

Spot Safety Project Evaluation

Order # 41000006097

Spot Safety Project # 09-02-210

**Spot Safety Project Evaluation of the Left Turn Lane Installation
NC 109 at SR 2269 (Ernest Snider Road)
Davidson 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

5-12-2010

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 NC 109 left turn lanes. NC 109 and SR 2269 (Ernest Snider Rd) are both two-lane facilities at the subject intersection with speed limits of 55 mph on all approaches. The subject location is a four-leg intersection, which is controlled by a stop condition on the SR 2269 approaches.

The original statement of problem expressed concern for motorists turning left from the through lane of a high speed roadway. This improvement was established as the result of a fatal crash investigation. The intended purpose of the countermeasure was to alleviate the rear-end and left turn crash potential.

The initial crash analysis was completed from May 1, 1999 to May 1, 2002 with five (5) reported crashes which resulted in two fatalities and two A-class injuries, three (3) collisions of which were deemed correctable. The final completion date for the improvement at the subject intersection was on April 1, 2005 with a total cost of \$103,000.

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 March through April 2005. The before period consisted of reported crashes from April 1, 2000 through February 28, 2005 (4 years and 11 months); and the after period consisted of reported crashes from May 1, 2005 through March 31, 2010 (4 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 NC 109 Rear-ends and Left Turn-Same Roadway Crashes were the target crashes for the applied countermeasure.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	4	5	25.0 %
Total Severity Index	42.60	19.12	- 55.1 %
Target Crashes	2	2	0.0 %
Target Crash Severity Index	42.60	8.40	- 80.3 %
Volume (2002, 2007)	9,600	10,700	11.5 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	1	0	- 100.0 %
Class A injury Crashes	1	1	0.0 %
Class B injury Crashes	2	1	- 50.0 %
Class C Injury Crashes	0	1	100.0 %
Total Injury Crashes	4	3	- 25.0 %

The naive before and after analysis at the treatment location resulted in a 25 percent increase in Total Crashes, zero percent change in Target Crashes, but a 55 percent decrease in the Total Severity Index. The before period ADT year was 2002 and the after period ADT year was 2007.

Results and Discussion

Referencing the *Collision Diagrams*, the before period crash history included one fatal crash which resulted when a northbound moped merged from the right shoulder into the travel lane while attempting to turn left onto SR 2269. The moped was struck by the northbound through vehicle as he attempted to avoid the collision. After the left turn lane installations, crash history remained consistent at this location with one (1) left turn-same roadway crash and one (1) illegal passing or merge collision in each evaluation period. However, overall crash severity was reduced by 55 percent and target crash severity improved by 80 percent. This reduction in crash severity provided this evaluation project with a positive benefit-cost ratio.

The calculated benefit to cost ratio for this project is **6.19 considering total crashes**. The benefit to cost ratio **considering only target crashes is 6.07**. 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 the three intersection approaches that had photos presented. 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 North on NC 109



Traveling North on NC 109 at Intersection



Looking South on NC 109 approaching intersection



Traveling East on SR 2269 (Ernest Snider Road)

BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes

LOCATION: NC 109 at SR 2269		BY: JBS						
COUNTY: Davidson		DATE: 5/11/2010						
FILE NO.: SS 09-02-210		NOTES: Total Crashes						
DETAILED COST: TYPE IMPROVEMENT - NC 109 Left Turn Lanes								
ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
Construction	\$103,000	10	0.149	\$15,350				
Right-of-Way	\$0	0	0.000	\$0				
TOTALS	\$103,000	10	0.149	\$15,350				
ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$800				
ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0				
TOTAL ANNUAL COST=				\$16,150				
TOTAL COST OF PROJECT=				\$103,000				
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	4.92	2	0.41	2	0.41	0	0.00	\$210,569
AFTER	4.92	1	0.20	2	0.41	2	0.41	\$110,528
Annual Benefits from Crash Cost Savings								\$100,041
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST						=	\$83,891	
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST						=	6.19	
TOTAL COST OF PROJECT		-	\$103,000	COMPREHENSIVE B/C RATIO		-	6.19	

BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes

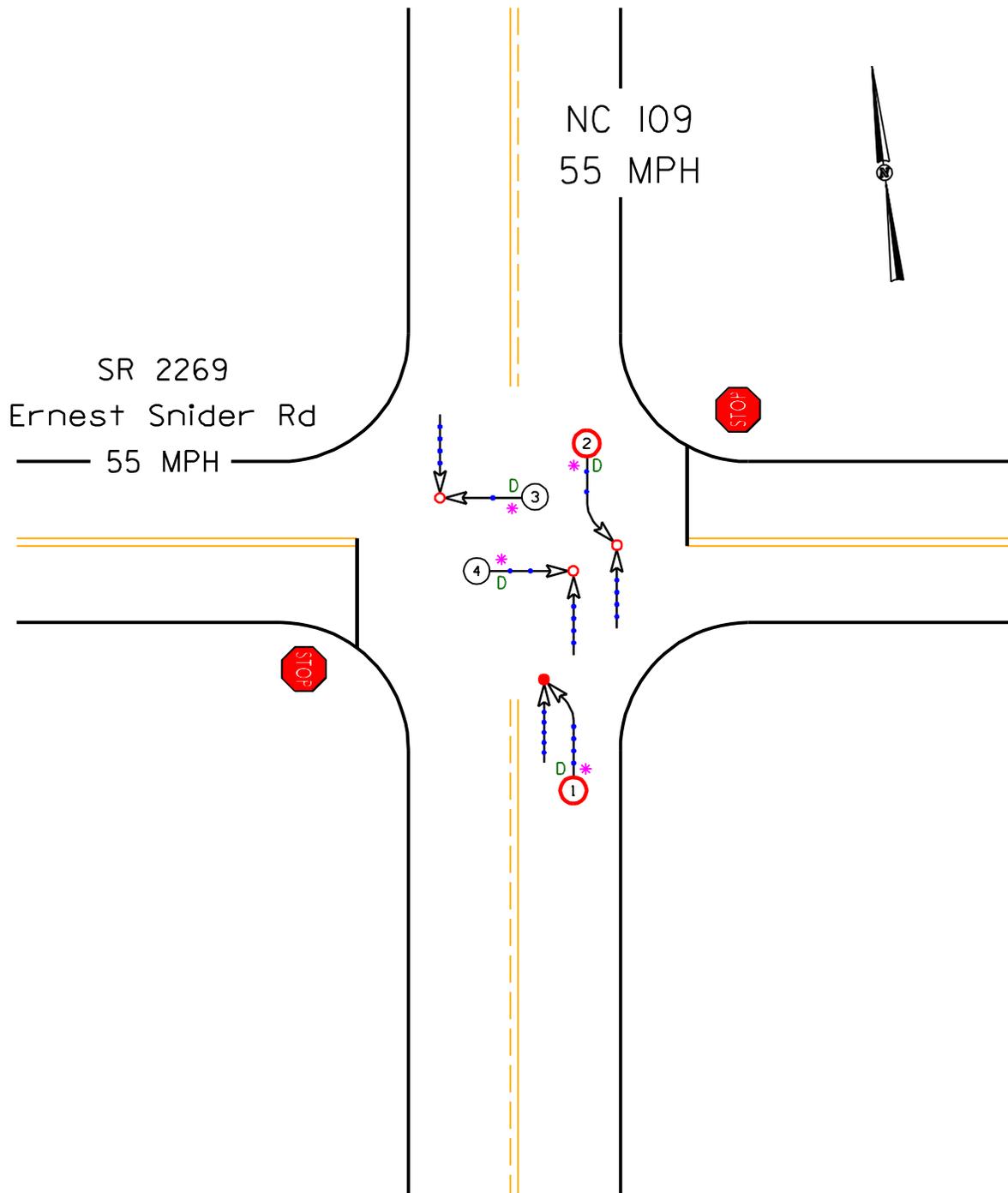
LOCATION: NC 109 at SR 2269		BY: JBS						
COUNTY: Davidson		DATE: 5/11/2010						
FILE NO.: SS 09-02-210		NOTES: Target Crashes - Left Turn, Same Rd						
DETAILED COST: TYPE IMPROVEMENT - NC 109 Left Turn Lanes								
ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
Construction	\$103,000	10	0.149	\$15,350				
Right-of-Way	\$0	0	0.000	\$0				
TOTALS	\$103,000	10	0.149	\$15,350				
ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$800				
ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0				
TOTAL ANNUAL COST=				\$16,150				
TOTAL COST OF PROJECT=				\$103,000				
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	4.92	1	0.20	1	0.20	0	0.00	\$105,285
AFTER	4.92	0	0.00	2	0.41	0	0.00	\$7,317
Annual Benefits from Crash Cost Savings								\$97,967
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST						=	\$81,817	
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST						=	6.07	
TOTAL COST OF PROJECT		-	\$103,000	COMPREHENSIVE B/C RATIO		-	6.07	

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		REAR END		50 MPH TO 59		ICY OR SNOWY
	REAR END		RAN OFF ROAD		60 MPH TO 69		TO AND UP
	RAN OFF ROAD		FATALITY		SPEED UNKNOWN		ONLY

