

Spot Safety Project Evaluation

Order # 41000007062

Spot Safety Project # 03-02-204

Spot Safety Project Evaluation of the Installation of a Left Turn Lane on NC 24 at its Western-Most Intersection with SR 1303 (Mitchell Loop) Sampson County

Documents Prepared By:

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

Principal Investigator



Brad Robinson, PE

7/15/2010

Date

Traffic Safety Project Engineer

The subject location is a three-leg intersection which is controlled by a stop sign on SR 1303. Prior to the turn lane construction all approaches were single lane. The speed limit is 55 mph for all approaches.

The original statement of problem was that vehicles traveling east on NC 24 could not see the intersection with SR 1303 due to a vertical curve crest. When vehicles stopped in the roadway to turn left they were being rear-ended by other eastbound vehicles.

The initial crash analysis was conducted from October 31, 1998 to October 31, 2001 with a total of seven reported crashes, six of which were considered correctable by the chosen countermeasure. The final completion date for the improvements at the subject intersection was on May 31, 2005 with a total cost of \$110,000.00.

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 was from January 1, 2005 to June 30, 2005. The before period consisted of reported crashes from March 1, 2000 through December 31, 2004 (4 years and 10 month) and the after period consisted of reported crashes from July 1, 2005 through April 30, 2010 (4 years and 10 month). The ending date for this analysis was limited by the available crash data at the time the analysis was conducted.

The treatment data consisted of all reported crashes within 150 feet of the subject intersection. The following data table depicts the Naive Before and After Analysis for the treatment location. Please note both Left Turn-Same Roadway Crashes on NC 24 and Rear-End Crashes on the eastbound approach of NC 24 were the Target Crashes for the applied countermeasure.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	7	5	-28.6
Total Severity Index	7.34	1	-86.4
Target Crashes	6	0	-100.0
Target Crash Severity Index	7.17	0	-100.0
Volume	9400	8900	-5.3
<u>Target Crash Severity Summary</u>			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	1	0	-100.0
Class C Crashes	4	0	-100.0
PDO Crashes	1	0	-100.0

The naive before and after analysis at the treatment location resulted in a 29 percent decrease in Total Crashes, a 100 percent decrease in Target Crashes, and a 5 percent decrease in Average Daily Traffic (ADT). The before period ADT year was 2002 and the after period ADT year was 2007.

Results and Discussion

The calculated benefit to cost ratio for this project is 1.27 considering total crashes. The benefit to cost ratio considering only target crashes is 1.29. 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.

The turn lane installation appears to have been effective in reducing Target Crashes at the intersection. In the before period there were four Rear-End Target Crashes and one Ran Off Road Crash that was considered a Target Crash (see *collision diagram*). There was also one Left Turn-Same Roadway Target Crash. In the after period there were no crashes of either type.

All five of the after period crashes occurred during wet conditions. One involved an eastbound vehicle swerving to avoid slowed traffic due to a crash that had recently taken place. The other four all involved westbound vehicles losing control on the wet roadway just prior to or at the intersection.

Please see the attached *Treatment Site Photos*. Photos were obtained from Google Street-view. 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.

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: NC 24 at SR 1303 (western intersection)
 COUNTY: Sampson
 FILE NO.: SS 03-02-204

BY: bdr
 DATE: 7/6/2010

DETAILED COST: TYPE IMPROVEMENT - Left Turn Lane

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$110,000	10	0.149	\$16,393
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$110,000	10	0.149	\$16,393

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$400
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$0
 TOTAL ANNUAL COST= \$16,793
 TOTAL COST OF PROJECT= \$110,000

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	4.83	0	0.00	6	1.24	1	0.21	\$25,735
AFTER	4.83	0	0.00	0	0.00	5	1.04	\$4,451

Annual Benefits from Crash Cost Savings \$21,284

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$4,490

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 1.27

TOTAL COST OF PROJECT - \$110,000 COMPREHENSIVE B/C RATIO - 1.27

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: NC 24 at SR 1303 (western intersection)
 COUNTY: Sampson
 FILE NO.: SS 03-02-204 Target Crashes Only

BY: bdr
 DATE: 7/6/2010

DETAILED COST: TYPE IMPROVEMENT - Left Turn Lane

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
Right-of-Way	\$110,000	10	0.149	\$16,393
	\$0	0	0.000	\$0
TOTALS	\$110,000	10	0.149	\$16,393

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ESTIMATED INCREASE IN ANNUAL UTILITY COST =	\$0
TOTAL ANNUAL COST=	\$16,793
TOTAL COST OF PROJECT=	\$110,000

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	4.83	0	0.00	5	1.04	1	0.21	\$21,594
AFTER	4.83	0	0.00	0	0.00	0	0.00	\$0

Annual Benefits from Crash Cost Savings \$21,594

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$4,801

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 1.29

TOTAL COST OF PROJECT - \$110,000 COMPREHENSIVE B/C RATIO - 1.29

Treatment Site Photos



Looking Northeast on NC 24



Looking southwest on NC 24



Looking toward SR 1303 from intersection

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 Sampson County
 BEFORE Period
 3/1/2000-12/31/2004

