

Spot Safety Project Evaluation

Order # 41000014220

Spot Safety Project # 08-03-203

**Spot Safety Project Evaluation of the Intersection Realignment and
Southbound US 15/501 Right Turn Lane Installation
US 15/501 at NC 144 (Old Wire Rd) and SR 1429 (Shaw Currie Rd)
Scotland 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

10-4-2011

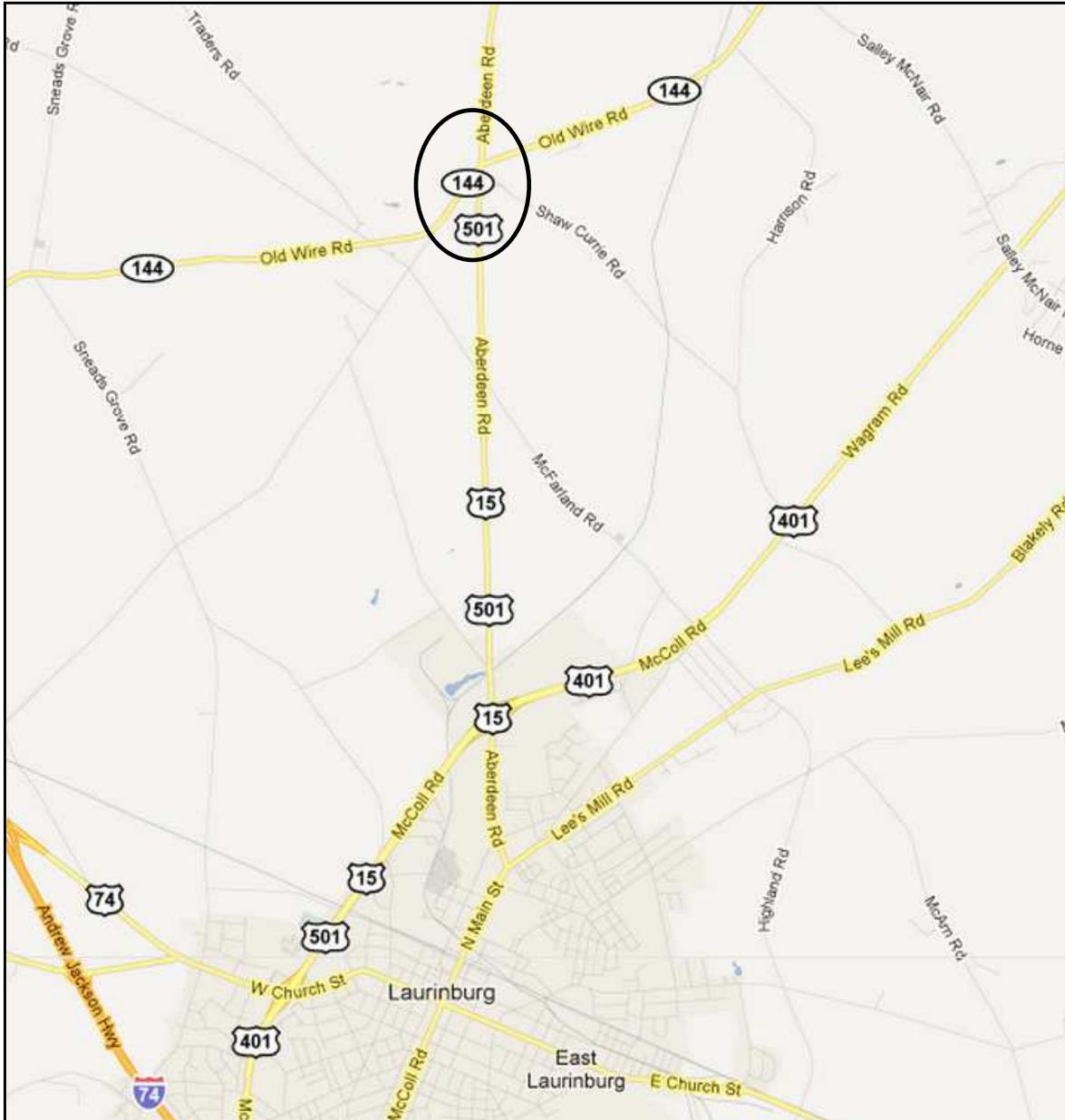
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 08-03-203 located at the Intersection of US 15/501 (Aberdeen Road) at NC 144 (Old Wire Road) and SR 1429 (Shaw Currie Road) in Scotland County, north of the City of Laurinburg.





