

Spot Safety Project Evaluation

Work Order #41000007961

Spot Safety Project # 08-05-202

**Spot Safety Project Evaluation of the Installation of a Two Foot Paved Shoulder
Along the Outside of a Curve on SR 1176 Approximately 0.3 Miles South of SR 2118/1134
Chatham 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

8/19/2010

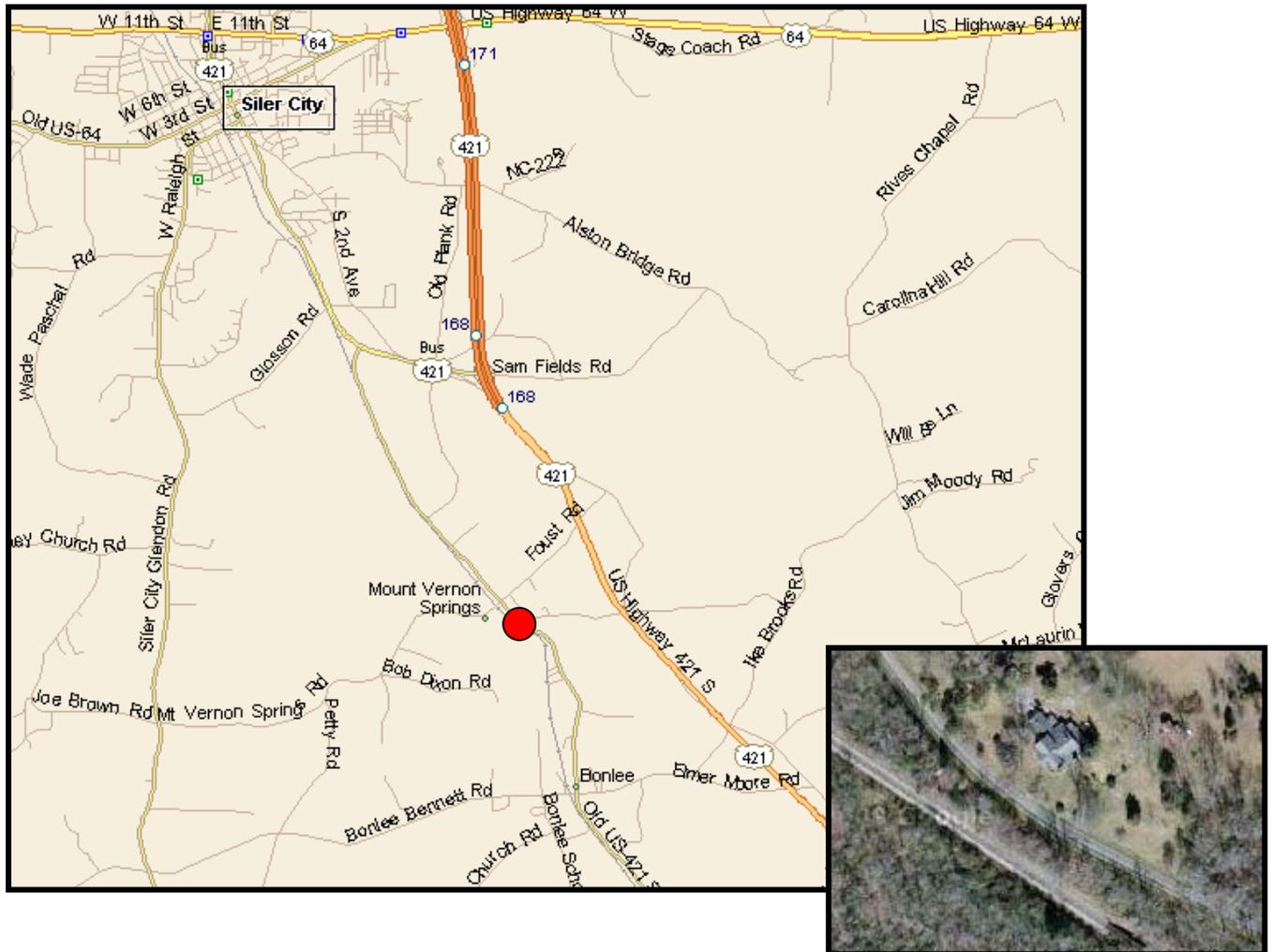
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 08-05-202 – SR 1176 (Old US 421) approximately 0.3 miles south of SR 2118/1134 in Chatham County.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was to construct a two foot paved shoulder along the outside of the curve.

SR 1176 is a two lane roadway that previously did not have paved shoulders. The speed limit is 55 mph. Chevrons and curve warning signs with 35 mph speed limit advisories are located at the curve location.

The initial crash analysis was conducted from September 1, 1999 to August 31, 2004 with a total of ten reported crashes. The final completion date for the improvements at the subject intersection was on November 1, 2005 with a total cost of \$9,000.00.

