

Hazard Elimination Project Evaluation

Order # 41000011000

Hazard Elimination Project W-4804

**Evaluation of the 1.5 Foot Paved Shoulder Installation
SR 1501 (Sand Ridge Road)
Onslow County**

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Transportation Mobility and Safety Division
North Carolina Department of Transportation

Principal Investigator



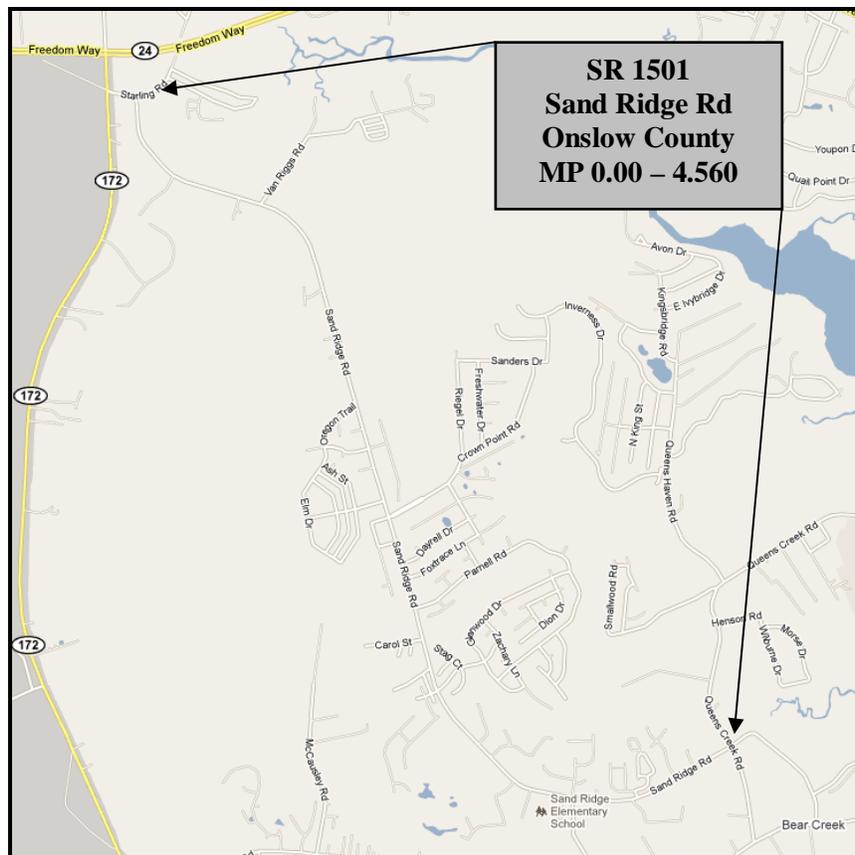
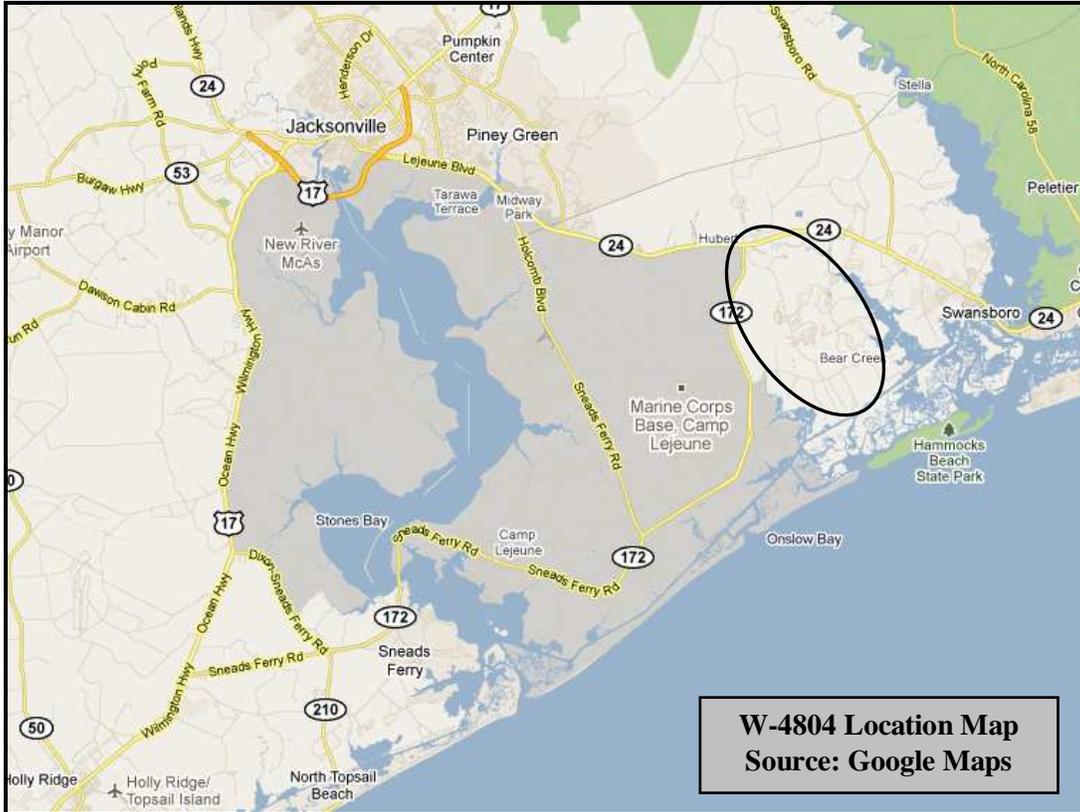
Jason B. Schronce

