

Spot Safety Project Evaluation

Order # 41000002915

Spot Safety Project # 02-03-207

Spot Safety Project Evaluation of the Guardrail Installation at Bridge #11 on SR 1100 (Core Point Rd) Beaufort 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

12/7/2009

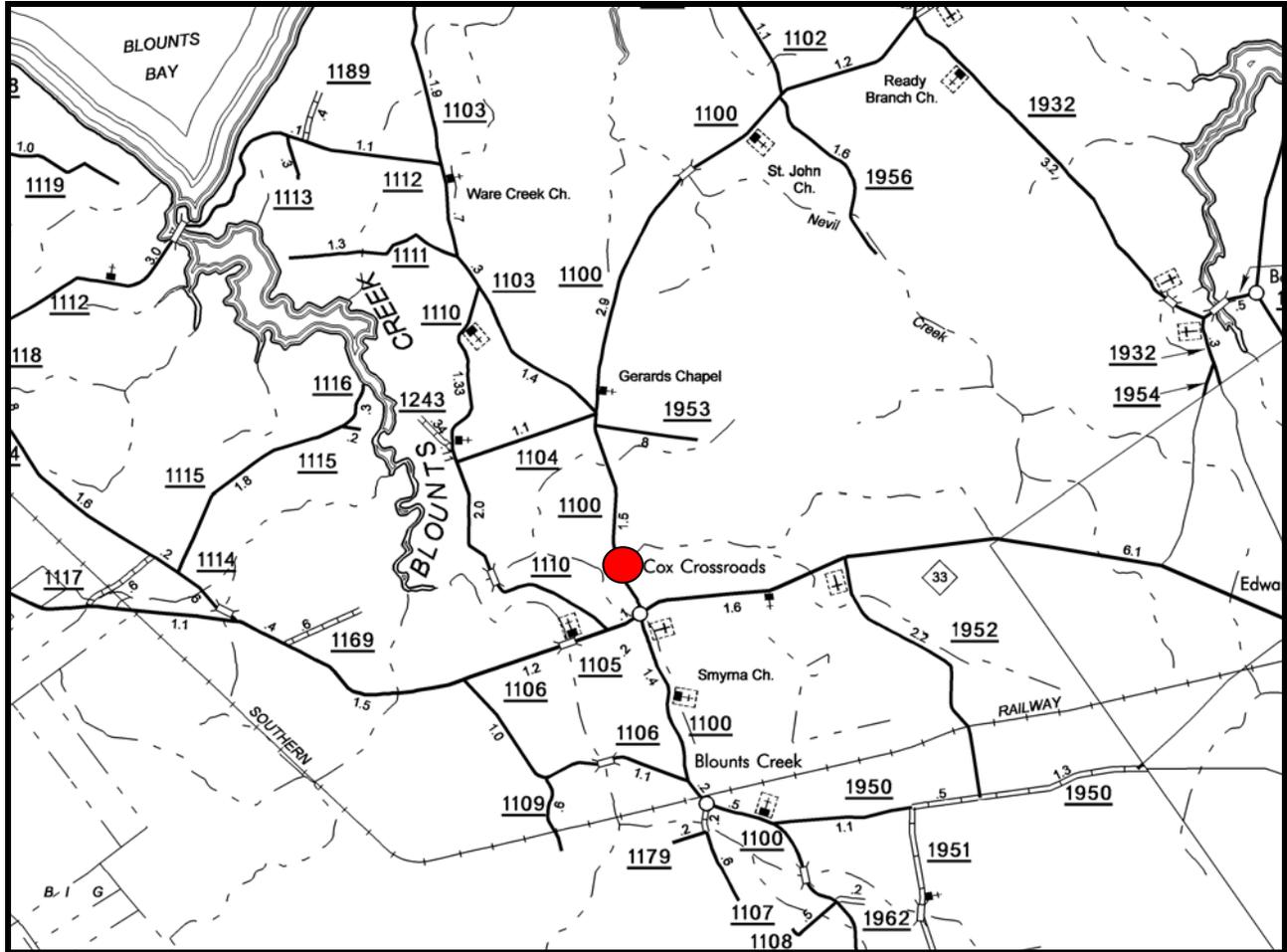
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 02-03-207 – Bridge #11 on SR 1100 (Core Pointe Rd), north of NC 33 in Beaufort County.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was retrofit guardrail to the existing bridge on SR 1100.

