

Spot Safety Project Evaluation

Project Log # 200704278

Spot Safety Project # 04-01-200

Spot Safety Project Evaluation of the Traffic Signal Installation at SR 1770 (Sunset Ave) and Westridge Circle in Nash 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

Samuel D. Coleman, EI

3/11/2008
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 04-01-200 – Traffic Signal Installation at SR 1770 (Sunset Ave) and Westridge Circle in Nash County.

Project Information and Background from the Project File Folder

SR 1770 (Sunset Ave) is a five lane facility with a center left turn lane and a speed limit of 45 mph. Westridge Circle has a three lane section at the intersection with SR 1770 with dedicated left and right turn lanes. Westridge Circle has a statutory speed limit of 35 mph. The driveway to Southern Bank forms the north leg of the intersection. The intersection was controlled by a stop condition at Westridge Circle and Southern Bank.

The original problem statement shows there were left turn crashes resulting from poor gap selection. The original study period was from 1/1/1997 to 12/31/2000 and yielded 11 total crashes. From the 11 crashes, 10 were considered correctable; including 9 left turn and 1 angle crash. The countermeasure chosen to alleviate the problem was to install a traffic signal to allow for a better flow of traffic. The traffic signal installation was completed on 12/2/2002 at a cost of \$45,000.

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 2002 through January 2003. The before period consisted of reported crashes from September 1, 1998 through October 31, 2002 (4 years, 2 months) and the after period consisted of reported crashes from February 1, 2003 through March 31, 2007 (4 years, 2 months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The treatment data consisted of all crashes within 150 feet of the subject intersection. The following data table depicts the Naive Before and After Analysis for the above information. Please note that Frontal Impact crash types influenced by the implemented countermeasure were the target crashes for the treatment location. These crash types considered are as follows: Left Turn, same roadway; Left Turn, different roadway; Right Turn, same roadway; Right Turn, different roadway; Head On, and Angle. The target crashes are clearly identified in the before and after period collision diagrams.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	13	28	115.4
Total Severity Index	5.6	6.4	14.3
Target Crashes	11	12	9.1
Target Severity Index	6.4	4.1	-36.0
Volume	20000	23000	15.0
<u>Treatment Injury Crashes</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal	0	0	N/A
Class A	0	1	N/A
Class B	3	0	-100.0
Class C	5	10	100.0
Property Damage Only	5	17	240.0
<u>Target Injury Crashes</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal	0	0	N/A
Class A	0	0	N/A
Class B	3	0	-100.0
Class C	5	5	0.0
Property Damage Only	3	7	133.3

Table 1.

The naive before and after analysis at the treatment location resulted in a 115 percent increase in Total Crashes, a 9 percent increase in Frontal Impact Crashes, and a 15 percent increase in Average Daily Traffic (ADT). The before period ADT year was 2000 and the after period ADT year was 2005.

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 115 percent increase in Total Crashes and a 9 percent increase in Frontal Impact Crashes. The summary results above demonstrate that the treatment location appears to have had an increase in the number of Total Crashes and an increase in the number of Frontal Impact Crashes from the before to the after period.

The after period diagram shows 9 of the 11 target crashes involving an eastbound thru vehicle. The after period collision diagram also shows four rear end crashes and one backing up crash in the eastbound thru lanes as well. These crashes may indicate, along with nine of the target crashes, an issue with vehicles stopping in time before reaching the intersection. During the field investigation there were no noted sight distance issues which can be seen in the Photos section. Other probable factors may need to be observed to identify the reason behind these crash patterns.

The calculated benefit to cost ratio for this project is -15.69 considering total crashes. The benefit to cost ratio considering only target crashes is 1.03. 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.

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 road.

TREATMENT SITE BENEFIT-COST ANALYSIS

LOCATION: SR 1770 at Westridge Cir
 COUNTY: Nash
 FILE NO.: SS 04-01-200

BY: S Coleman
 DATE: 10/29/2007

DETAILED COST: TYPE IMPROVEMENT - Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$44,000	10	0.149	\$6,557
	\$0	0	0.000	\$0
Right-of-Way	\$1,000	0	0.000	\$0
TOTALS	\$45,000	10	0.146	\$6,557

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$2,000
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$900
 TOTAL ANNUAL COST= \$9,457
 TOTAL COST OF PROJECT= \$45,000

COMPREHENSIVE COST REDUCTION:

TIME PERIOD	YEARS	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES						ANNUAL COSTS
		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	
BEFORE	4.16	0	0.00	8	1.92	5	1.20	\$41,466
AFTER	4.16	1	0.24	10	2.40	17	4.09	\$189,832