3-15-2011

Date

Traffic Safety Project Engineer

Hazard Elimination Project Evaluation Documentation



Subject Location

The treatment location includes the entire 4.56 mile roadway of SR 1501 (Sand Ridge Road) in Onslow County as shown above. The study begins at the SR 1509 – Queens Creek Rd - intersection (MP 0.00) and continues west and northwest to the SR 1500 – Starling Road - intersection (MP 4.560). SR 1501 is a two-lane, two-way rural roadway with 10-foot lane widths and a 55-mph posted speed limit.

Upon research, there were no other discovered TIP projects for this segment between calendar years 2002 and 2010. However, there are currently three W-projects (W-5106, W-5322, and W-5328) approved for funding to widen SR 1501 to a three-lane cross section roadway. These additional projects have not been constructed at the time of this evaluation.

Project Information and Background from the Project File Folder

The hazard elimination project improvement chosen was the installation of 1.5 foot paved shoulders on the outside shoulders of SR 1501. This roadway has experienced high volumes due to subdivision growth and has a history of run-off-road crashes resulting in fatalities, serious injury, and property damage. The intended purpose of the improvement was to give motorists additional room to correct errors and remain on the roadway safely.

The initial crash analysis was completed from July 31, 2000 to July 31, 2003 with 89 Total Crashes; 35 of which were Ran-Off-Road crashes. The improvement was completed on December 31, 2006 with a total cost of \$200,000. The projected B/C Ratio was 33.33:1.

Location Photographs





Naive Before and After Analysis

After reviewing the 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 July through December 2006. The before period consisted of reported crashes from July 1, 2002 through June 30, 2006 (4 years); and the after period consisted of reported crashes from January 1, 2007 through December 31, 2010 (4 years). The ending date for this analysis was determined by the date of available crash data at the time of analysis. The before period ADT year was 2004 and the after period ADT year was 2008.

The treatment data consisted of all mainline crashes with a 0' y-line. Target crashes are lane departure crash types. The lane departure crash types include: Fixed Object; Head-on; Movable Object; Overturn / Rollover; Parked Motor Vehicle; Ran-off Road (left, right, straight); and Sideswipe (opposite direction, same direction).

<u><i>SR 1501 (Sand Ridge Road)</i></u> <u><i>4.56 Mile Segment</i></u>	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	141	152	7.8 %
Total Severity Index	8.67	9.11	5.1 %
Lane Departure Crashes	62	63	1.6 %
Lane Departure Severity Index	9.86	9.60	- 2.6 %
Volume (2004, 2008)	5,800	6,800	17.2 %

