

# Spot Safety Project Evaluation

Order # 41000008849

Spot Safety Project # 06-04-226

## Spot Safety Project Evaluation of the Installation of Guardrail On US 301 at the Johnston / Harnett County Line

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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Chad J. Neilson

10/06/2010

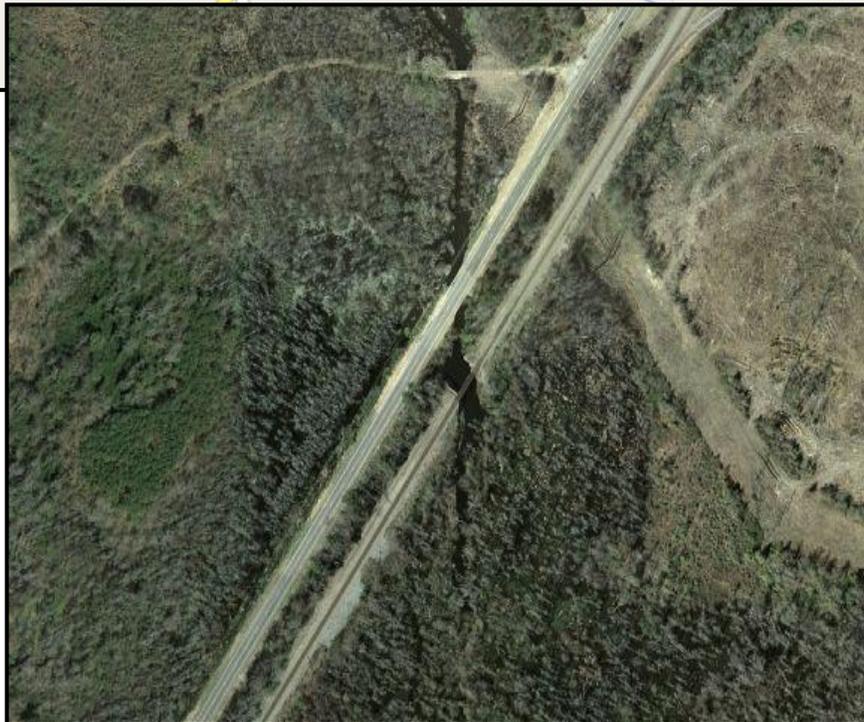
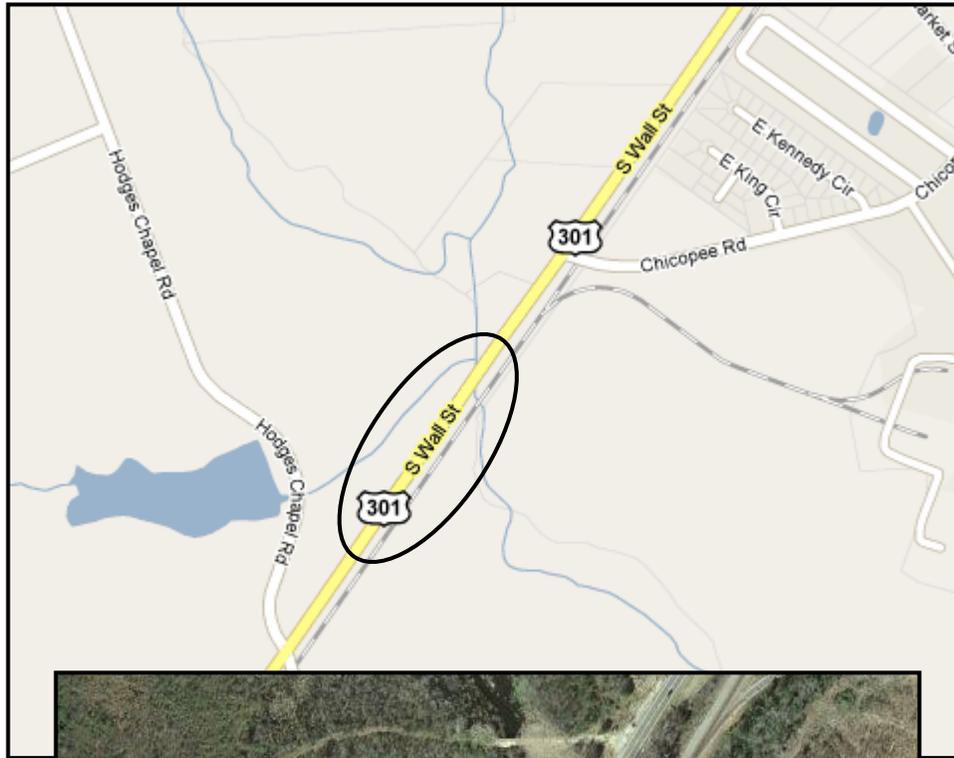
Date

Traffic Safety Project Engineer

# *Spot Safety Project Evaluation Documentation*

## **Subject Location**

Evaluation of Spot Safety Project Number 06-04-226 located on US 301 at the Johnston / Harnett County Line, south of Benson, Johnston County.



## 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 guardrail along both sides of US 301 at the Johnston / Harnett county line. US 301 is a two-lane facility at the subject location with speed limit of 55 mph for both directions. The subject location has a bridge over a creek at the county line as well as a marsh / swamp running along both sides of the roadway.

The original statement of problem was the lack of guardrail along the roadway. There is nothing to prevent a ran-off roadway crash from being completely submerged in the waters surrounding US 301.