Annual Benefits from Crash Cost Savings (\$148,365)

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$157,823)
 BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = -15.69

TOTAL COST OF PROJECT - \$45,000 COMPREHENSIVE B/C RATIO - -15.69

TARGET CRASH BENEFIT-COST ANALYSIS

LOCATION: SR 1770 at Westridge Cir
 COUNTY: Nash
 FILE NO.: SS 04-01-200

BY: S Coleman
 DATE: 10/29/2007

DETAILED COST: TYPE IMPROVEMENT - Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$44,000	10	0.149	\$6,557
	\$0	0	0.000	\$0
Right-of-Way	\$1,000	0	0.000	\$0
TOTALS	\$45,000	10	0.146	\$6,557

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$2,000
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$900
 TOTAL ANNUAL COST= \$9,457
 TOTAL COST OF PROJECT= \$45,000

COMPREHENSIVE COST REDUCTION:

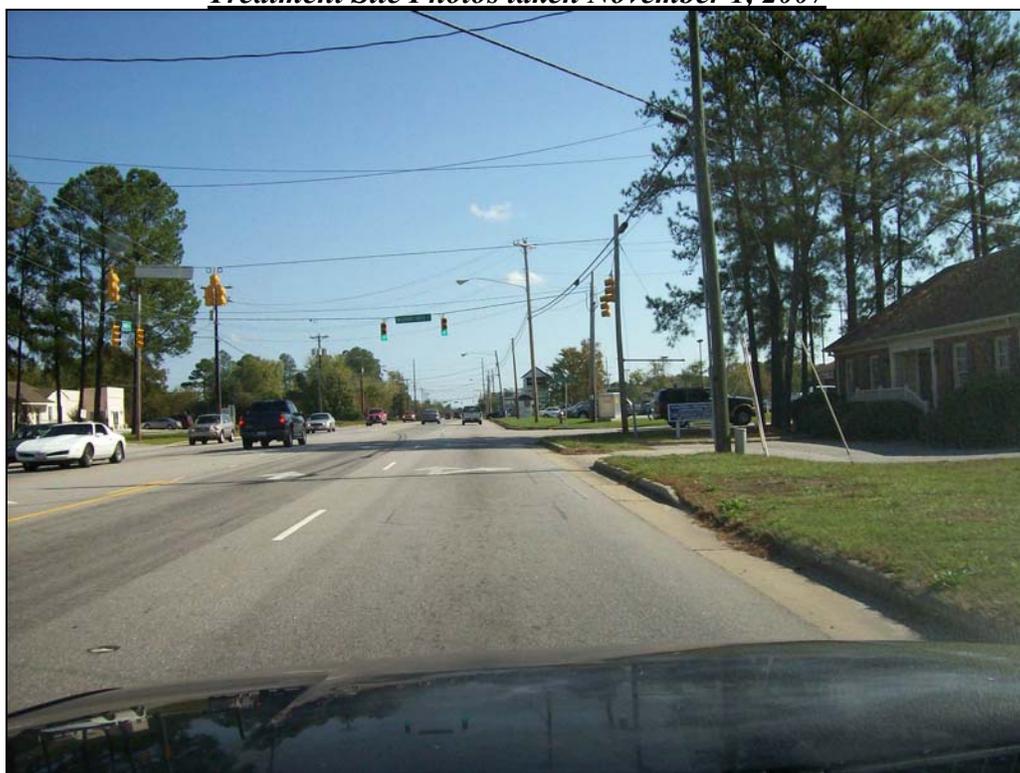
TIME PERIOD	YEARS	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES						ANNUAL COSTS
		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	
BEFORE	4.16	0	0.00	8	1.92	3	0.72	\$39,495
AFTER	4.16	0	0.00	5	1.20	7	1.68	\$29,736

Annual Benefits from Crash Cost Savings \$9,760

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$302
 BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 1.03

TOTAL COST OF PROJECT - \$45,000 COMPREHENSIVE B/C RATIO - 1.03

Treatment Site Photos taken November 1, 2007



Driving east on SR 1770



Driving north on Westridge Circle



Driving west on SR 1770



Driving south in the Southern Bank driveway

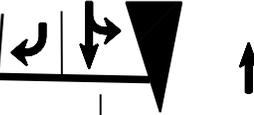


Driving south in the Southern Bank driveway

Nash County
Treatment Site - Total Crashes
Before Period
September 1, 1998 - October 31, 2002
(4 years, 2 months)



