Spot Safety Project Evaluation

Order # 41000016662

Spot Safety Project # 13-06-208

Spot Safety Project Evaluation of the Guardrail Installation on SR 1003 (Reems Creek Rd)
From US 19/23 Business to SR 2121 (Pink Fox Cove)
Buncombe County

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
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Principal Investigator

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Brad Robinson, PE

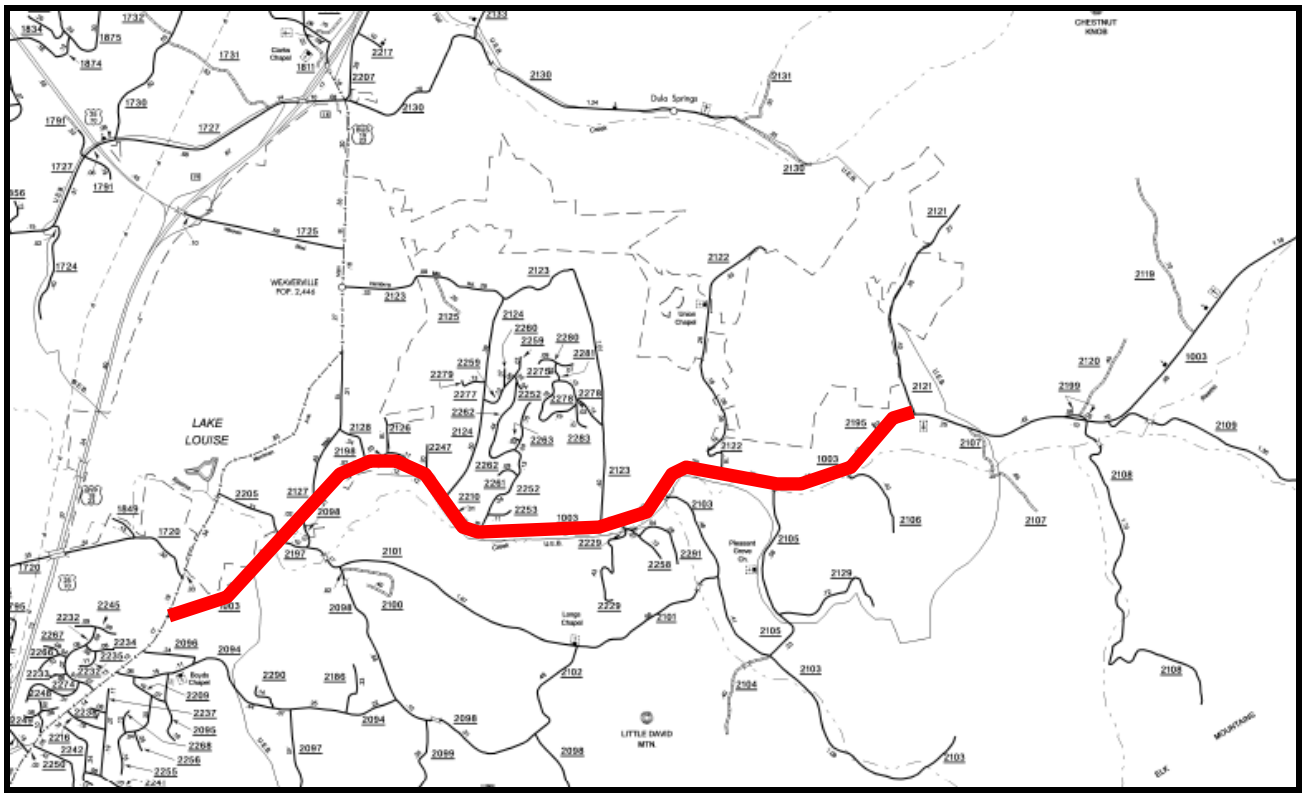
1/24/2012
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 13-06-208 – SR 1003 (Reems Creek Rd) in Buncombe County from US 19/23 Business to SR 2121 (Pink Fox Cove), a distance of approximately 3.66 miles.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was to install shoulder guardrail as needed along the shoulders of the approximately 3.66 mile section.

SR 1003 (Reems Creek Rd) is a two-lane, two-way roadway with a pavement width of 22 feet and four feet grass shoulders. The speed limit is 45 mph.

The original statement of problem was that vehicles were running off the road and resulting in severe injuries. The final completion date for the improvements was on September 30, 2007 with a total cost of $142,000.00.

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 August 1, 2007 to October 31, 2007. The before period consisted of reported crashes from August 1, 2003 through July 31, 2007 (4 years) and the after period consisted of reported crashes from November 1, 2007 through October 31, 2011 (4 years). 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 on SR 1003 from US 19/23B to SR 2121. The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Ran Off Road crash types were the target crashes for the applied countermeasures. Ran Off Road crash types considered are as follows: Ran Off Road – Left, Ran Off Road – Right, Ran Off Road – Straight, Fixed Object, Head-on, Sideswipe – Same Direction, Sideswipe – Opposite Direction, and Overturn / Rollover. The target crashes are clearly identified in the before and after period crash severity diagrams.