The initial crash analysis was completed from May 1, 2001 to April 30, 2004 with three (3) reported crashes, of which zero (0) were deemed correctable. The final completion date for the improvement at the subject location was on March 17, 2005 with a total cost of \$43,000.00.

### 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 were the months of February through April 2005. The before period consisted of reported crashes from October 1, 1999 through January 31, 2005 (5 years and 4 months); and the after period consisted of reported crashes from May 1, 2005 through August 31, 2010 (5 years and 4 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 1425 feet south of the county line to 530 feet north of the county line. *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 ran-off roadway crashes that occurred within the study limits were the target crashes for the applied countermeasure.

<b><u>Treatment Information</u></b>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total Crashes	9	2	- 77.78 %
Total Crash Severity Index	12.71	1.00	- 92.13 %
Target Crashes	3	0	- 100.0 %
Target Crash Severity Index	26.27	0.00	- 100.0 %
Volume (2002, 2007)	5,700	5,100	- 10.53 %

<u>Injury Crash Summary</u>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Fatal injury Crashes	1	0	- 100.00 %
Class A injury Crashes	0	0	N/A
Class B injury Crashes	0	0	N/A
Class C Injury Crashes	4	0	- 100.00 %
Total Injury Crashes	5	0	- 100.00 %

The naive before and after analysis at the treatment location resulted in a seventy-seven (77) percent decrease in Total Crashes, one-hundred (100) percent elimination of Target Crashes, and a ninety-two (92) percent decrease in the Total Severity Index. The before period ADT year was 2002 and the after period ADT year was 2007.

## **Results and Discussion**

Referencing the *Collision Diagrams*, the before period consisted of three (3) target crashes. One of the target crashes was a fatal crash. After the installation of the guardrail, there were zero (0) target crashes.

The calculated benefit to cost ratio for this project is **21.00 considering total crashes**. The benefit to cost ratio **considering only target crashes is 18.66**. 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.

Photos were provided for this location by Google Street View for both approaches of this location. 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 countermeasure.

## TREATMENT SITE PHOTOS



Looking North on US 301



Looking South on US 301

**BENEFIT-COST ANALYSIS WORKSHEET - TOTAL**

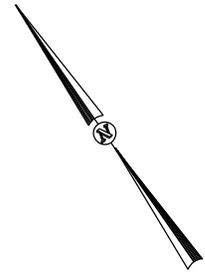
LOCATION: US 301 at the Johnston / Harnett Co Line		BY: C Neilson						
COUNTY: Harnett		DATE: 10/5/2010						
FILE NO.: SS 06-04-226								
DETAILED COST:	TYPE IMPROVEMENT -	Shoulder Guardrail						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$43,000	10	0.149	\$6,408			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$43,000	10	0.149	\$6,408			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$0			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$6,408			
	TOTAL COST OF PROJECT=				\$43,000			
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	5.34	1	0.19	4	0.75	4	0.75	\$136,180
AFTER	5.34	0	0.00	0	0.00	2	0.37	\$1,610
						Annual Benefits from Crash Cost Savings		\$134,569
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST						=	\$128,161	
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST						=	21.00	
TOTAL COST OF PROJECT		-	\$43,000	COMPREHENSIVE B/C RATIO		-	21.00	

**BENEFIT-COST ANALYSIS WORKSHEET - TARGET**

LOCATION: US 301 at the Johnston / Harnett Co Line		BY: C Neilson						
COUNTY: Harnett		DATE: 10/5/2010						
FILE NO.: SS 06-04-226								
DETAILED COST:	TYPE IMPROVEMENT -	Shoulder Guardrail						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$43,000	10	0.149	\$6,408			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$43,000	10	0.149	\$6,408			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$0			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$6,408			
	TOTAL COST OF PROJECT=				\$43,000			
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	5.34	1	0.19	0	0.00	2	0.37	\$119,588
AFTER	5.34	0	0.00	0	0.00	0	0.00	\$0
						Annual Benefits from Crash Cost Savings		\$119,588
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST						=	\$113,180	
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST						=	18.66	
TOTAL COST OF PROJECT		-	\$43,000	COMPREHENSIVE B/C RATIO		-	18.66	



SR 1100



M.P. 0.37

Bridge

M.P. 0.27

JOHNSTON CO.  
HARNETT CO.

SS# 06-04-226  
Order# 41000008849  
Harnett County &  
Johnston County  
BEFORE Period  
10/1/99 - 1/31/05

55 MPH

US 301

ROLLOVER

M.P. 0.0

SR 1709



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

Target Crashes

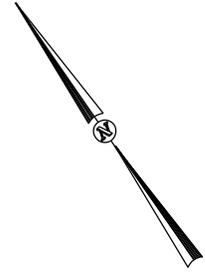
N.C. DEPARTMENT of TRANSPORTATION  
DIVISION of HIGHWAYS  
TRANSPORTATION MOBILITY and  
SAFETY DIVISION

TRAFFIC SAFETY UNIT

Date: 10-05-2010 Prepared By: C Neilson



SR 1100



M.P. 0.37

Bridge

M.P. 0.27

JOHNSTON CO.  
HARNETT CO.

SS# 06-04-226

Order# 41000008849

Harnett County &  
Johnston County

AFTER Period

5/1/05 - 8/31/10

55 MPH

US 301

M.P. 0.0

SR 1709



*LEGEND*

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		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		* SPEED UNKNOWN
	RAN OFF ROAD				70 AND UP		O ONLY



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

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**TRAFFIC SAFETY UNIT**

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Date: 10-05-2010 Prepared By: C Neilson