SR 1100 is a two-lane, two-way roadway with a speed limit of 55 mph. The original statement of problem was that there were multiple Ran Off Road Crashes at and near the bridge. The guardrail was installed to reduce the severity of Ran Off Road Crashes.

The initial crash analysis was conducted from August 1, 1992 to July 31, 2002 with a total of ten 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 August 30, 2004 with a total cost of \$38,500.00.

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, 2004 to September 30, 2004. The before period consisted of reported crashes from August 1, 1999 through July 31, 2004 (5 years) and the after period consisted of reported crashes from October 1, 2004 through September 30, 2009 (5 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 within 200 feet of the subject bridge. 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 countermeasure. 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 collision diagrams.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	2	1	-50.0
Total Severity Index	42.6	76.8	80.3
Target Crashes			
Target Crashes	2	1	-50.0
Target Crash Severity Index	42.6	76.8	80.3
Volume			
Volume	1,300	1,100	-15.4
<u>Crash Severity Summary</u>			
Fatal Crashes	0	0	N/A
Class A Crashes	1	1	0.0
Class B Crashes	0	0	N/A
Class C Crashes	1	0	-100.0
PDO Crashes	0	0	N/A

The naive before and after analysis at the treatment location resulted in a 50 percent decrease in both Total and Target Crashes, and a 15 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 naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 50 percent decrease in both Total and Target Crashes. The Severity Indexes increased by 80 percent. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have increased at the treatment location from the before to the after period. The large increase in the severity index can be misleading since there was only one crash in the after period.

The calculated benefit to cost ratio for this project is 0.70 considering total crashes. The benefit to cost ratio considering only target crashes is also 0.70. 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.

Both of the before period crashes involved a northbound vehicle running off the roadway just prior to the bridge and crashing into it, one on the right side and the other on the left. The single after period crash involved a southbound vehicle running off the road to the right, overcorrecting, and then running off the road to the left and hitting a tree. According to the crash report diagram there was guardrail on the right side of the road where the crash occurred but not on the left side.

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 1100 at bridge #11

BY: BDR

COUNTY: Beaufort

DATE: 12/2/2009

FILE NO.: SS 02-03-207 (Total and Target Crashes the same)

DETAILED COST: TYPE IMPROVEMENT - Guardrail

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$38,500	10	0.149	\$5,738
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$38,500	10	0.149	\$5,738

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$0
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$0
 TOTAL ANNUAL COST= \$5,738
 TOTAL COST OF PROJECT= \$38,500

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES				PDO		ANNUAL COSTS
		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	CRASHES	CRASHES PER YR	
BEFORE	5.00	1	0.20	1	0.20	0	0.00	\$130,000
AFTER	5.00	1	0.20	0	0.00	0	0.00	\$126,000