SR 2269
Ernest Snider Rd
55 MPH

NC 109
55 MPH



SS# 09-02-210
Davidson County
BEFORE Period
4/1/00 - 2/28/05

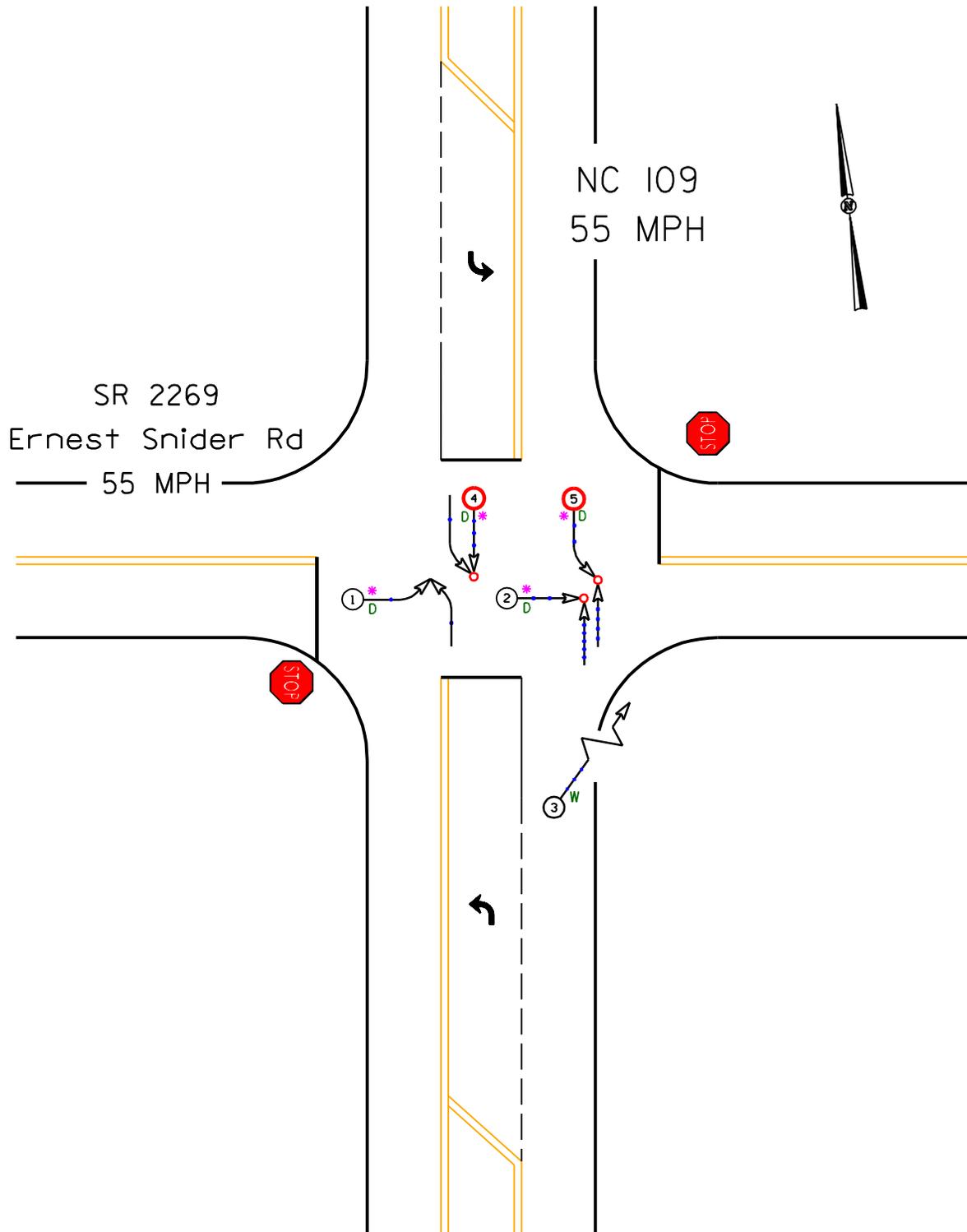
Creator: J. Schronce
DATE: 5-6-2010
Order Number: 4100006097 BEFORE

Mainline Lefts
Target Crashes

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

SR 2269
Ernest Snider Rd
55 MPH

NC 109
55 MPH



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		REAR END		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY		TO AND UP		SPEED UNKNOWN
	RAN OFF ROAD						

SS# 09-02-210
Davidson County
AFTER Period
5/1/05 - 3/31/10

Countermeasure:
Install Left Turn
Lanes on NC 109

Creator: J. Schronce
DATE: 5-6-2010
Order Number: 4100006097 AFTER

Mainline Lefts
Target Crashes

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