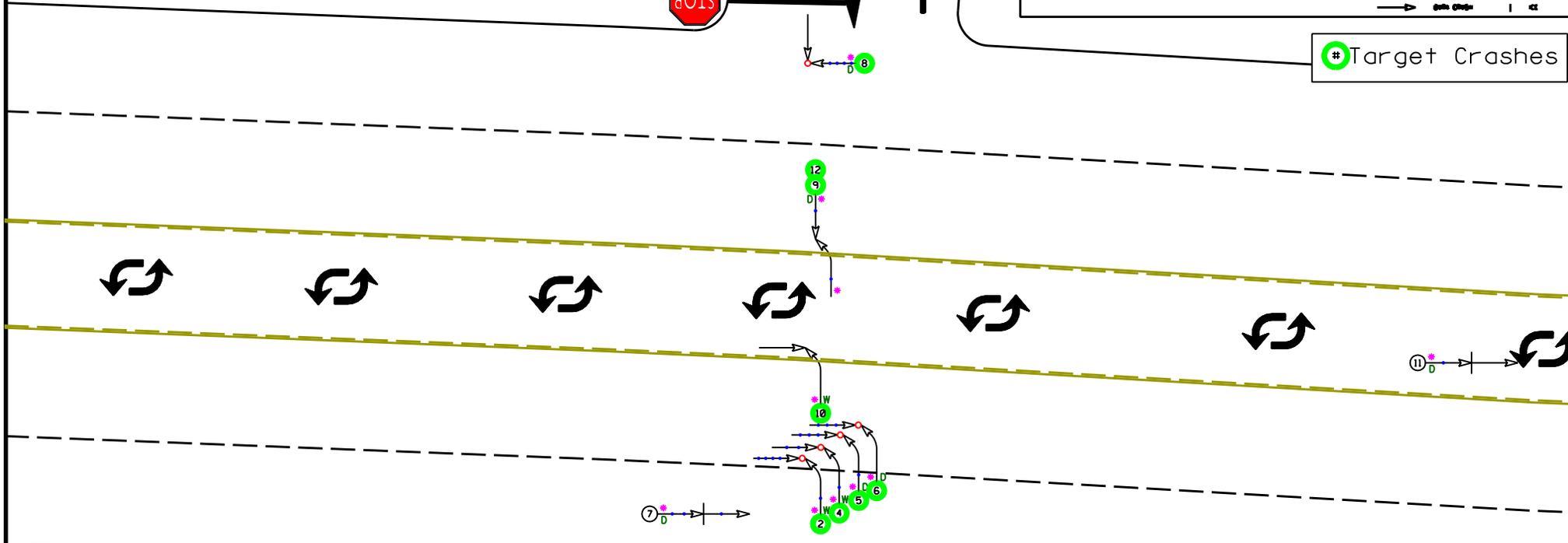
Entrance to
Southern Bank



LEGEND

	vehicle		truck		10 mph or less		P pedestrian
	motorcycle		turning		10 mph to 19		B bicycle
	truck with trailer		backing		20 mph to 29		T train
	truck with trailer		backing		30 mph to 39		A animal
	truck with trailer		backing		40 mph to 49		OTHER AT FAULT
	truck with trailer		backing		50 mph to 59		D driver
	truck with trailer		backing		60 mph to 69		W west
	truck with trailer		backing		70 mph or more		E east
	truck with trailer		backing		out of control		SPD unknown
	truck with trailer		backing		right		80 mph or more
	truck with trailer		backing		left		90 mph or more
	truck with trailer		backing		straight		100 mph or more

Target Crashes



SR 1770 (Sunset Ave)
45 MPH

STOP
Crash #1-ran off road to avoid a left turning road to Sunset Ave.

Westridge Circle
25 MPH

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT	
ROADWAY SAFETY IMPROVEMENT PROGRAM	SAFETY INFORMATION MANAGEMENT AND SUPPORT
SAFETY EVALUATION	
BEFORE TRAFFIC SIGNAL INSTALLATION	
N.C. DEPARTMENT of TRANSPORTATION	
DIVISION of HIGHWAYS	
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH	