<i>SR 1501 Crash Details</i>	Before	After	Percent Reduction (-)/ Percent Increase (+)
Injuries			
Fatal Injury Crashes	2	3	50.0 %
Class-A Injury Crashes	7	8	14.3 %
Class-B Injury Crashes	14	15	7.1 %
Class-C Injury Crashes	40	39	- 2.5 %
Property Damage Only Crashes	78	87	11.5 %
Contributing Factors			
Lane Departure Wet Crashes	16	16	0.0 %
Lane Departure Wet Severity Index	9.68	12.33	27.4 %
Night Crashes	59	66	11.9 %
Total Wet Road Crashes	14	25	78.6 %
Alcohol Related	20	27	35.0 %
Lane Departure Crash Types			
Fixed Object	32	44	37.5 %
Head On	2	2	0.0 %
Movable Object	4	2	- 50.0 %
Overturn / Rollover	4	6	50.0 %
Parked Motor Vehicle	2	1	- 50.0%
Ran Off Road (Left)	4	0	- 100.0 %
Ran Off Road (Right)	6	3	- 50.0 %
Sideswipe, Opposite Direction	4	5	25.0 %
Sideswipe, Same Direction	4	0	- 100.0 %

The naive before and after analysis for US 264 in Nash / Wilson Counties resulted in an overall 8 percent increase in Total Crashes and a 5 percent increase in the Total Severity Index. There was also a 2 percent increase in Target Crashes but a 3 percent decrease in the Target Severity Index.

Results and Discussion

From the tables above, the total and lane departure crashes appear to have remained seemingly consistent through the evaluation. Total crashes increased by 8 percent with large increases of alcohol and wet road collisions at 35 percent and 79 percent respectfully. With an increase in total wet road crashes, lane departure wet collisions actually remained consistent at sixteen (16) crashes in both periods but experienced a severity index hike of 27 percent. This roadway segment also saw an increase in ADT of 17 percent.

As previously mentioned, SR 1501 is under pending construction to widen the roadway to a 3-lane cross-section segment. This improvement will assist the volume increase by removing motorists from the through lane when accessing the many side streets and driveways along Sand Ridge Road. Also, the wider roadway will hopefully give vehicles additional room to correct driving maneuvers and help reduce the overall run-off roadway crash types.

The calculated benefit to cost ratio for W-4804 is **(-16.69) considering Total Crashes**. The benefit to cost ratio **considering only Target Crashes is 0.15**. 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 costs when applicable.

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 treatment.

BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes

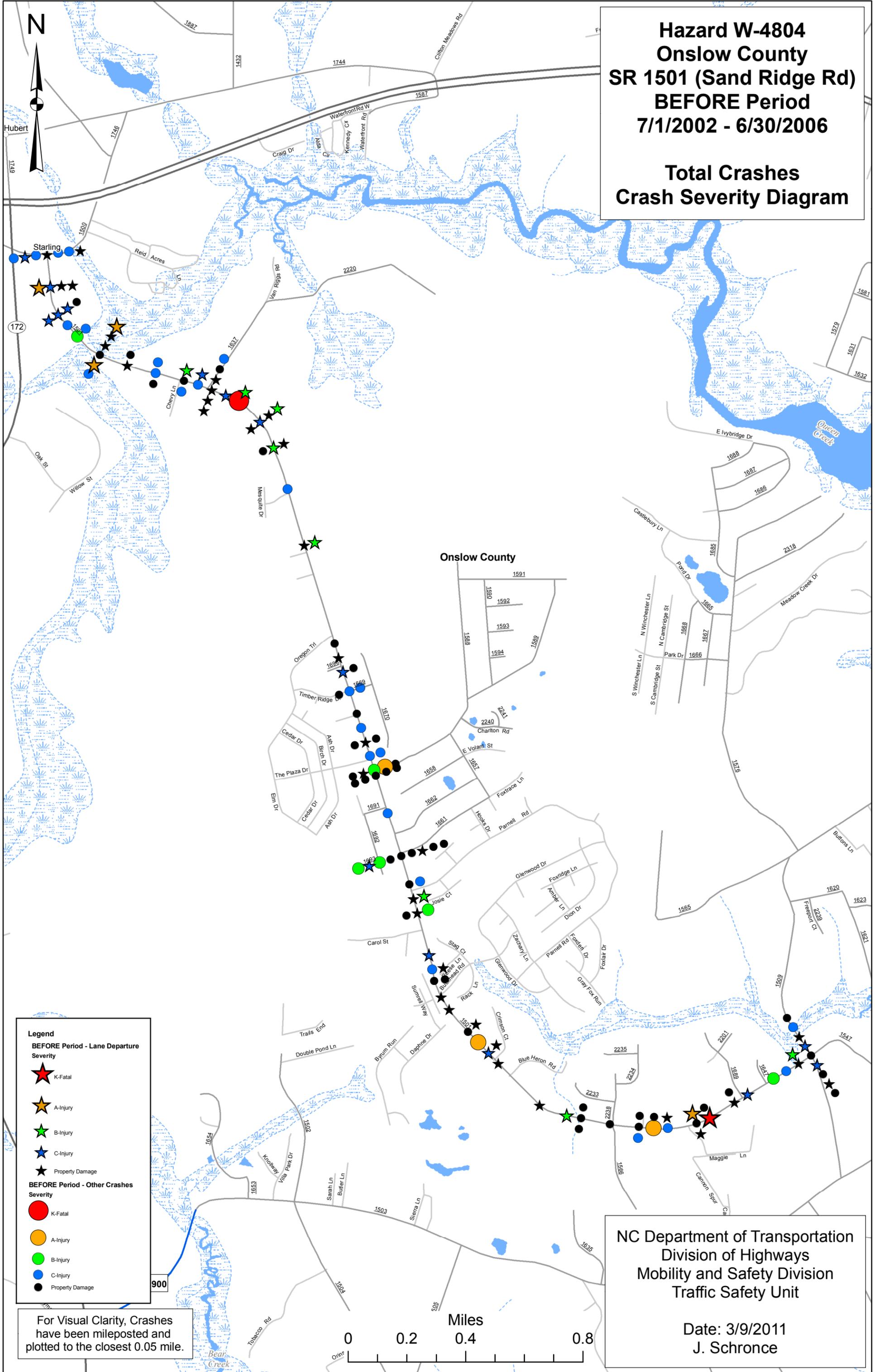
LOCATION: SR 1501 (Sand Ridge Road)		BY: JBS						
COUNTY: Onslow		DATE: 3/9/2011						
FILE NO.: W-4804								
DETAILED COST:	TYPE IMPROVEMENT - 1.5' Paved Shoulders							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$200,000	20	0.102	\$20,370			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$200,000	20	0.102	\$20,370			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				(\$912)			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$19,458			
	TOTAL COST OF PROJECT=				\$200,000			
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	9	2.25	54	13.50	78	19.50	\$1,771,350
AFTER	4.00	11	2.75	54	13.50	87	21.75	\$2,096,025
Annual Benefits from Crash Cost Savings								(\$324,675)
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	(\$344,133)		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	-16.69		
TOTAL COST OF PROJECT		-	\$200,000	COMPREHENSIVE B/C RATIO		-	-16.69	

BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes

LOCATION: SR 1501 (Sand Ridge Road)		BY: JBS						
COUNTY: Onslow		DATE: 3/9/2011						
FILE NO.: W-4804		Lane Departure Crashes Only						
DETAILED COST:	TYPE IMPROVEMENT - 1.5' Paved Shoulders							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$200,000	20	0.102	\$20,370			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$200,000	20	0.102	\$20,370			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				(\$912)			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$19,458			
	TOTAL COST OF PROJECT=				\$200,000			
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	5	1.25	23	5.75	34	8.50	\$939,050
AFTER	4.00	5	1.25	22	5.50	36	9.00	\$936,200
Annual Benefits from Crash Cost Savings								\$2,850
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	(\$16,608)		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	0.15		
TOTAL COST OF PROJECT		-	\$200,000	COMPREHENSIVE B/C RATIO		-	0.15	

**Hazard W-4804
Onslow County
SR 1501 (Sand Ridge Rd)
BEFORE Period
7/1/2002 - 6/30/2006**

**Total Crashes
Crash Severity Diagram**



Legend

**BEFORE Period - Lane Departure
Severity**

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

**BEFORE Period - Other Crashes
Severity**

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

For Visual Clarity, Crashes have been mileposted and plotted to the closest 0.05 mile.



