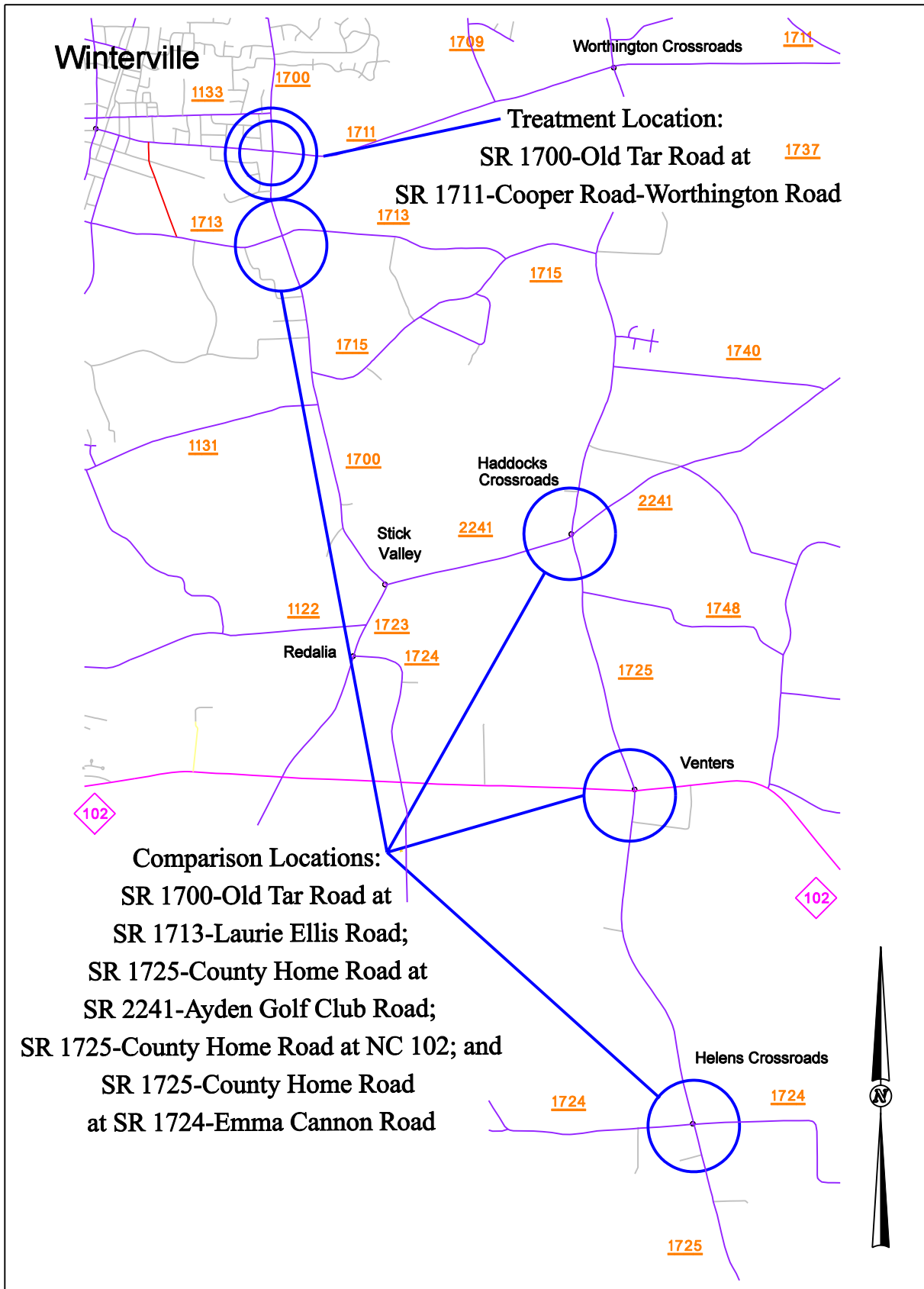
Examination of the crash history prior to the before period reveals that a fatal crash occurred at the treatment intersection in September 1993. In the four year period between September 1, 1991 and August 31, 1995, nine Frontal Impact crashes occurred, resulting in the fatal injury and ten non-fatal injuries.

The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of a 28.6 percent increase to a 50.0 percent decrease in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection is a 166.7 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.

Location Map

4 Way Stop Treatment

Near Greenville, Pitt County



Treatment Site - TotalCrashes
 Before Period
 12/1/1997 - 5/31/2001
 (3 years, 6 months)

LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PARKED 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 SNOWY
	HEAD ON		FATALITY		60 MPH TO 69		OIL
	REAR END		70 AND UP		SPEED UNKNOWN		
	RAN OFF ROAD						

PANTRY STORE

TRADE MART

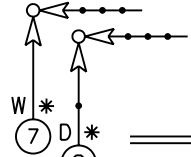
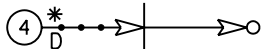
35 MPH

SR 1711 (COOPER STREET)

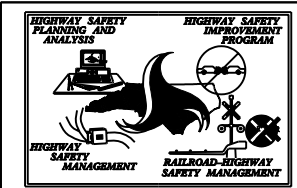
SR 1711 (WORTHINGTON ROAD)

SR 1700 (OLD TAR ROAD)

45 MPH



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT



COLLISION DIAGRAM	
DIVISION:	AREA:
STUDY PERIOD: 12/1/1997 - 5/31/2001	
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:	

