

Spot Safety Project Evaluation

Order # 41000009984

Spot Safety Project # 07-02-204

**Spot Safety Project Evaluation of the Installation of Right Turn Lanes and a Left Turn Lane
With a New Traffic Signal
At the Intersection of SR 2269 (Alcorn Road) and SR 2131 (N.W. School Road)
In Oak Ridge, Guilford County**

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Transportation Mobility and Safety Division
North Carolina Department of Transportation

Principal Investigator



Chad J. Neilson

12-6-2010

Date

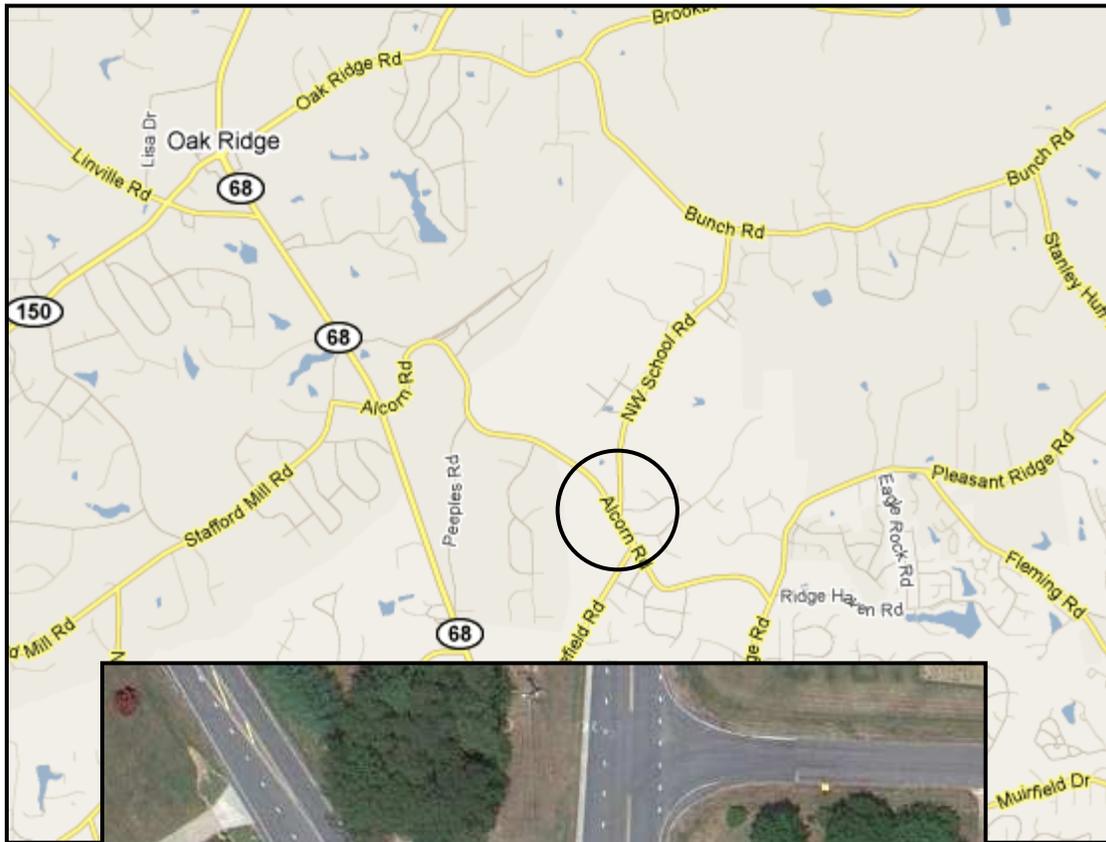
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 07-02-204 located at the intersection of SR 2269 (Alcorn Road) and SR 2131 (N.W. School Road) in Oak Ridge, Guilford County.

The signal ID for the newly installed signal is 07-2056.



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 left turn lane on SR 2269 (Alcorn Road) and a right turn lane on SR 2131 (N.W. School Road). Additionally, with Small Construction funds this project includes the installation of a right turn lane on SR 2269 (Alcorn Road) and the signalization of the intersection. SR 2269 (Alcorn Road) is a two-lane facility at the subject intersection with speed limit of 45 mph for both approaches. SR 2131 (N.W. School Road) is a two-lane facility with a speed limit of 45 mph. The subject location is a stop sign controlled three-leg intersection with SR 2131 (N.W. School Road) encountering the stop sign condition.

The original statement of problem was existing single lane approaches were causing vehicular delay because of left-turning traffic.

The initial crash analysis was completed from May 1, 1997 to April 30, 2000 with two (2) reported crashes, of which one (1) was deemed correctable. The final completion date for the improvement at the subject intersection was on October 20, 2006 with a total cost of \$130,000.00 from Spot Safety funds and \$ 70,000.00 from Small Construction funds.

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 were the months of August 2006 though November 2006. The before period consisted of reported crashes from September 1, 2002 through July 31, 2006 (3 years and 11 months); and the after period consisted of reported crashes from December 1, 2006 through October 31, 2010 (3 years and 11 months). The ending date for this analysis was determined by the date of available crash data at the time of analysis.

