

Spot Safety Project Evaluation

Order # 41000004802

Spot Safety Project # 07-02-231

**Spot Safety Project Evaluation of the Channelization Installation
NC 61 at SR 3108 (Shoe Road)
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



Jason B. Schronce

3-1-2010

Date

Traffic Safety Project Engineer

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 raised median channelization island with dual posted stop signs. This location was also provided with a right-side oversized stop sign on the shoulder. NC 61 and SR 3108 (Shoe Road) are both two-lane facilities at the subject intersection with speed limits of 55 mph on all approaches. The subject location is a three-leg intersection, which is controlled by stop signs on the SR 3108 approach.

The original statement of problem was that vehicles were running the stop sign on SR 3108 (Shoe Road). The intended purpose of the additional signage was to bring awareness to the intersection and alleviate this pattern of vehicles avoiding the stop condition.

The initial crash analysis was completed from April 1, 1998 to March 31, 2001 with three (3) reported crashes, two (2) of which were deemed correctable. The final completion date for the improvement at the subject intersection was on July 12, 2004 with a total cost of \$40,000.

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 June through July 2004. The before period consisted of reported crashes from December 1, 1998 through May 31, 2004 (5 years and 5 months); and the after period consisted of reported crashes from August 1, 2004 through December 31, 2009 (5 years and 5 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 Stop Sign Run Crashes were the target crashes for the applied countermeasure. The Stop Sign Run Crash types considered are as follows: Angle and Ran-off Roadway, Straight.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	3	1	- 66.7 %
Total Severity Index	3.47	8.40	142.1 %
Target Crashes	2	0	- 100.0 %
Target Crash Severity Index	4.70	0.00	- 100.0 %
Volume	2,600	2,800	7.7 %

<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	1	1	0.0 %
Class C Injury Crashes	0	0	N/A
Total Injury Crashes	1	1	0.0 %

The naive before and after analysis at the treatment location resulted in a 67 percent decrease in Total Crashes, an 83 percent decrease in Target Crashes, but a 63 percent increase in the Total Severity Index. The before period ADT year was 2001 and the after period ADT year was 2007.

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 67 percent decrease in Total Crashes and a 100 percent decrease in Target Crashes. The summary results above demonstrate that both Total and Target Crashes appear to have decreased at the treatment location from the before to the after period.

Referencing the *Collision Diagrams*, the before period showed two vehicles avoiding the stop sign control resulting in one angle collision and one ran-off roadway through the intersection. After the additional signage and channelization installation, this pattern was completely eliminated. The only after period crash resulted from a SR 3108 motorist who chose an inappropriate gap to make a left hand turn after coming to a complete stop at the intersection.

The calculated benefit to cost ratio for this project is **0.21 considering total crashes**. The benefit to cost ratio **considering only target crashes is 0.59**. 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 three 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



Traveling Southeast on NC 61



Traveling Northwest on NC 61 approaching intersection



Traveling South on SR 3108 (Shoe Road)
Notice Oversized Stop Sign on Shoulder

BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes

LOCATION: NC 61 at SR 3108		BY: JBS						
COUNTY: Guilford		DATE: 3/1/2010						
FILE NO.: SS 07-02-231		NOTES: Total Crashes						
DETAILED COST:	TYPE IMPROVEMENT -	Channelization and Signs						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$40,000	10	0.149	\$5,961			
		\$0	0	0.000	\$0			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$40,000	10	0.149	\$5,961			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$850			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$6,811			
	TOTAL COST OF PROJECT=				\$40,000			
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	5.42	0	0.00	1	0.18	2	0.37	\$4,760
AFTER	5.42	0	0.00	1	0.18	0	0.00	\$3,321
							Annual Benefits from Crash Cost Savings	\$1,439
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST						=	(\$5,372)	
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST						=	0.21	
TOTAL COST OF PROJECT		-	\$40,000	COMPREHENSIVE B/C RATIO		-	0.21	

BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes

LOCATION: NC 61 at SR 3108		BY: JBS						
COUNTY: Guilford		DATE: 3/1/2010						
FILE NO.: SS 07-02-231		NOTES: Target Crashes - Stop Sign Run						
DETAILED COST:	TYPE IMPROVEMENT -	Channelization and Signs						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$40,000	10	0.149	\$5,961			
		\$0	0	0.000	\$0			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$40,000	10	0.149	\$5,961			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$850			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$6,811			
	TOTAL COST OF PROJECT=				\$40,000			
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	5.42	0	0.00	1	0.18	1	0.18	\$4,041
AFTER	5.42	0	0.00	0	0.00	0	0.00	\$0
							Annual Benefits from Crash Cost Savings	\$4,041
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST						=	(\$2,771)	
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST						=	0.59	
TOTAL COST OF PROJECT		-	\$40,000	COMPREHENSIVE B/C RATIO		-	0.59	



