

# Spot Safety Project Evaluation

Order # 41000001600

Spot Safety Project # 13-02-204

**Spot Safety Project Evaluation of the Channelization Installation  
SR 1003 (Reems Creek Rd) at SR 2122 (Union Chapel Rd)  
Buncombe County**

Documents Prepared By:

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

**Principal Investigator**



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Jason B. Schronce

10-12-2009

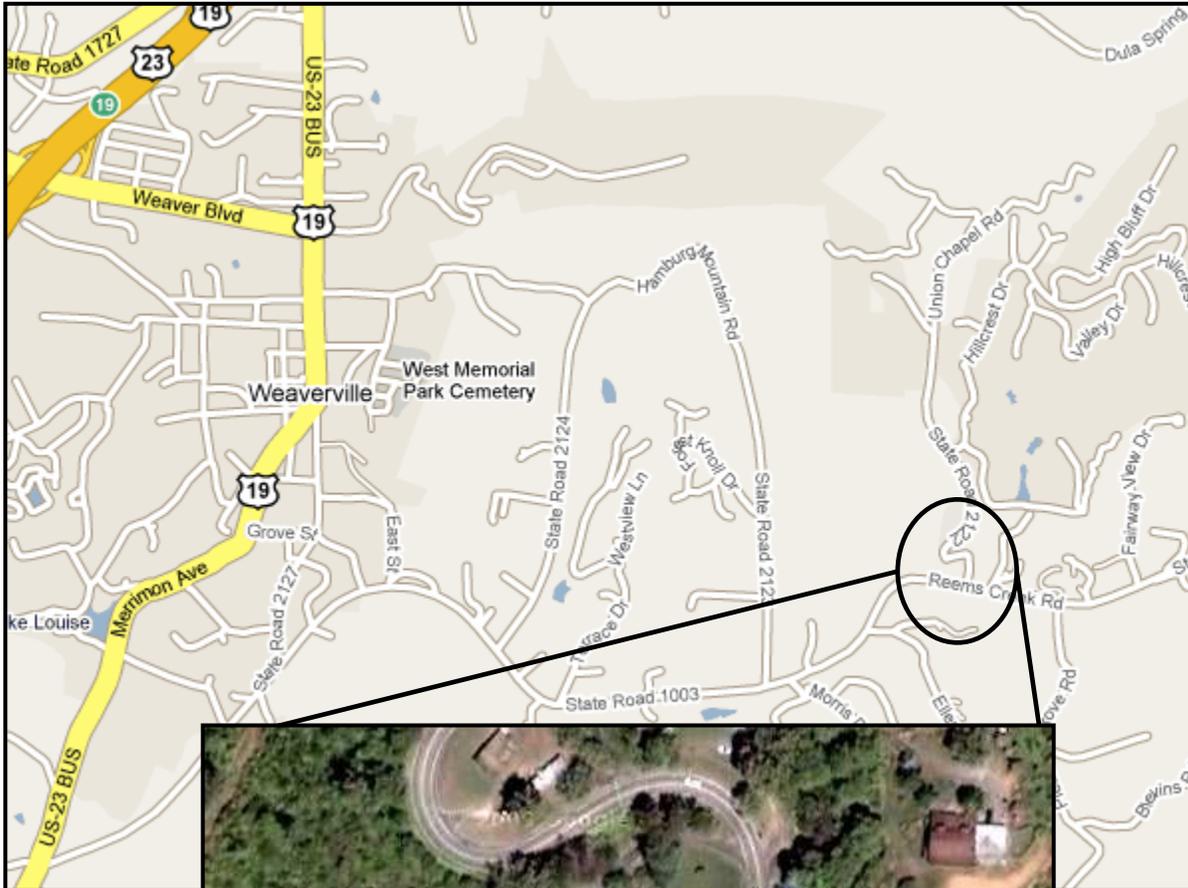
Date

Traffic Safety Project Engineer

# Spot Safety Project Evaluation Documentation

## Subject Location

Evaluation of Spot Safety Project Number 13-02-204 located at the Intersection of SR 1003 (Reems Creek Rd) and SR 2122 (Union Chapel Rd) in Buncombe County, near the City of Weaverville.