Before Period Alignment provided from BING Maps



After Period Alignment provided from Google Maps

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasures chosen for the subject location were the installation of a southbound US 15/501 right turn lane at NC 144 and the relocation of SR 1429 (Shaw Currie Road). The before period location consisted of a single five-road intersection comprised of all two-lane roadways and speed limits of 55-mph. NC 144 (Old Wire Road) and SR 1429 operate under stop sign control. The new intersection of US 15/501 and SR 1429 is a 3-leg intersection located approximately 550 feet south of the existing NC 144 intersection. There is also a 40-mph advisory speed limit posted through the intersections.

The original statement of problem was the concern that motorists were distracted by the configuration of the five-leg intersection. In addition, the sight distance on the vertical curve looking north from NC 144 is limited by the northwest embankment. This location was part of the 2002 Highway Safety Improvement Program under HSIP # 82I00032.

The initial crash analysis was completed from July 1, 1999 to June 30, 2002 with twenty-three (23) reported crashes, seventeen (17) of which were deemed correctable. The final completion date for these improvements by the crash reports was during July 2007 with a total cost of \$130,000.

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 was the month of July 2007. The before period consisted of reported crashes from August 1, 2003 through June 30, 2007 (3 years and 11 months); and the after period consisted of reported crashes from August 1, 2007 through June 30, 2011 (3 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 from 150 feet south of the new SR 1429 intersection (MP 11.711) to 150 feet north of the NC 144 intersection (MP 11.872) with a 150 foot y-line. *Please see attached location map, aerial maps, 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; Head on; and Angle.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	47	35	- 25.5 %
Total Severity Index	10.09	5.86	- 41.9 %
Target Crashes – Frontal Impact	38	30	- 21.1 %
Target Crash Severity Index	11.46	6.18	- 46.1 %
Volume (2005, 2009)	8,400	7,500	- 10.7 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	1	0	- 100.0 %
Class A injury Crashes	2	0	- 100.0 %
Class B injury Crashes	8	5	- 37.5 %
Class C Injury Crashes	19	18	- 5.3 %
Total Injury Crashes	30	23	- 23.3 %

The naive before and after analysis at the treatment location resulted in a 26 percent decrease in Total Crashes, a 21 percent decrease in Target Crashes, and a 42 percent decrease in the Total Severity Index. The before period ADT year was 2005 and the after period ADT year was 2009.

Results and Discussion

Referencing the *Collision Diagrams*, the before period experienced a significant frontal impact crash pattern as vehicles attempted to cross US 15/501. There were fourteen (14) angle / left turn crashes crossing eastbound, eighteen (18) angle crashes crossing westbound, and five (5) ran-off roadway collisions while avoiding an angle impact. In addition, three (3) more vehicles ran through the posted stop signs on NC 144 westbound and crashed on the opposite side of the intersection.

After the SR 1429 relocation, the intersection experienced a slight improvement with the reduction of severe injury (Fatal and A-injuries) crashes from three (3) to zero (0). Although in the after period, there were fourteen (14) angle / left turn crashes crossing eastbound at NC 144 and ten (10) angle / left turn crashes crossing NC 144 westbound. The new SR 1429 (Shaw Currie Rd) intersection experienced two (2) improper passing crashes as southbound US 15/501 vehicles attempted the new left turn movement. Also, left turn same roadway collisions in the NC 144 intersection increased from one (1) to four (4) through the evaluation.