SR 3108
Shoe Road
55 MPH

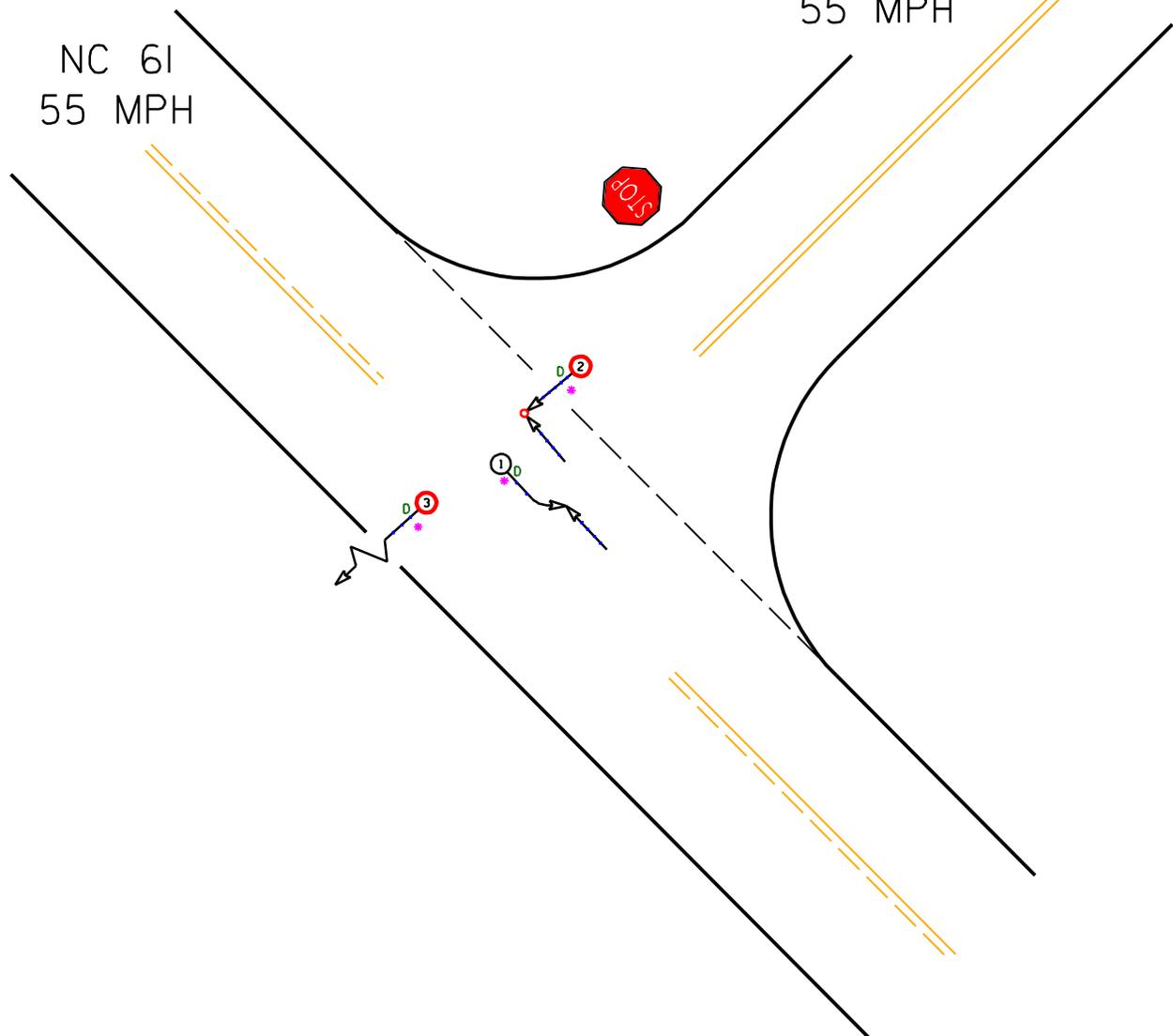
NC 61
55 MPH



SS# 07-02-231
Guilford County
BEFORE Period
12/1/98 - 5/1/04

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
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		TO AND UP		50 MPH TO 59		ICY OR SNOW
	REAR END		INJURY		60 MPH TO 69		SPEED UNKNOWN
	RAN OFF ROAD		FATALITY		9 MPH OR LESS		ONLY



Stop Sign Run
Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT



COLLISION DIAGRAM	
DIVISION: 7	AREA:
STUDY PERIOD: 2/1/1998 - 5/1/2004	
DISTANCE: Y-LINE + 150 FT	
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: N/A	
DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE	
DATE: 2-23-200	
LOG NUMBER: SS* 07-02-231 BEFORE	

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

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
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		TO AND UP		50 MPH TO 59		ICY OR SNOW
	REAR END		HURRY		60 MPH TO 69		SPEED UNKNOWN
	RAN OFF ROAD		FATALITY		9 MPH OR LESS		ONLY