## 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 SR 2122 raised concrete intersection island. SR 1003 (Reems Creek Road) and SR 2122 are both two-lane facilities at the subject intersection with speed limits of 45 mph on all approaches. The subject location is a three-leg intersection, which is controlled by a stop sign on SR 2122 (Union Chapel Rd).

The original statement of problem was that vehicles in their attempt to access the gas station located at this intersection were cutting at a 45 degree angle across SR 2122 to enter the parking lot. This was creating a crash potential due to limited sight distance and roadway geometry.

The initial crash analysis was completed from August 1, 1998 to July 31, 2001 with two (2) reported crashes, none of which were deemed correctable. The final completion date for the improvement at the subject intersection was on January 6, 2004 with a total cost of \$5,000.

## 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 December 2003 through January 2004. The before period consisted of reported crashes from June 1, 1998 through November 30, 2003 (5 years and 6 months); and the after period consisted of reported crashes from February 1, 2004 through July 31, 2009 (5 years and 6 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 Frontal Impact Crashes from vehicles attempting to access to the Exxon Gas Station located at the intersection were the selected Target Crashes.

<u>Treatment Information</u>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total crashes	3	2	- 33.3 %
Total Severity Index	5.93	4.70	- 20.7 %
Target Crashes	0	0	N/A
Target Crash Severity Index	0.0	0.0	N/A
Volume	7,100	7,400	4.2 %

<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	0	0	N/A
Class C Injury Crashes	2	1	- 50.0 %
<b>Total Injury Crashes</b>	<b>2</b>	<b>1</b>	<b>- 50.0 %</b>

The naive before and after analysis at the treatment location resulted in a 33 percent decrease in Total Crashes and a 21 percent decrease in the Total Severity Index. The before period ADT year was 2001 and the after period ADT year was 2006.

## **Results and Discussion**

Referencing the *Collision Diagrams*, there were zero target crashes in the before or the after period at this location. The single frontal impact collision, a left turn crash from a SR 1003 vehicle accessing SR 2122, was eliminated in the after period. This location does not present any conclusive accident patterns.

The calculated benefit to cost ratio for this project is **2.12 considering total crashes**. 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 subject 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



Looking West on SR 1003 approaching intersection



Looking East on SR 1003 – Exxon Station to left



From Intersection looking North onto SR 2122 with countermeasure island

**BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes**

LOCATION: SR 1003 at SR 2122  
 COUNTY: Buncombe  
 FILE NO.: SS 13-02-204

BY: JBS  
 DATE: 10/7/2009  
 NOTES: Total Crashes

DETAILED COST: TYPE IMPROVEMENT - Raised Channelization

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$5,000	10	0.149	\$745
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$5,000	10	0.149	\$745

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$800  
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$0  
 TOTAL ANNUAL COST= \$1,545  
 TOTAL COST OF PROJECT= \$5,000

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	5.50	0	0.00	2	0.36	1	0.18	\$7,255
AFTER	5.50	0	0.00	1	0.18	1	0.18	\$3,982

Annual Benefits from Crash Cost Savings \$3,273

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$1,728  
 BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 2.12