The calculated benefit to cost ratio for this project is **25.69 considering total crashes**. The benefit to cost ratio **considering only target crashes is 25.07**. 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 our field visit on September 14th, 2011 for all five 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



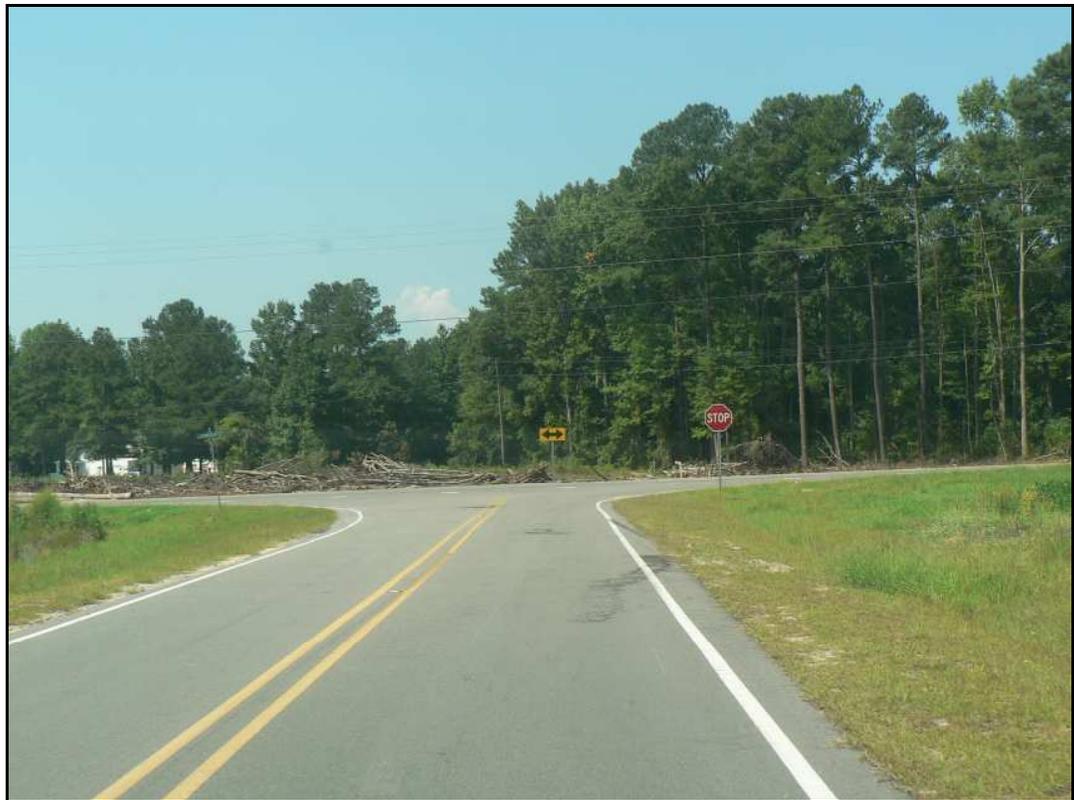
**Travelling Northbound on US 15/501 at SR 1429 (Shaw Currie Rd)
Truck Turning at NC 144 Intersection**



Travelling Northbound on US 15/501 at NC 144 (Old Wire Rd)