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 October 1, 2005 to November 30, 2005. The before period consisted of reported crashes from March 1, 2001 through September 30, 2005 (4 years and 7 months) and the after period consisted of reported crashes from December 1, 2005 through June 30, 2010 (4 years and 7 months). 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 that occurred in the curve. The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Ran Off Road Crashes that occurred on the outside of the curve were the Target Crashes for the applied countermeasure. The target crashes are clearly identified in the before and after period collision diagrams.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	6	2	-66.7
Total Severity Index	14.87	4.7	-68.4
Target Crashes	3	1	-66.7
Target Severity Index	28.73	8.4	-70.8
Volume	2100	2000	-4.8
<u>Target Crash Severity Summary</u>			
Fatal Crashes	1	0	-100.0
Class A Crashes	0	0	N/A
Class B Crashes	1	1	0.0
Class C Crashes	0	0	N/A
PDO Crashes	1	0	-100.0

The naive before and after analysis at the treatment location resulted in a 67 percent decrease in both Total and Target Crashes and a 5 percent decrease in Average Daily Traffic (ADT). The before period ADT year was 2003 and the after period ADT year was 2008.

Results and Discussion

The countermeasure appears to have been effective at reducing Target Crashes at the subject location. In the before period there were three Target Crashes, all involving southbound vehicles running off the roadway to the right. One of the crashes resulted in a fatality. The vehicle was

speeding around the curve (65 mph in a 55 mph zone), ran off the road and hit several trees, ejecting the driver. The investigation of the crash led to the development of this project. In the after period there was a single Target Crash, also involving a southbound vehicle running of the road to the right.

The calculated benefit to cost ratio for this project is 152.80 considering total crashes. The benefit to cost ratio considering only target crashes is 150.75. 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 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 roadway.

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1176 0.3 miles south of SR 2118/1134 BY: bdr
 COUNTY: Chatham DATE: 8/18/2010
 FILE NO.: SS 08-05-202

DETAILED COST: TYPE IMPROVEMENT - 2-ft paved shoulder

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$9,000	20	0.102	\$917
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$9,000	20	0.102	\$917

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$0
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$0
 TOTAL ANNUAL COST= \$917
 TOTAL COST OF PROJECT= \$9,000

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	4.59	1	0.22	1	0.22	4	0.87	\$145,359
AFTER	4.59	0	0.00	1	0.22	1	0.22	\$5,294

Annual Benefits from Crash Cost Savings \$140,065

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$139,149
 BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 152.80

TOTAL COST OF PROJECT - \$9,000 COMPREHENSIVE B/C RATIO - 152.80

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1176 0.3 miles south of SR 2118/1134 BY: bdr
 COUNTY: Chatham DATE: 8/18/2010
 FILE NO.: SS 08-05-202 Target Crashes Only

DETAILED COST: TYPE IMPROVEMENT - 2-ft paved shoulder

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 TOTAL ANNUAL COST= \$917
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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	4.59	1	0.22	1	0.22	1	0.22	\$142,549
AFTER	4.59	0	0.00	1	0.22	0	0.00	\$4,357

Annual Benefits from Crash Cost Savings \$138,192

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$137,275

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 150.75

TOTAL COST OF PROJECT - \$9,000 COMPREHENSIVE B/C RATIO - 150.75

Treatment Site Photos from Google Street-View



Looking south on SR 1176

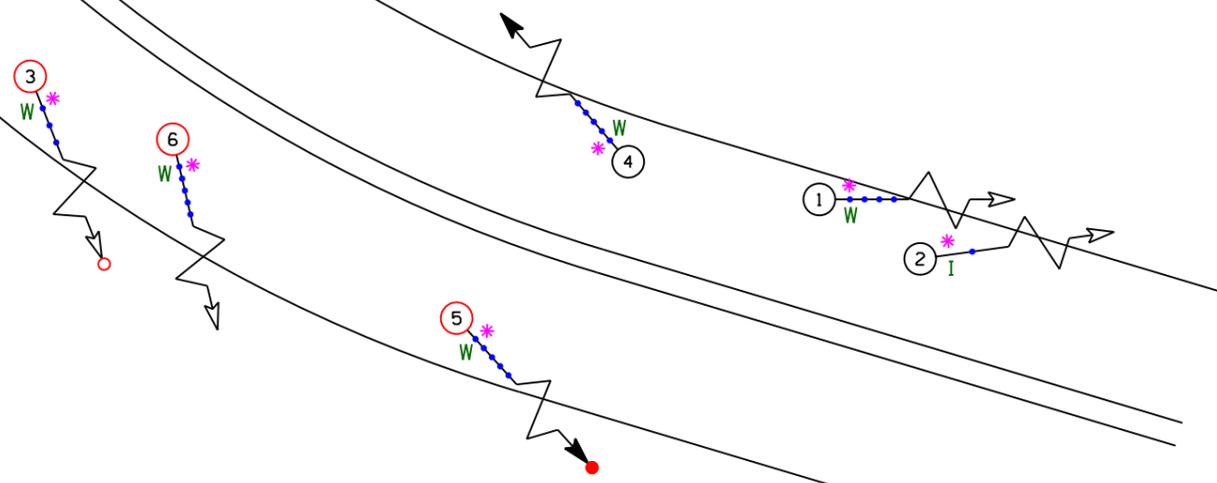


Looking south on SR 1176

SS# 08-05-202
 Order# 41000007961
 Chatham County
 BEFORE Period
 3/1/2001-9/30/2005