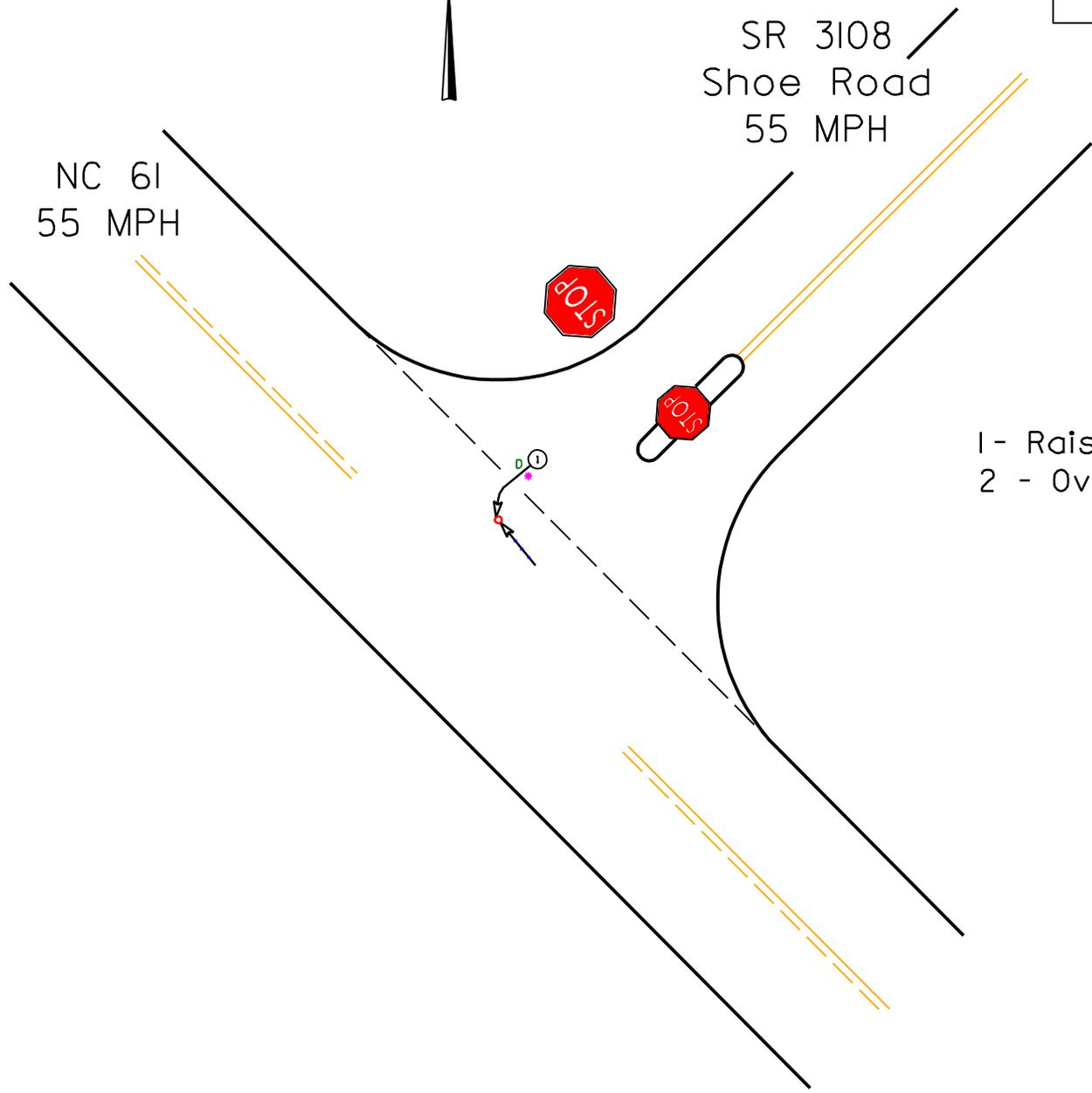


SR 3108
Shoe Road
55 MPH

NC 61
55 MPH

SS# 07-02-231
Guilford County
AFTER Period
8/1/04 - 12/31/09

Countermeasures:
1 - Raised Median w/ Stop Sign
2 - Oversized Right Stop Sign



Stop Sign Run
Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION 7	AREA:
	STUDY PERIOD: 8/1/2004 - 12/31/2009	
	DISTANCE: Y-LINE + 150 FT	
ANALYSIS PREPARED BY: JBS		
ANALYSIS CHECKED BY: N/A		
DIAGRAM PREPARED BY: JBS		
DIAGRAM REVIEWED BY: ST		
SCALE: NOT TO SCALE		
DATE: 2-23-2010		
LOG NUMBER: SS* 07-02-231 AFTER		

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