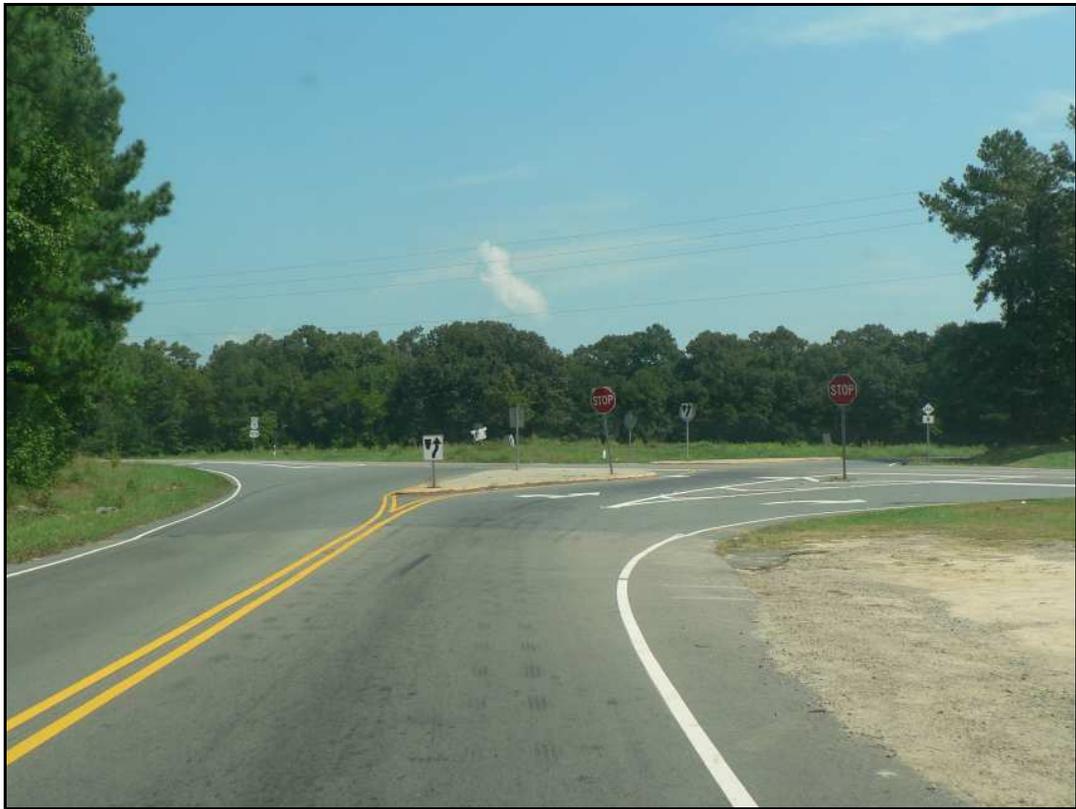
Travelling North/West on SR 1429 – Showing Previous Alignment



Travelling West on SR 1429 – New 3-Leg Intersection



Travelling South on US 15/501 at NC 144 – Showing New Right Turn Lane



Travelling East on NC 144 (Old Wire Road)



Travelling East on NC 144 – Sight Distance Looking North on US 15/501



Travelling East on NC 144 – Sight Distance Looking South on US 15/501



Travelling West on NC 144 (Old Wire Road)



Travelling West on NC 144 (Old Wire Road) at US 15/501

BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes

LOCATION: US 15/501 @ NC 144 / SR 1429		BY: JBS						
COUNTY: Scotland		DATE: 9/19/2011						
FILE NO.: SS 08-03-203								
DETAILED COST:	TYPE IMPROVEMENT - Right Turn Lane Installation, Relocation							
ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
Construction	\$130,000	10	0.149	\$19,374				
Right-of-Way	\$0	0	0.000	\$0				
TOTALS	\$130,000	10	0.149	\$19,374				
ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$400				
ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0				
TOTAL ANNUAL COST=				\$19,774				
TOTAL COST OF PROJECT=				\$130,000				
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	3.92	3	0.77	27	6.89	17	4.34	\$638,546
AFTER	3.92	0	0.00	23	5.87	12	3.06	\$130,510
Annual Benefits from Crash Cost Savings								\$508,036
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST						=	\$488,262	
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST						=	25.69	
TOTAL COST OF PROJECT		-	\$130,000	COMPREHENSIVE B/C RATIO		-	25.69	

BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes

LOCATION: US 15/501 @ NC 144 / SR 1429		BY: JBS						
COUNTY: Scotland		DATE: 9/19/2011						
FILE NO.: SS 08-03-203		Frontal Impact Target Crashes						
DETAILED COST:	TYPE IMPROVEMENT - Right Turn Lane Installation, Relocation							
ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
Construction	\$130,000	10	0.149	\$19,374				
Right-of-Way	\$0	0	0.000	\$0				
TOTALS	\$130,000	10	0.149	\$19,374				
ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$400				
ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0				
TOTAL ANNUAL COST=				\$19,774				
TOTAL COST OF PROJECT=				\$130,000				
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	3.92	3	0.77	23	5.87	12	3.06	\$612,653
AFTER	3.92	0	0.00	21	5.36	9	2.30	\$117,015
Annual Benefits from Crash Cost Savings								\$495,638
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST						=	\$475,864	
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST						=	25.07	
TOTAL COST OF PROJECT		-	\$130,000	COMPREHENSIVE B/C RATIO		-	25.07	



ADT (Year)
5,500 (2005)

US 15/501
Aberdeen Road
55-mph

ADT (Year)
2,800 (2005)

NC 144
Old Wire Road
(SR 1319 / 1405)
55-mph

ADT (Year)
2,987 (2005)

NC 144
Old Wire Road
(SR 1319 / 1405)
55-mph

SR 1429
Shaw Currie Rd
55-MPH

ADT (Year)
62 (2005)

US 15/501
Aberdeen Road
55-mph

ADT (Year)
5,400 (2005)

Note: Ran-Off Road
Crashes 5, 6, 15, 36, 44
occurred while avoiding
a Frontal Impact Crash

LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PAKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	FIXED OBJECT		SIDESWIPE		30 MPH TO 39		DRY
	HEAD ON		OUT OF CONTROL		40 MPH TO 49		WET
	REAR END		RUNAWAY		50 MPH TO 59		ICY OR SNOWY
	RAN OFF ROAD		FATALITY		60 MPH TO 69		KEY OR SMOKY
			TO AND UP		70 MPH TO 79		ONLY
			SPEED UNKNOWN				

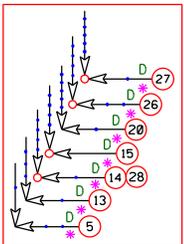
SS# 08-03-203
Order# 41000014220
Scotland County
BEFORE Period
8/1/03 - 6/30/07

Frontal Impact
Target Crashes

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

TRAFFIC SAFETY UNIT

Date: 8-17-2011 Prepared By: J. Schronce



ADT (Year)
5,500 (2009)

ADT (Year)
1,900 (2009)

ADT (Year)
2,575 (2009)

NC 144
Old Wire Road
(SR 1319 / 1405)
55-mph

Note: Crash 4 -
Exact Location and
details of crash
unknown.

US 15/501
Aberdeen Road
55-mph
(40-mph Advisory)

ADT (Year)
5,000 (2009)

ADT (Year)
5,500 (2009)

ADT (Year)
1,900 (2009)

NC 144
Old Wire Road
(SR 1319 / 1405)
55-mph

Former
SR 1429
Alignment

ADT (Year)
72 (2009)

SR 1429
Shaw Currie Rd
55-MPH

LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PAKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	FIXED OBJECT		SIDESWIPE		30 MPH TO 39		DRY
	HEAD ON		OUT OF CONTROL		40 MPH TO 49		WET
	REAR END		RUNAWAY		50 MPH TO 59		ICY OR SNOWY
	RAN OFF ROAD		OUT OF CONTROL		60 MPH TO 69		TO AND UP
			FATALITY		TO AND UP		ONLY
					70 MPH TO 79		
					80 MPH TO 89		
					90 MPH TO 99		
					100 MPH TO 109		
					110 MPH TO 119		
					120 MPH TO 129		
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					150 MPH TO 159		
					160 MPH TO 169		
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