The treatment data consisted of all crashes within 150 feet of the subject intersection. *Please see attached location map, aerial 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.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	11	6	- 45.45 %
Total Crash Severity Index	3.02	3.47	14.90 %
Target Crashes	9	4	- 55.56 %
Target Crash Severity Index	1.82	4.70	158.24 %
Volume (2005, 2009)	7,500	7,700	2.67 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	0	N/A
Class B injury Crashes	2	1	- 50.00 %
Class C Injury Crashes	1	1	0.00 %
Total Injury Crashes	3	2	- 33.33 %

The naive before and after analysis at the treatment location resulted in a forty-five (45) percent decrease in Total Crashes, fifty-five (55) percent decrease of Target Crashes, and a fourteen (14) percent increase in the Total Severity Index. The before period ADT year was 2005 and the after period ADT year was 2009.

Results and Discussion

Referencing the *Collision Diagrams*, the before period presented nine (9) target crashes. There was a crash pattern involving left-turning vehicle from SR 2131 (N.W. School Road) on to SR 2269 (Alcorn Road). This pattern made up seven (7) target crashes. After the countermeasures were installed, there were four (4) target crashes. The crash pattern involving left-turning vehicles from SR 2131 (N.W. School Road) was reduced to two (2) crashes in the after period.

The calculated benefit to cost ratio for this project is **0.29 considering total crashes**. The benefit to cost ratio **considering only target crashes is 0.05**. The benefits are calculated using the change in annual crash costs from the before to the after period. Operational and other benefits related to the project are not considered in this analysis. The costs of the project include the actual construction costs as well as the increase in annual maintenance and utility costs.

Photos were provided for this location by Google Street View for all three approaches of this 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



Looking South on SR 2269 (Alcorn Rd)



Looking South on SR 2131 (N.W. School Rd)



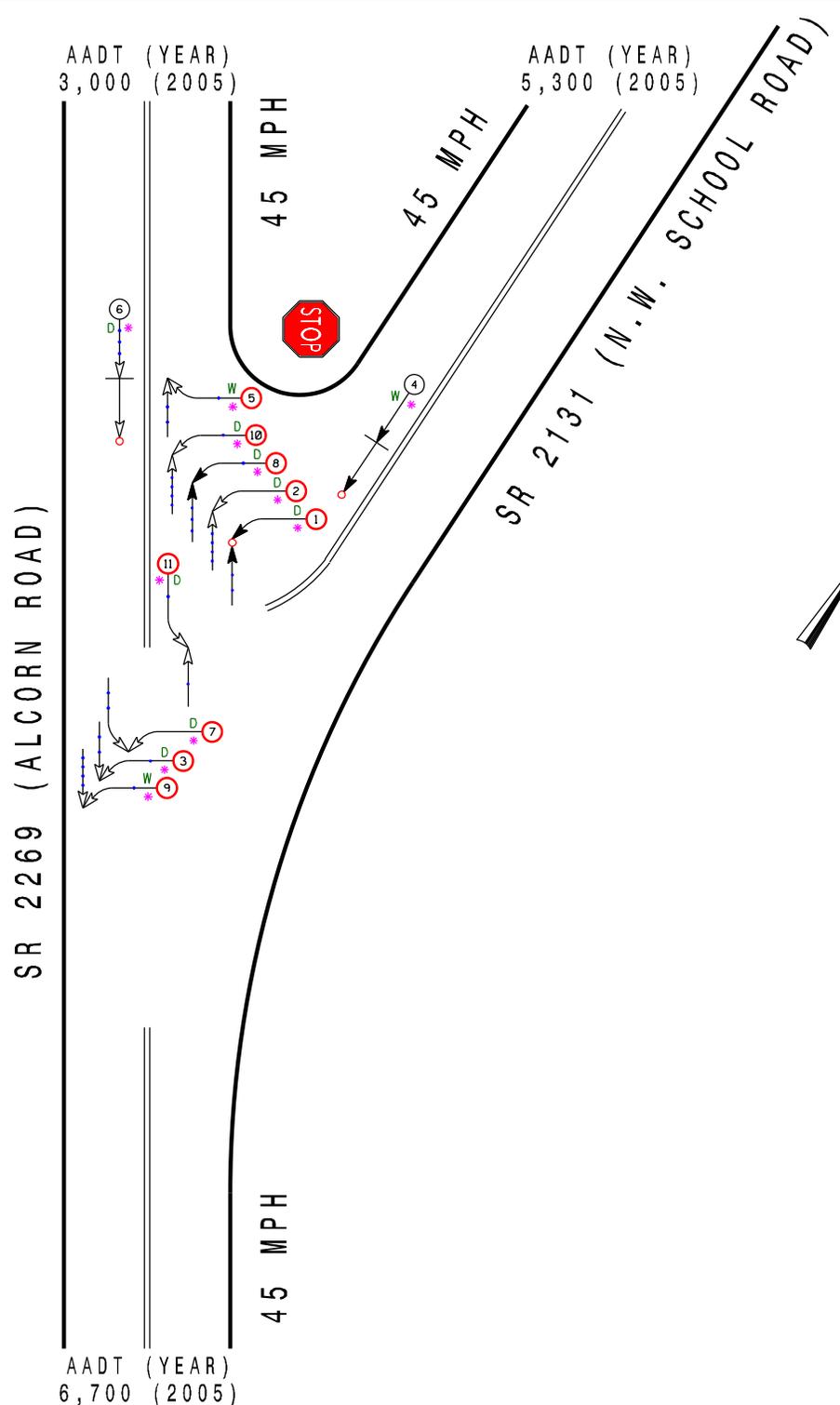
Looking North on SR 2269 (Alcorn Rd)