Treatment Information			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Total Crashes	57	60	5.3
Total Severity Index	9.56	8.12	-15.1
Target Crashes	18	18	0.0
Target Crash Severity Index	7.68	8.09	5.3
Volume	7,500	7,600	1.3
Target Crash Severity Summary			
Fatal Crashes	0	1	N/A
Class A Crashes	1	0	-100.0
Class B Crashes	3	5	66.7
Class C Crashes	3	2	-33.3
PDO Crashes	11	10	-9.1

Results and Discussion

The naive before and after analysis at the treatment location resulted in a 5 percent increase in Total Crashes, no change in Target Crashes, and a one percent increase in Average Daily Traffic (ADT). The before period ADT year was 2005 and the after period ADT year was 2009.

The calculated benefit to cost ratio for this project is 6.72 considering total crashes. The benefit to cost ratio considering only target crashes is -0.19. 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.

After reviewing the crash reports it was determined that there was only one target crash in the after period in which a vehicle collided with guardrail. The crash was a fatal crash, however the guardrail likely did not contribute to the fatality (the narrative doesn't even mention guardrail). An eastbound vehicle traveled left of center, sideswiped a vehicle heading in the opposite direction, and then hit another vehicle head-on. It is not known which vehicle hit the guardrail as the only mention of it is in the 'additional property damage' field on the crash report.

There was also only a single target crash in the before period that involved guardrail. A vehicle lost control in icy conditions, went off the road to the left, down an embankment, and then overturned on top of guardrail. The crash resulted in a 'C' injury.

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 - TOTAL

LOCATION: SR 1003 From US 19/23B to SR 2121 BY: bdr
COUNTY: Buncombe DATE: 1/24/2012
FILE NO.: SS 13-06-208

DETAILED COST: TYPE IMPROVEMENT - shoulder guardrail

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$0	0	0.000	$0
	$142,000	10	0.149	$21,162
Right-of-Way	$0	0	0.000	$0
TOTALS	$142,000	10	0.149	$21,162

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $0
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $0

TOTAL ANNUAL COST= $21,162
TOTAL COST OF PROJECT= $142,000

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	4.00	4	1.00	25	6.25	25	6.25	$781,875
AFTER	4.00	3	0.75	27	6.75	30	7.50	$639,750

Annual Benefits from Crash Cost Savings $142,125

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = $120,963

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 6.72

TOTAL COST OF PROJECT - $142,000 COMPREHENSIVE B/C RATIO - 6.72

BENEFIT-COST ANALYSIS WORKSHEET - TARGET

LOCATION: SR 1003 From US 19/23B to SR 2121 BY: bdr
COUNTY: Buncombe DATE: 1/24/2012
FILE NO.: SS 13-06-208

DETAILED COST: TYPE IMPROVEMENT - shoulder guardrail

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$0	0	0.000	$0
	$142,000	10	0.149	$21,162
Right-of-Way	$0	0	0.000	$0
TOTALS	$142,000	10	0.149	$21,162

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $0
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $0

TOTAL ANNUAL COST= $21,162
TOTAL COST OF PROJECT= $142,000

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	4.00	1	0.25	6	1.50	11	2.75	$199,325
AFTER	4.00	1	0.25	7	1.75	10	2.50	$203,250

Annual Benefits from Crash Cost Savings ($3,925)

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = ($25,087)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = -0.19

TOTAL COST OF PROJECT - $142,000 COMPREHENSIVE B/C RATIO - -0.19

Treatment Site Photos Taken December 12, 2011

Traveling east on SR 1003

Traveling east on SR 1003

SS #13-06-208
Buncombe County
SR 1003 (Reems Creek Rd) from US 19/23B to SR 2121

Before Period
8/1/2003-7/31/2007

Study Range
Buncombe County MP 0.0-3.66
Total Length = 3.66 Miles

Buncombe County

Lake Louise

Note: Crashes Mileposted to nearest 0.1 mile for visual clarity on diagram.

N

Legend

Target Crashes severity

- K
- A
- B
- C
- O

Other Crashes severity

- K
- A
- B
- C
- O

SS #13-06-208
Buncombe County
SR 1003 (Reems Creek Rd) from US 19/23B to SR 2121

After Period
11/1/2007-10/31/2011

Study Range
Buncombe County MP 0.0-3.66
Total Length = 3.66 Miles

Buncombe County

Lake Louise

Note: Crashes Mileposted to nearest 0.1 mile for visual clarity on diagram.

N

Legend

Target Crashes severity
- K
- A
- B
- C
- O

Other Crashes severity
- K
- A
- B
- C
- O