

Spot Safety Project Evaluation

Order # 41000006374

Spot Safety Project # 04-03-212

**Spot Safety Project Evaluation of a Signal Installation
SR 1770 (Sunset Avenue) and Candlewood Road / Guardian Court
Nash 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

6-29-2010
Date

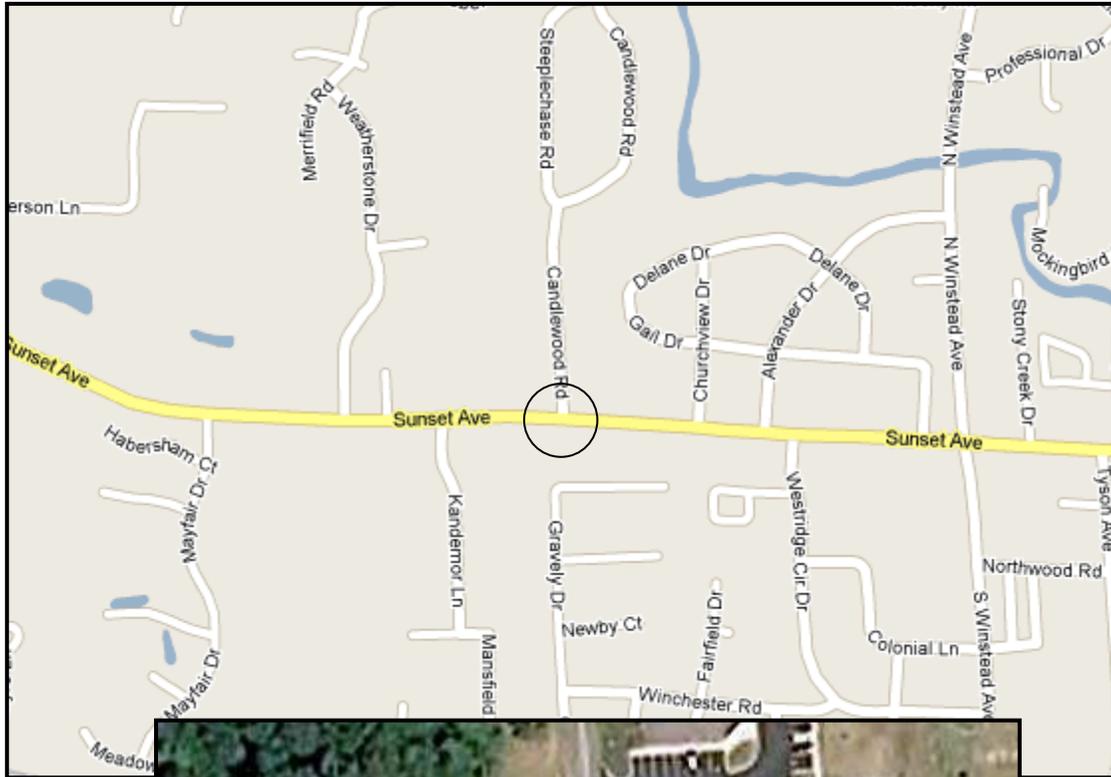
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 04-03-212 located at the Intersection of SR 1770 (Sunset Avenue) and Candlewood Road / Guardian Court in Nash County, in the City of Rocky Mount.

The Signal ID for the newly installed signal is 04-1026.



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 traffic signal. SR 1770 (Sunset Avenue) is a five lane facility with a center two-way-left-turn lane and a posted speed limit of 45 mph. Candlewood Road is a two-lane facility at the subject intersection with a speed limit of 25 mph. The subject location was a three-leg intersection, which was controlled by a stop sign on Candlewood Road during the before period. The subject location was modified to a four-leg signalized intersection for the after period. Guardian Court, the northbound added leg, is a two lane facility with an assumed speed limit of 25 mph. Guardian Court services multiple businesses.

