

Spot Safety Project Evaluation

Order # 41000010520

Spot Safety Project # 06-04-225

**Spot Safety Project Evaluation of the
Roadway Widening for 2 Foot Paved Shoulder Installation
SR 1201 (Ponderosa Road)
Harnett 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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1-12-2011

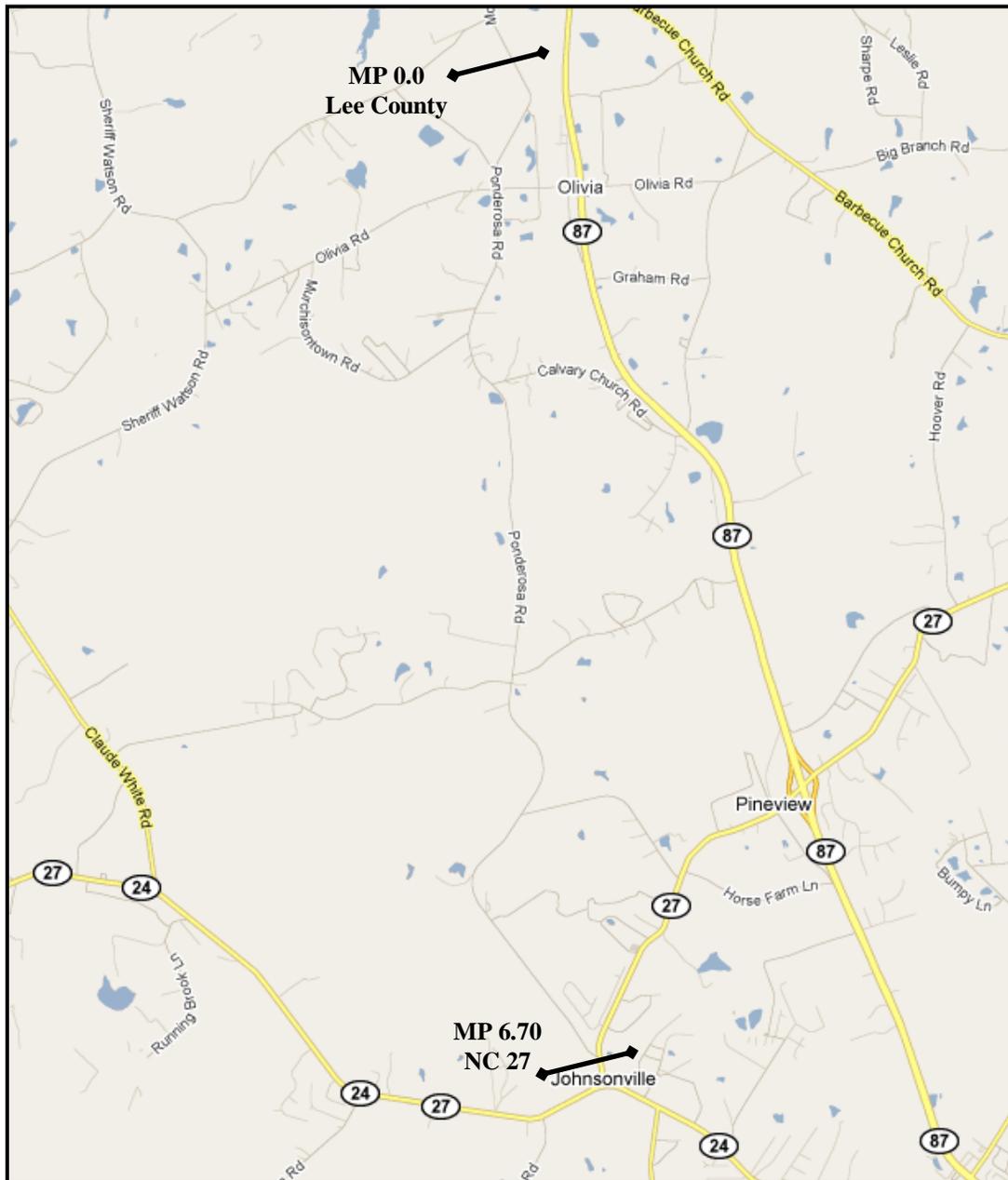
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 06-04-225 located along SR 1201 (Ponderosa Road) in Harnett County for the entire roadway consisting of 6.70 miles. SR 1201 runs from the Lee County Line (MP 0.00) to NC 27 (MP 6.70). This segment runs parallel to NC 87 and connects the Communities of Olivia and Johnsonville; which are located south of Sanford.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject roadway segment was the pavement widening from 18 feet to 22 feet in order to install 2 foot paved shoulders on both sides of the roadway. SR 1201 (Ponderosa Road) is a rural two-lane roadway with a 55 mph speed limit. The segment has a winding horizontal alignment with many residential driveways and insufficient shoulders present in the before period.