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

SR 1176
 (Old US 421)
 55 mph



Target Crashes

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

TRAFFIC SAFETY UNIT

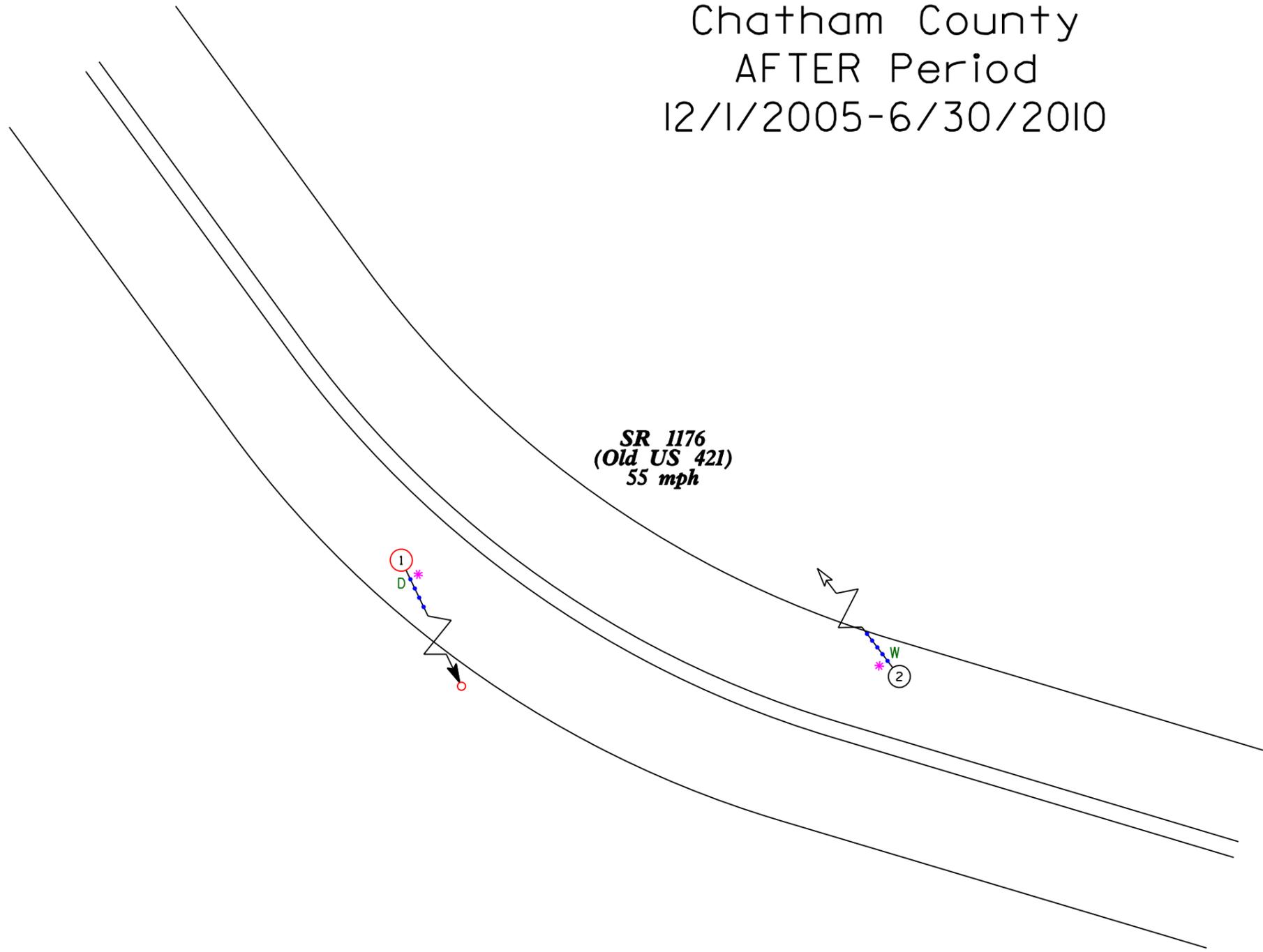
Date: August 2010

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SS# 08-05-202
 Order# 41000007961
 Chatham County
 AFTER Period
 12/1/2005-6/30/2010

LEGEND

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



SR 1176
 (Old US 421)
 55 mph

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