The original statement of problem was the concern for crashes due to insufficient gaps in traffic along SR 1770 (Sunset Avenue) for vehicles attempting to enter from Candlewood Road. The intended purpose of the signal is to alleviate crashes and create gaps in traffic to allow vehicles to enter SR 1770 (Sunset Avenue) from Candlewood Road / Guardian Court.

The initial crash analysis was completed from June 1, 2000 to May 31, 2003 with five (5) reported crashes, four (4) of which were deemed correctable. The final completion date for the improvement at the subject intersection was on July 29, 2005 with a total cost of \$60,000.00.

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 July 2005 through August 2005. The before period consisted of reported crashes from December 1, 2000 through June 30, 2005 (4 years and 7 months); and the after period consisted of reported crashes from September 1, 2005 through March 31, 2010 (4 years and 7 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; and Angle.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	6	8	33.33 %
Total Severity Index	5.93	4.7	- 20.74 %
Target Crashes	2	0	- 100.00 %
Target Crash Severity Index	8.4	0	- 100.00 %
Volume	24,600	24,100	- 2.03 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	0	0	0.00 %
Class A injury Crashes	0	0	0.00 %
Class B injury Crashes	2	1	- 50.00 %
Class C Injury Crashes	2	3	50.00 %
Total Injury Crashes	4	4	0.00 %

The naive before and after analysis at the treatment location resulted in a thirty-three (33) percent increase in Total Crashes, a 100 percent decrease in Target Crashes, and a twenty-one (21) percent decrease in the Total Severity Index. The before period ADT year was 2003 and the after period ADT year was 2007.

Results and Discussion

Referencing the *Collision Diagrams*, there is not a clearly defined crash pattern at the study location. During the before period, there were two (2) left-turn different roadway crashes for vehicles attempting to enter SR 1770 (Sunset Avenue) from Candlewood Road. After the signal installation, there were zero (0) left-turn different roadway crashes and seven (7) rear-end crashes along SR 1770 (Sunset Avenue).

The calculated benefit to cost ratio for this project is **(-0.15) considering total crashes**. The benefit to cost ratio **considering only target crashes is 0.71**. 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.

Please see the attached *Treatment Site Photos*. Photos are provided from Google Street View for all four approaches to the treatment 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 East on SR 1770 (Sunset Avenue)



Looking West on SR 1770 (Sunset Avenue)



Looking North on Guardian Court



Looking South on Candlewood Rd

BENEFIT-COST ANALYSIS WORKSHEET - TOTAL CRASHES

LOCATION: SR 1770 (Sunset Ave) & Candlewood / Guar		BY: C Neilson						
COUNTY: Nash		DATE: 6/2/2010						
FILE NO.: SS 04-03-212								
DETAILED COST:	TYPE IMPROVEMENT -	New Signal						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$60,000	10	0.149	\$8,942			
		\$0	0	0.000	\$0			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$60,000	10	0.149	\$8,942			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,400			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900			
	TOTAL ANNUAL COST=				\$12,242			
	TOTAL COST OF PROJECT=				\$60,000			
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	4.58	0	0.00	4	0.87	2	0.44	\$19,345
AFTER	4.58	0	0.00	4	0.87	4	0.87	\$21,223
								Annual Benefits from Crash Cost Savings (\$1,878)
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST							= (\$14,119)
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST							= -0.15
	TOTAL COST OF PROJECT	-	\$60,000	COMPREHENSIVE B/C RATIO	-			-0.15