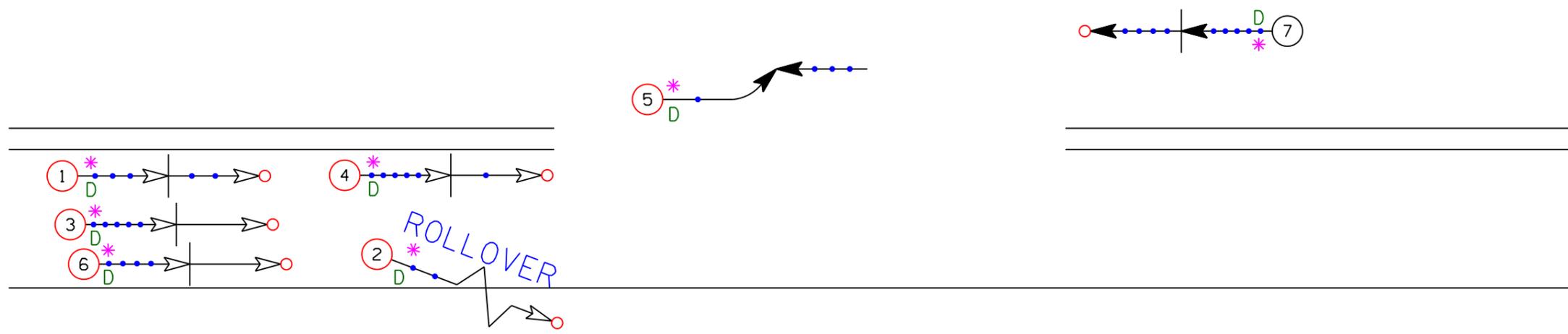
LEGEND							
	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PARKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		INJURY		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		SPEED UNKNOWN
	RAN OFF ROAD		70 AND UP		70 AND UP		ONLY

SR 1303
 Mitchell Loop Rd
 (western intersection)

NC 24
 Roseboro Hwy
 55 mph



NC 24
 Roseboro Hwy
 55 mph



Note: Crash #2 considered a Target Crash. Driver swerved to avoid a vehicle waiting to make a left turn.



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

TRAFFIC SAFETY UNIT

Date: July 2010 Prepared By: BDR

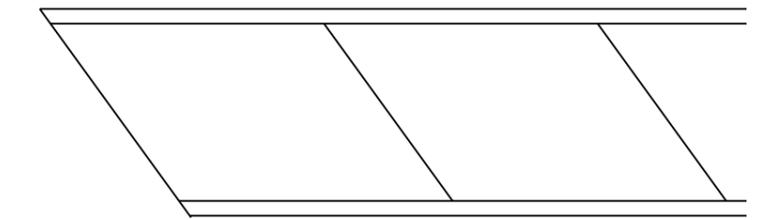
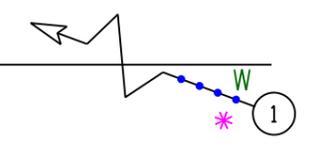
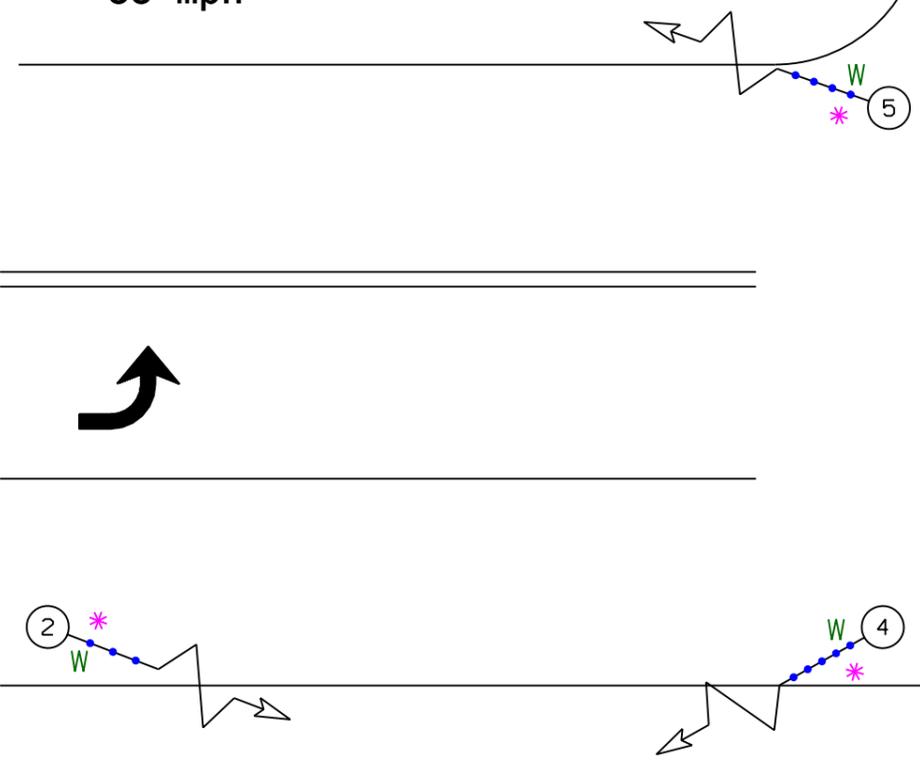
SS# 03-02-204
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 Sampson County
 AFTER Period
 7/1/2005-4/30/2010

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
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 Mitchell Loop Rd
 (western intersection)

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 Roseboro Hwy
 55 mph

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