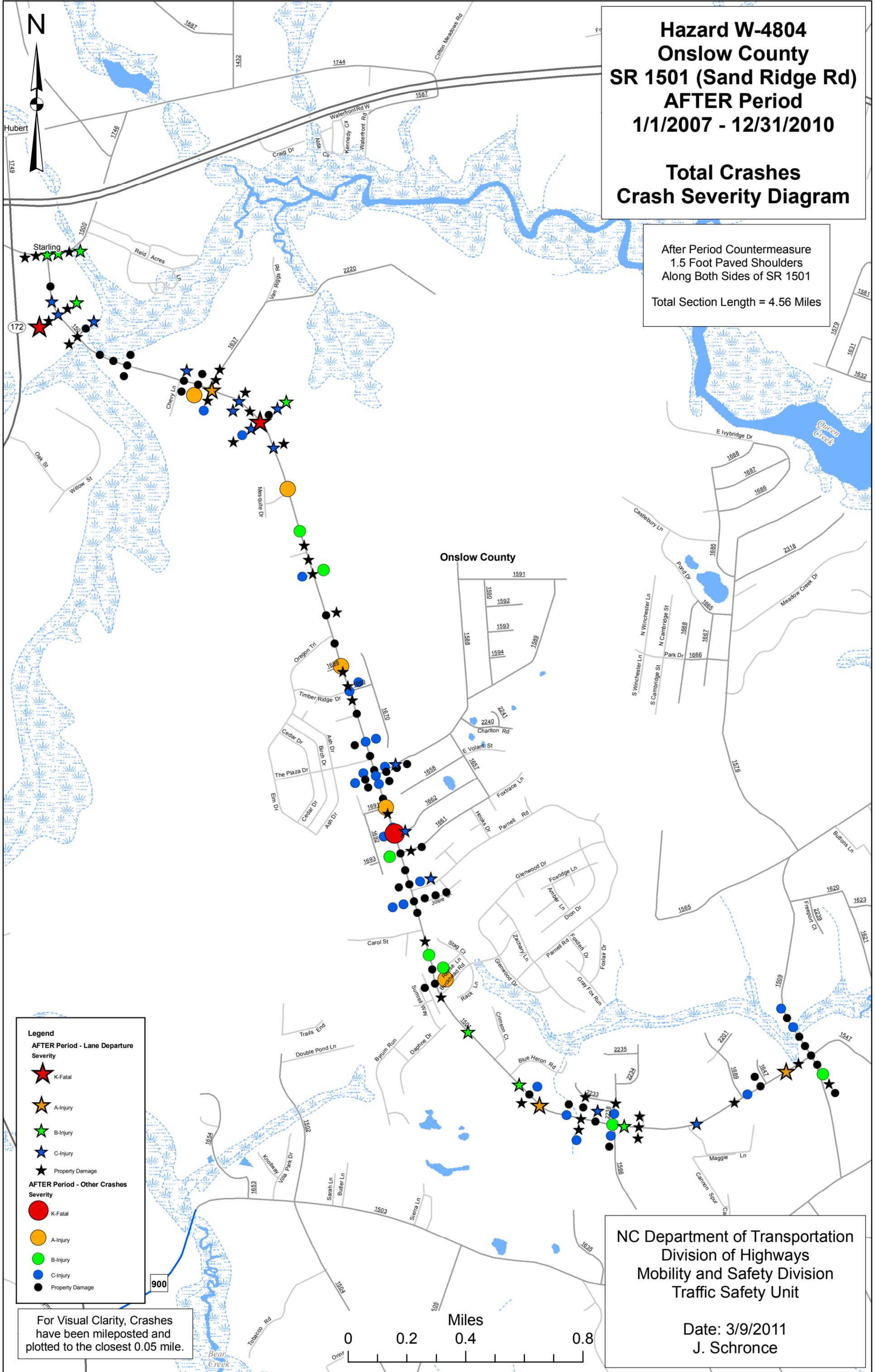
NC Department of Transportation
Division of Highways
Mobility and Safety Division
Traffic Safety Unit

Date: 3/9/2011
J. Schronce

Hazard W-4804 Onslow County SR 1501 (Sand Ridge Rd) AFTER Period 1/1/2007 - 12/31/2010

Total Crashes Crash Severity Diagram

After Period Countermeasure
1.5 Foot Paved Shoulders
Along Both Sides of SR 1501
Total Section Length = 4.56 Miles



Legend

AFTER Period - Lane Departure Severity

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

AFTER Period - Other Crashes Severity

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

For Visual Clarity, Crashes have been mileposted and plotted to the closest 0.05 mile.

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