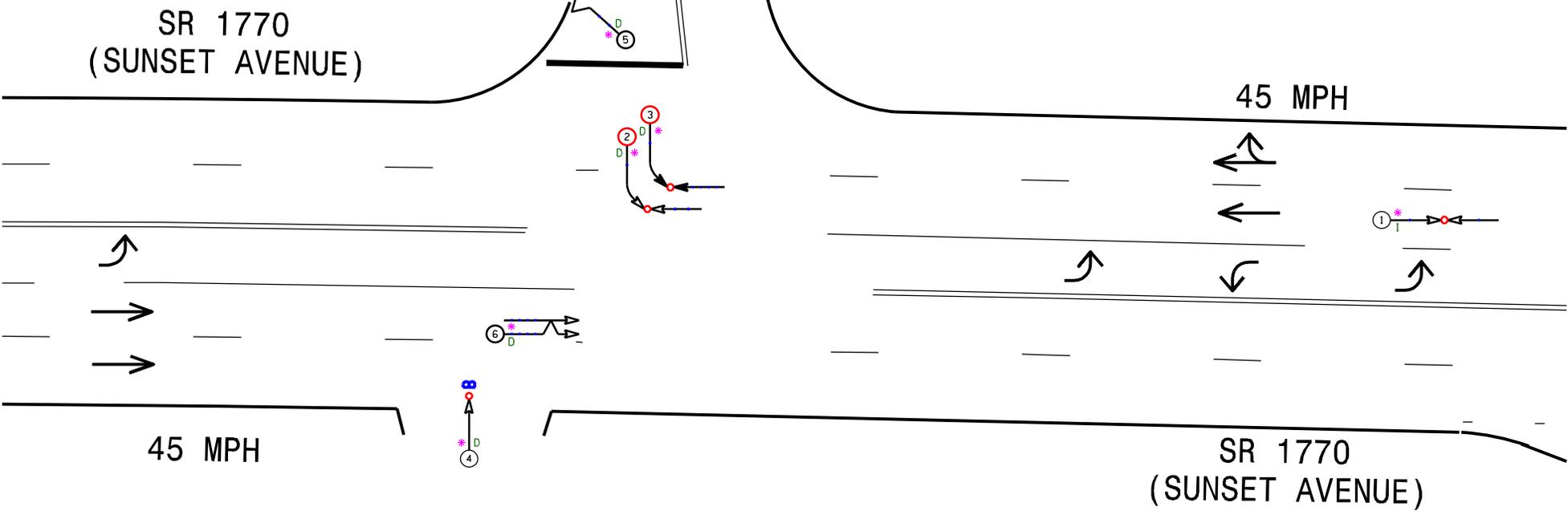
BENEFIT-COST ANALYSIS WORKSHEET - TARGET CRASHES

LOCATION: SR 1770 (Sunset Ave) & Candlewood / Guar		BY: C Neilson						
COUNTY: Nash		DATE: 6/2/2010						
FILE NO.: SS 04-03-212								
DETAILED COST:	TYPE IMPROVEMENT -	New Signal						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$60,000	10	0.149	\$8,942			
		\$0	0	0.000	\$0			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$60,000	10	0.149	\$8,942			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,400			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900			
	TOTAL ANNUAL COST=				\$12,242			
	TOTAL COST OF PROJECT=				\$60,000			
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	4.58	0	0.00	2	0.44	0	0.00	\$8,734
AFTER	4.58	0	0.00	0	0.00	0	0.00	\$0
								Annual Benefits from Crash Cost Savings \$8,734
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST							= (\$3,508)
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST							= 0.71
	TOTAL COST OF PROJECT	-	\$60,000	COMPREHENSIVE B/C RATIO	-			0.71

SS# 04-03-212
 Order# 41000006374
 Nash County
 Before Period
 12/1/00 - 6/30/05

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



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

TRAFFIC SAFETY UNIT



Date: 6-2-2010

Prepared By: C Neilson

SS# 04-03-212
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 Nash County
 After Period
 9/1/05 - 3/31/10