The original statement of problem was the existing crash pattern of vehicles running off the road attributed to narrow lane widths and insufficient shoulders. This location was identified from the 2003 Highway Safety Improvement Program under project 42S00013. The existing pavement markings and curve signing were found to be satisfactory when this segment was field investigated.

The initial crash analysis was completed from August 1, 2000 to July 31, 2003 with forty-five (45) reported crashes, thirty (30) of which were deemed correctable including four (4) A-injury collisions. The final completion date for the improvement at the subject intersection was on August 17, 2007 with a total cost of \$350,000; of which only \$243,000 was supplied by Spot Safety Funds.

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 the month of August 2007. The before period consisted of reported crashes from May 1, 2004 through July 31, 2007 (3 years and 3 months); and the after period consisted of reported crashes from September 1, 2007 through November 30, 2010 (3 years and 3 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 along SR 1201 with a zero (0) foot y-line. *Please see attached location map, GIS Collision Diagrams, 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 were the target crashes for the applied countermeasure. Typically “Lane Departure” crashes are the selected targets for this countermeasure; however in this instance all the lane departure crashes were indicated as ran-off roadway type collisions.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	45	47	4.4 %
Total Severity Index	9.51	3.20	- 66.4 %
Target Crashes	26	19	- 26.9 %
Target Crash Severity Index	13.45	3.73	- 72.3 %
Volume (2005, 2009)	1,200	1,200	0.0 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	1	0	- 100.0 %
Class A injury Crashes	2	0	- 100.0%
Class B injury Crashes	8	8	0.0 %
Class C Injury Crashes	13	6	- 53.8 %
Total Injury Crashes	24	14	- 41.7 %

The naive before and after analysis at the treatment location resulted in a 4 percent increase in Total Crashes, a 27 percent decrease in Target Crashes, and a 66 percent decrease in the Total Severity Index. The before period ADT year was 2005 and the after period ADT year was 2009.

Results and Discussion

Referencing the *Collision Diagrams and tables above*, this location experienced significant improvement in the severity index with the elimination of all Fatal and A-injury collisions during the after period. The diagrams indicate reduction of ran-off road crashes along the segment from the Lee County Line to SR 1205 from seven (7) to four (4) target crashes through the analysis. Also, around SR 1203 ran-off road collisions were eliminated in the after period. This vicinity experienced five (5) before period collisions including a fatal crash.

However, the segment of SR 1201 (Ponderosa Road) between milepost 4.123 and 5.942 indicated a significant increase in after period target crashes. The Safety Evaluation Group diagramed this portion of the strip which increased ran-off road collisions from four (4) to ten (10). Only two (2) of the after period crashes occurred on wet roadways and excessive speed does not appear to be the contributing factor.

Overall, this roadway receives an impressive benefit-cost ratio considering the elimination of all severe injury collisions; even though total collisions increased slightly by 4 percent.

The calculated benefit to cost ratio for this project is **17.74 considering total crashes**. The benefit to cost ratio **considering only target ran-off road crashes is 17.95**. 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 multiple points along the treatment segment. 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 South on SR 1201 near Lee County Line



Looking South on SR 1201 near SR 1205 (Olivia Rd – MP 1.01)



Looking North on SR 1201 north of SR 1202 (Johnsonville School Rd)
Area of Increased Target Crashes in After Period



Looking North on SR 1201 south of SR 1202 (Johnsonville School Rd)
Area of Increased Target Crashes in After Period

BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes

LOCATION: SR 1201 (Ponderosa Rd)		BY: JBS						
COUNTY: Harnett		DATE: 1/12/2011						
FILE NO.: SS 06-04-225								
DETAILED COST:	TYPE IMPROVEMENT - 2' Paved Shoulders							
ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
Construction	\$350,000	20	0.102	\$35,648				
Right-of-Way	\$0	0	0.000	\$0				
TOTALS	\$350,000	20	0.102	\$35,648				
ESTIMATED INCREASE IN ANNUAL MAINT. COST =				(\$1,340)				
ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0				
TOTAL ANNUAL COST=				\$34,308				
TOTAL COST OF PROJECT=				\$350,000				
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	3.25	3	0.92	21	6.46	21	6.46	\$738,554
AFTER	3.25	0	0.00	14	4.31	33	10.15	\$129,815
Annual Benefits from Crash Cost Savings								\$608,738
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST						=	\$574,430	
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST						=	17.74	
TOTAL COST OF PROJECT		-	\$350,000	COMPREHENSIVE B/C RATIO		-	17.74	

BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes

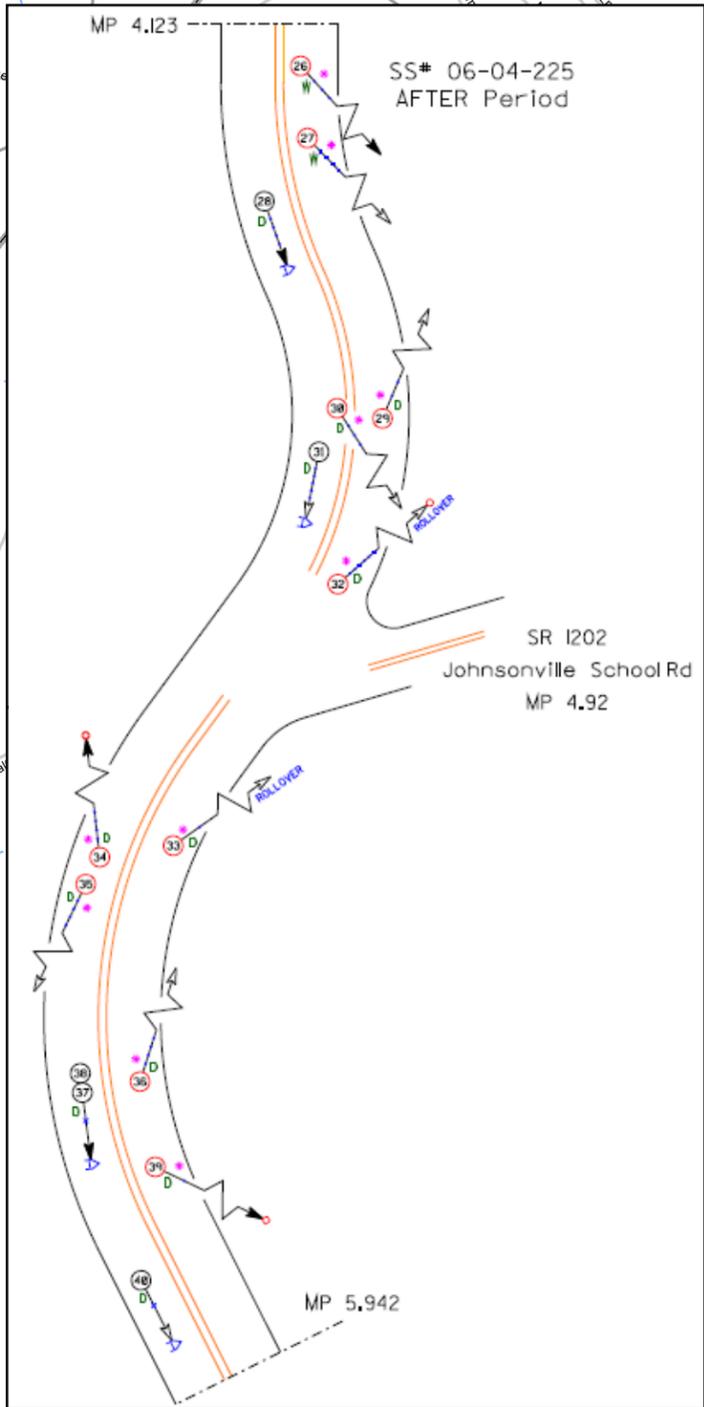
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COMPREHENSIVE COST REDUCTION:								
ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES								
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	3.25	3	0.92	13	4.00	10	3.08	\$674,769
AFTER	3.25	0	0.00	7	2.15	12	3.69	\$58,954
Annual Benefits from Crash Cost Savings								\$615,815
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST						=	\$581,507	
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST						=	17.95	
TOTAL COST OF PROJECT		-	\$350,000	COMPREHENSIVE B/C RATIO		-	17.95	

0 0.050.1 0.2 Miles

SS# 06-04-225 Harnett County SR 1201 (Ponderosa Rd) AFTER Period 9/1/07 - 11/30/10

Total Crashes Crash Severity Diagram

After Period Countermeasure
Widen Entire Roadway
From 18 ft to 22 ft for
2 Foot Shoulders both sides
Total Section Length = 6.7 Miles



Legend

After Period - Other Crashes Severity

- K-Fatal
- A-Injury
- B-Injury
- C-Injury
- Property Damage

After Period - ROR Target Severity

- ★ K-Fatal
- ★ A-Injury
- ★ B-Injury
- ★ C-Injury
- ★ Property Damage

NC Department of Transportation
Division of Highways
Mobility and Safety Division
Traffic Safety Unit

Date: 1/11/2011
J. Schronce