BENEFIT-COST ANALYSIS WORKSHEET - TOTAL

LOCATION: SR 2269 (Alcorn Road) and SR 2131 (N.W. School Road)		BY: C Neilson						
COUNTY: Guilford		DATE: 12/1/2010						
FILE NO.: SS 07-02-204								
DETAILED COST:	TYPE IMPROVEMENT -	Install Signal and Turn Lanes						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$190,000	10	0.149	\$28,316			
		\$0	0	0.000	\$0			
	Right-of-Way	\$10,000	10	0.149	\$1,490			
	TOTALS	\$200,000	10	0.149	\$29,806			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,000			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900			
	TOTAL ANNUAL COST=				\$32,706			
	TOTAL COST OF PROJECT=				\$200,000			
COMPREHENSIVE COST REDUCTION:								
	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES							
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	3.92	0	0.00	3	0.77	8	2.04	\$24,082
AFTER	3.92	0	0.00	2	0.51	4	1.02	\$14,592
							Annual Benefits from Crash Cost Savings	\$9,490
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST				=	(\$23,216)		
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST				=	0.29		
	TOTAL COST OF PROJECT	-	\$200,000	COMPREHENSIVE B/C RATIO	-		0.29	

BENEFIT-COST ANALYSIS WORKSHEET - TARGET

LOCATION: SR 2269 (Alcorn Road) and SR 2131 (N.W. School Road)		BY: C Neilson						
COUNTY: Guilford		DATE: 12/1/2010						
FILE NO.: SS 07-02-204								
DETAILED COST:	TYPE IMPROVEMENT -	Install Signal and Turn Lanes						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$190,000	10	0.149	\$28,316			
		\$0	0	0.000	\$0			
	Right-of-Way	\$10,000	10	0.149	\$1,490			
	TOTALS	\$200,000	10	0.149	\$29,806			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,000			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900			
	TOTAL ANNUAL COST=				\$32,706			
	TOTAL COST OF PROJECT=				\$200,000			
COMPREHENSIVE COST REDUCTION:								
	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES							
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	3.92	0	0.00	1	0.26	8	2.04	\$13,878
AFTER	3.92	0	0.00	2	0.51	2	0.51	\$12,398
							Annual Benefits from Crash Cost Savings	\$1,480
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST				=	(\$31,226)		
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST				=	0.05		
	TOTAL COST OF PROJECT	-	\$200,000	COMPREHENSIVE B/C RATIO	-		0.05	



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		D DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		W WET
	HEAD ON		TO AND LIP		60 MPH TO 69		I ICY OR SNOWY
	REAR END		INJURY		SPEED UNKNOWN		O ONLY
	RAN OFF ROAD		FATALITY				



SS# 07-02-204
 Order# 41000009984
 Guilford County
 BEFORE Period
 9/1/02 - 7/31/06

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRANSPORTATION MOBILITY and
SAFETY DIVISION

TRAFFIC SAFETY UNIT



Date: 11-30-2010

Prepared By: C Neilson

SR 2269 (ALCORN ROAD)

AAADT (YEAR)
3,900 (2009)

AAADT (YEAR)
4,500 (2009)

45 MPH

45 MPH

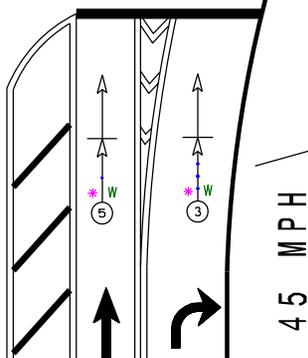
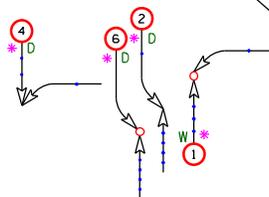
SR 2131 (N.W. SCHOOL ROAD)

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
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		TO AND LIP		50 MPH TO 59		ICY OR SNOWY
	REAR END		INJURY		60 MPH TO 69		SPEED UNKNOWN
	RAN OFF ROAD		FATALITY		FATALITY		ONLY



NEWLY INSTALLED
SIGNAL : 07-2056



AAADT (YEAR)
7,000 (2009)

ROADWAY COUNTERMEASURE:
TURN LANE INSTALLATION

45 MPH

SS# 07-02-204
Order# 41000009984
Guilford County
AFTER Period
12/1/06 - 10/31/10



N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRANSPORTATION MOBILITY and
SAFETY DIVISION

TRAFFIC SAFETY UNIT

Date: 11-30-2010

Prepared By: C Neilson