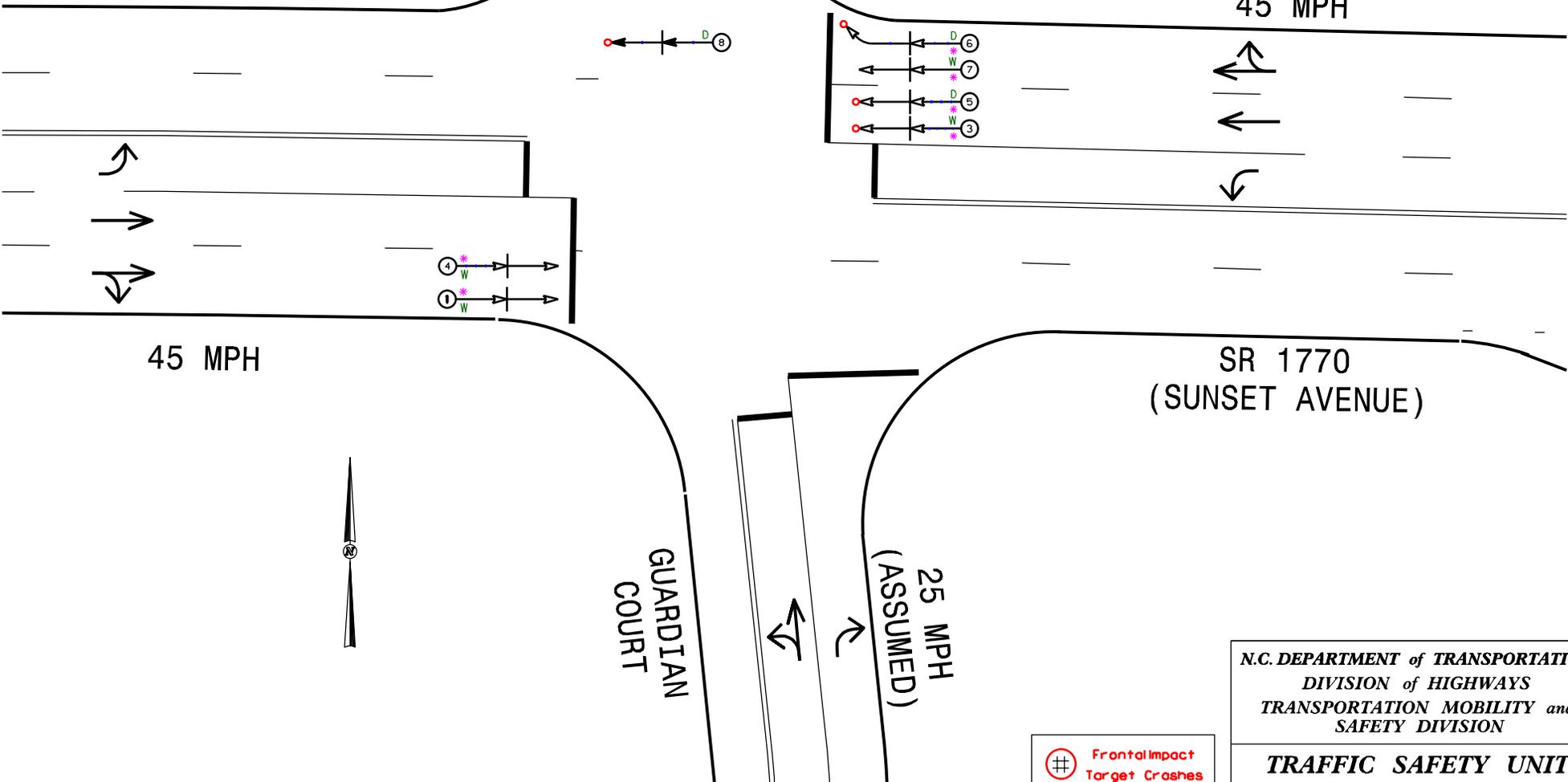
SR 1770
 (SUNSET AVENUE)

25 MPH

CANDLEWOOD
 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		INJURY		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		TO AND LIP
	RAN OFF ROAD		SPEED UNKNOWN		9 MPH OR LESS		ONLY



SR 1770
 (SUNSET AVENUE)

GUARDIAN
 COURT

25 MPH
 (ASSUMED)

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TRAFFIC SAFETY UNIT



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