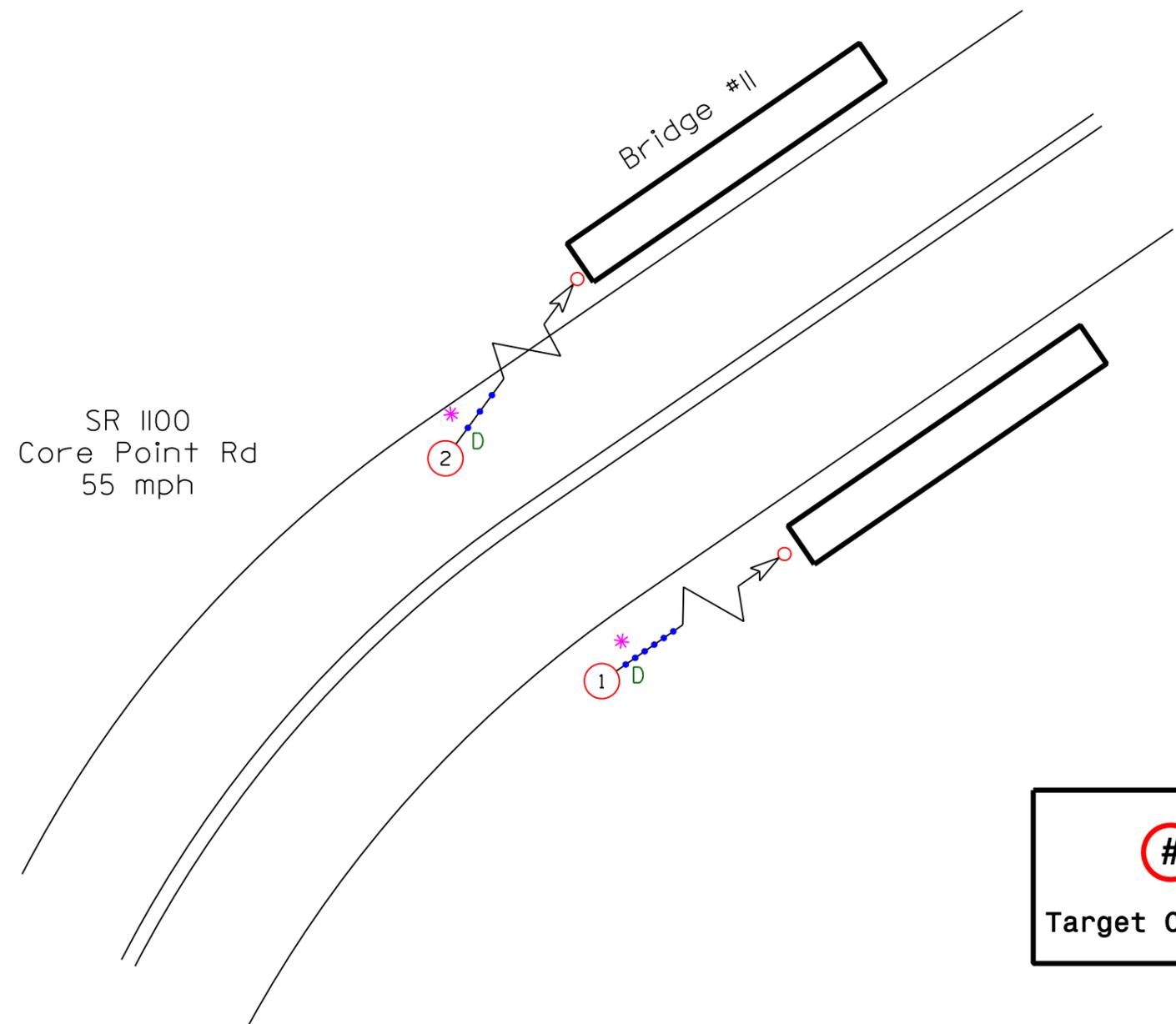
Annual Benefits from Crash Cost Savings \$4,000

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$1,738)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 0.70

TOTAL COST OF PROJECT - \$38,500 COMPREHENSIVE B/C RATIO - 0.70

Beaufort County
 SR 1100 at Bridge #11
 BEFORE Period
 8/1/1999-7/31/2004



 Target Crashes

LEGEND

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

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 2	AREA:
STUDY PERIOD: 8/1/99-7/31/04		
DISTANCE: Y-LINE : OF 1		
ANALYSIS PREPARED BY: BDR		
ANALYSIS CHECKED BY:		
DIAGRAM PREPARED BY: BDR		
DIAGRAM REVIEWED BY:		
SCALE: NOT TO SCALE		
DATE: December 2009		
ORDER NUMBER: 400000295		

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

Beaufort County
 SR 1100 at Bridge #11
 AFTER Period
 10/1/2004-9/30/2009



SR 1100
 Core Point Rd
 55 mph

Bridge #11

Tree

Note: No information is given in the background information about where guardrail was installed. Also, no site visit was conducted and google street-view does not work at this location.



LEGEND					
MOVING VEHICLE		ANGLE		9 MPH OR LESS	P PEDESTRIAN
PARKED VEHICLE		TURNING		10 MPH TO 19	T TRAIN
PARKING VEHICLE		BACKING		20 MPH TO 29	* DRIVER AT FAULT
FIXED OBJECT		SIDESWIPE		30 MPH TO 39	D DRY
RAN OFF ROAD		OUT OF CONTROL		40 MPH TO 49	W WET
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				70 AND UP	
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TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM	
DIVISION: 2	AREA:
STUDY PERIOD: 10/1/04-9/30/2009	
DISTANCE: Y-LINE : OF 1	
ANALYSIS PREPARED BY: BDR	
ANALYSIS CHECKED BY:	
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