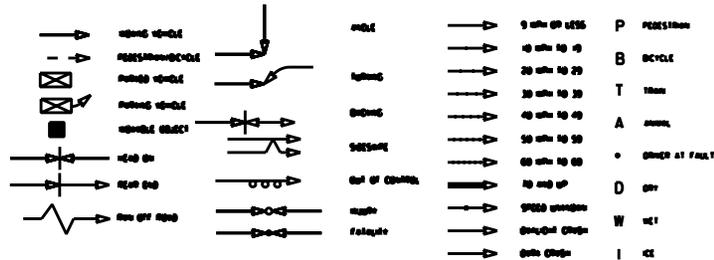
COLLISION DIAGRAM	
DIVISION:	AREA:
STUDY PERIOD: 9/1/98 TO 10/31/2002	
DISTANCE:	T-LENGTH:
ANALYSIS PREPARED BY: S. COVINO	
DIAGRAM PREPARED BY: S. COVINO	
DIAGRAM REVIEWED BY:	
SCALE:	NOT TO SCALE
DATE:	NOV 01 2002
LOG NUMBER:	

Nash County
Treatment Site - Total Crashes
After Period
February 1, 2003 - March 31, 2007
(4 years, 2 months)

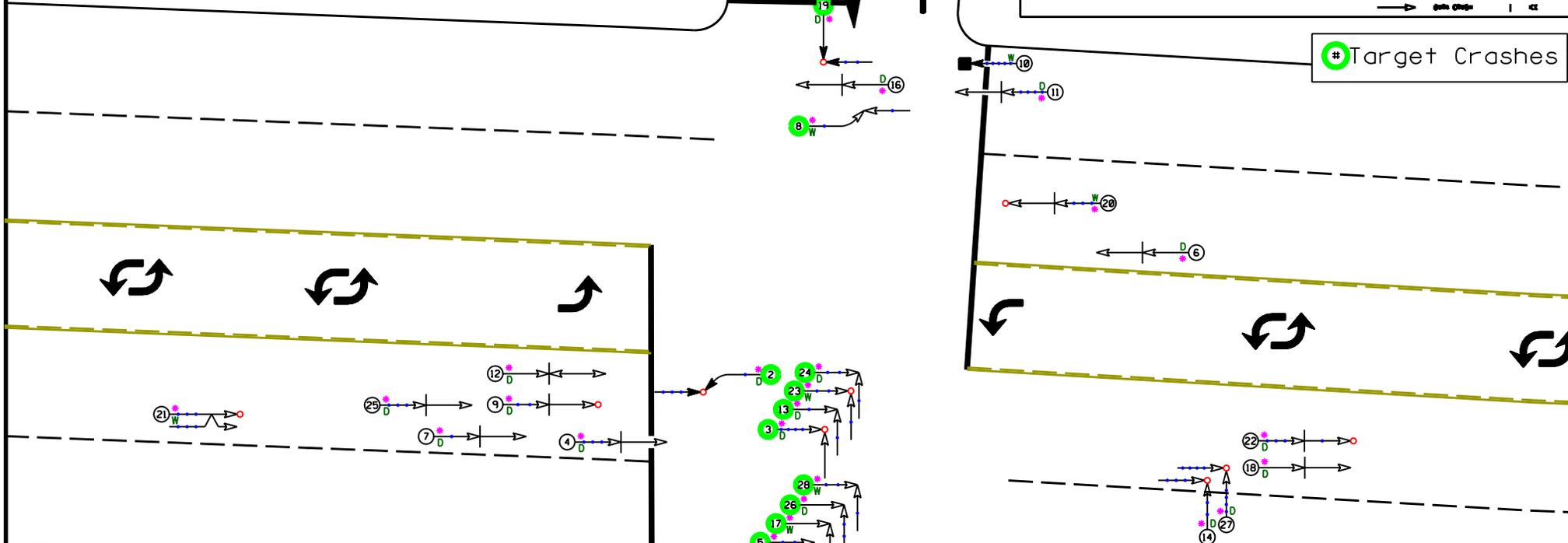


Entrance to
Southern Bank

LEGEND



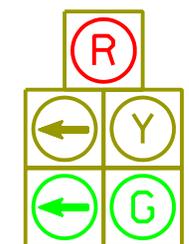
Target Crashes



SR 1770 (Sunset Ave)
45 MPH



Signalized
Intersection



Over left turn lane of
SR 1770 westbound

Westridge Circle
25 MPH

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT		COLLISION DIAGRAM	
ROADWAY SAFETY IMPROVEMENT PROGRAM	SAFETY PROMOTION MANAGEMENT AND SUPPORT	Division:	Area:
		Study Period:	2/1/2003 TO 3/31/2007
		Distance:	1-LINE: 150 FT
SAFETY EVALUATION		SCALE:	NOT TO SCALE
AFTER TRAFFIC SIGNAL INSTALLATION		DATE:	NOV03.2007
N.C. DEPARTMENT of TRANSPORTATION DIVISION of HIGHWAYS TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH		LOG NUMBER:	