TOTAL COST OF PROJECT - \$5,000 COMPREHENSIVE B/C RATIO - 2.12

SR 2122  
 Union Chapel Rd  
 45 MPH

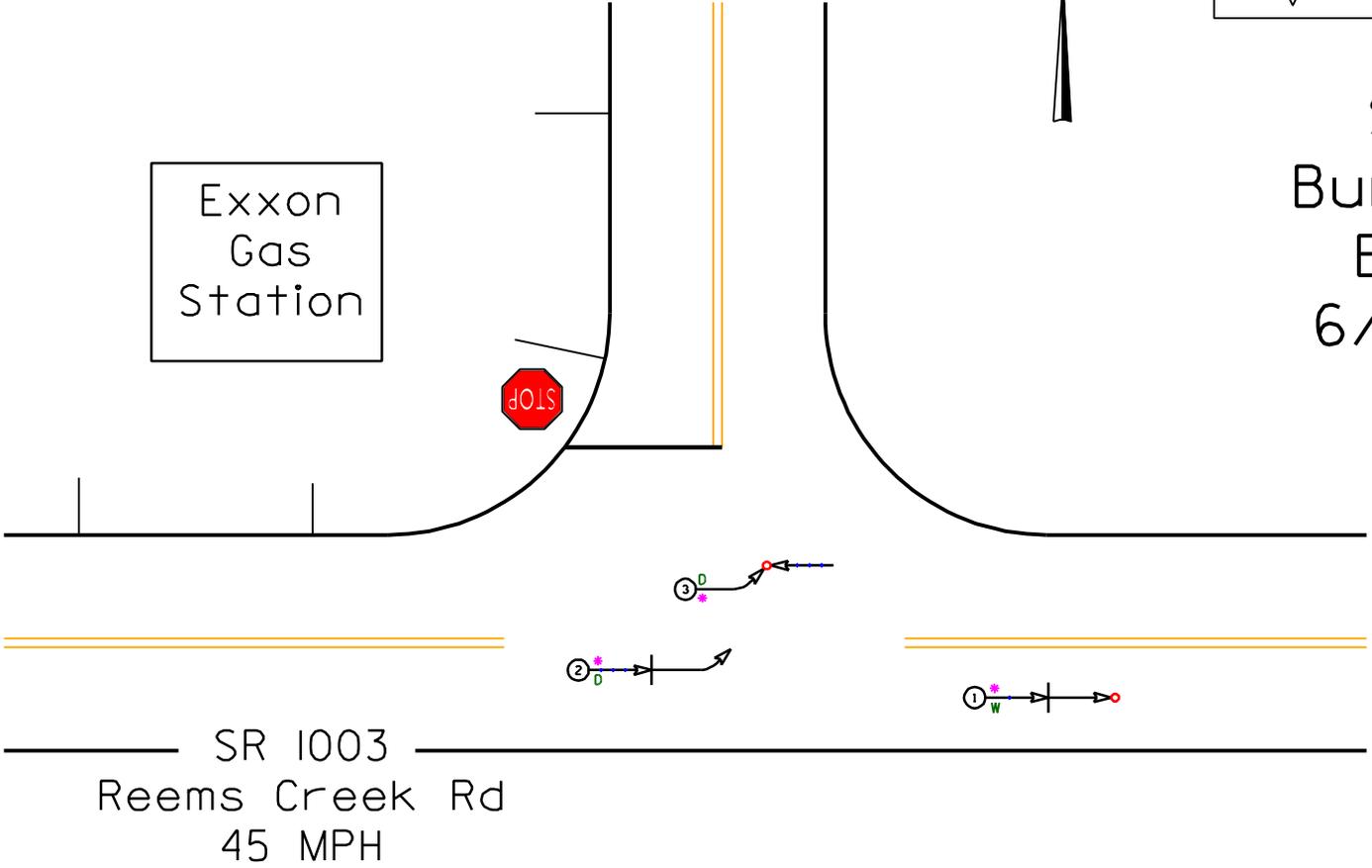
Exxon  
 Gas  
 Station



**LEGEND**

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAM
	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		HIT AND RUN		50 MPH TO 59		ICY OR SNOW
	REAR END		INJURY		60 MPH TO 69		SPEED UNKNOWN
	RAN OFF ROAD		FATALITY		TARGET CRASH		ONLY

SS# 13-02-204  
 Buncombe County  
 BEFORE Period  
 6/1/98 - 11/30/03



SR 1003  
 Reems Creek Rd  
 45 MPH



**TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT**



COLLISION DIAGRAM	
DIVISION 13	AREA:
STUDY PERIOD: 6/1/1998 - 11/30/2003	
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: 10-7-2009	
LOG NUMBER: SS* 13-02-204 BEFORE	

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

SR 2122  
Union Chapel Rd  
45 MPH

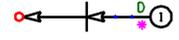
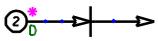
Exxon  
Gas  
Station



**LEGEND**

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

SS# 13-02-204  
Buncombe County  
AFTER Period  
2/1/04 - 7/31/09



SR 1003  
Reems Creek Rd  
45 MPH



**TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT**



COLLISION DIAGRAM	
DIVISION: 13	AREA:
STUDY PERIOD: 2/1/2004 - 7/31/2009	
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: 10-7-2009	
LOG NUMBER: SS* 13-02-204 AFTER	

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