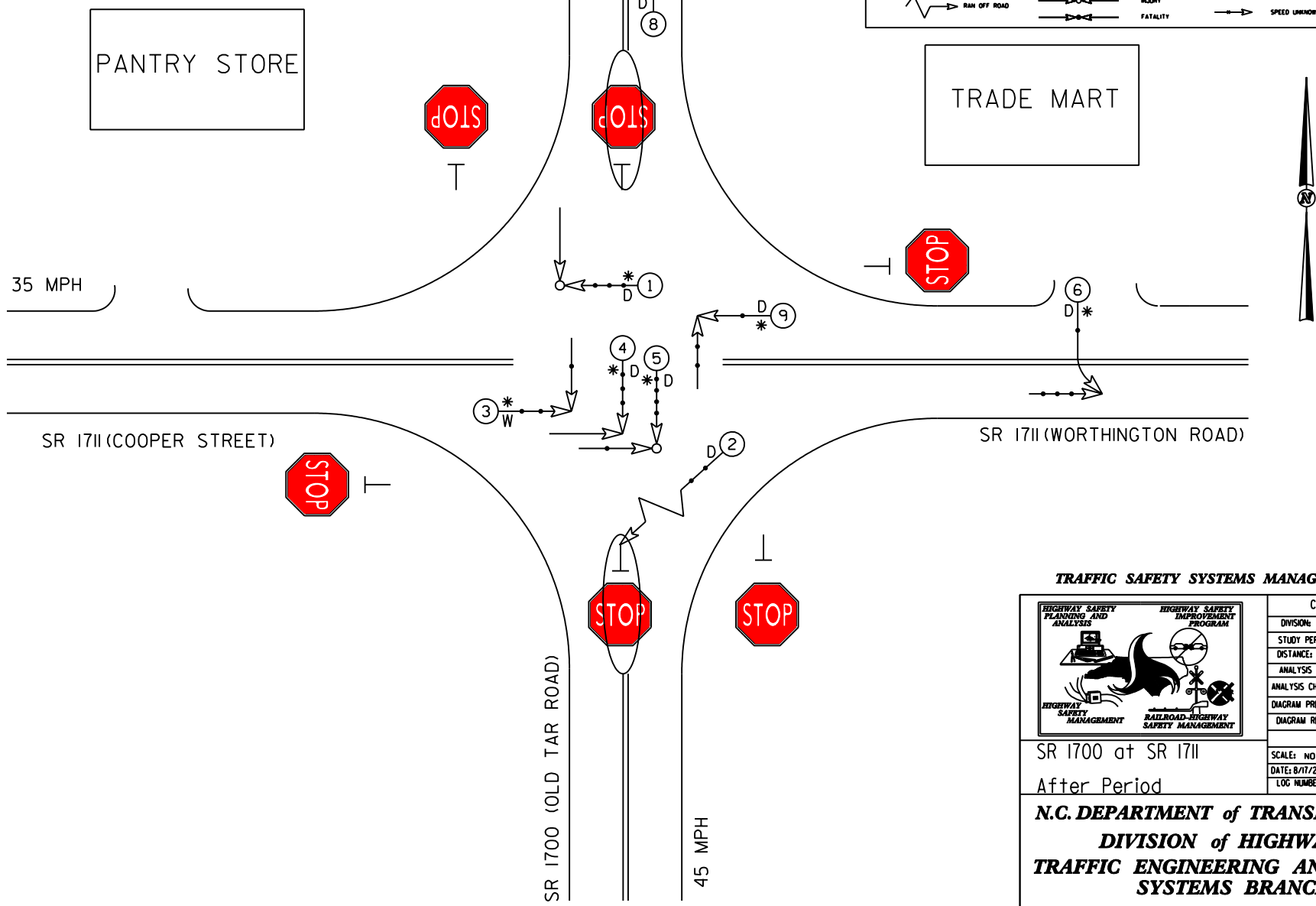
SR 1700 at SR 1711
 Before Period

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

Treatment Site - TotalCrashes
 After Period
 9/1/2001- 2/28/2005
 (3 years, 6 months)

LEGEND

→	MOVING VEHICLE	↘	ANGLE	→	9 MPH OR LESS	P	PEDESTRIAN
→	PEDESTRIAN	↙	TURNING	→	10 MPH TO 19	T	TRAM
⊠	PARKED VEHICLE	↔	BACKING	→	20 MPH TO 29	*	DRIVER AT FAULT
⊠	PARKING VEHICLE	↔	SIDESWPE	→	30 MPH TO 39	D	DRY
△	DEER	↔	OUT OF CONTROL	→	40 MPH TO 49	W	WET
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→	HEAD ON	↔	FATALITY	→	60 MPH TO 69	O	ONLY
→	REAR END	→	TO AND LIP	→	SPEED UNKNOWN		
↘	RAN OFF ROAD						



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION:	AREA:
	STUDY PERIOD: 9/1/2001 - 2/28/2005	
	DISTANCE: Y-LINE = 150 ft	
	ANALYSIS PREPARED BY: CLG	
ANALYSIS CHECKED BY:		
DIAGRAM PREPARED BY: CLG		
DIAGRAM REVIEWED BY:		
SR 1700 at SR 1711		
After Period		
SCALE: NOT TO SCALE		
DATE: 8/17/2005		
LOG NUMBER:		

N.C. DEPARTMENT of TRANSPORTATION
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TRAFFIC ENGINEERING AND SAFETY
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