

Hazard Elimination Project Evaluation

Order # 41000018861

Hazard Elimination Project W-5013

**Evaluation of the Roadway Widening and Paved Shoulders Installation
SR 1001 (Stoney Point Road) from US-74 Bypass to SR 2033
Cleveland County**

Documents Prepared By:

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

Principal Investigator



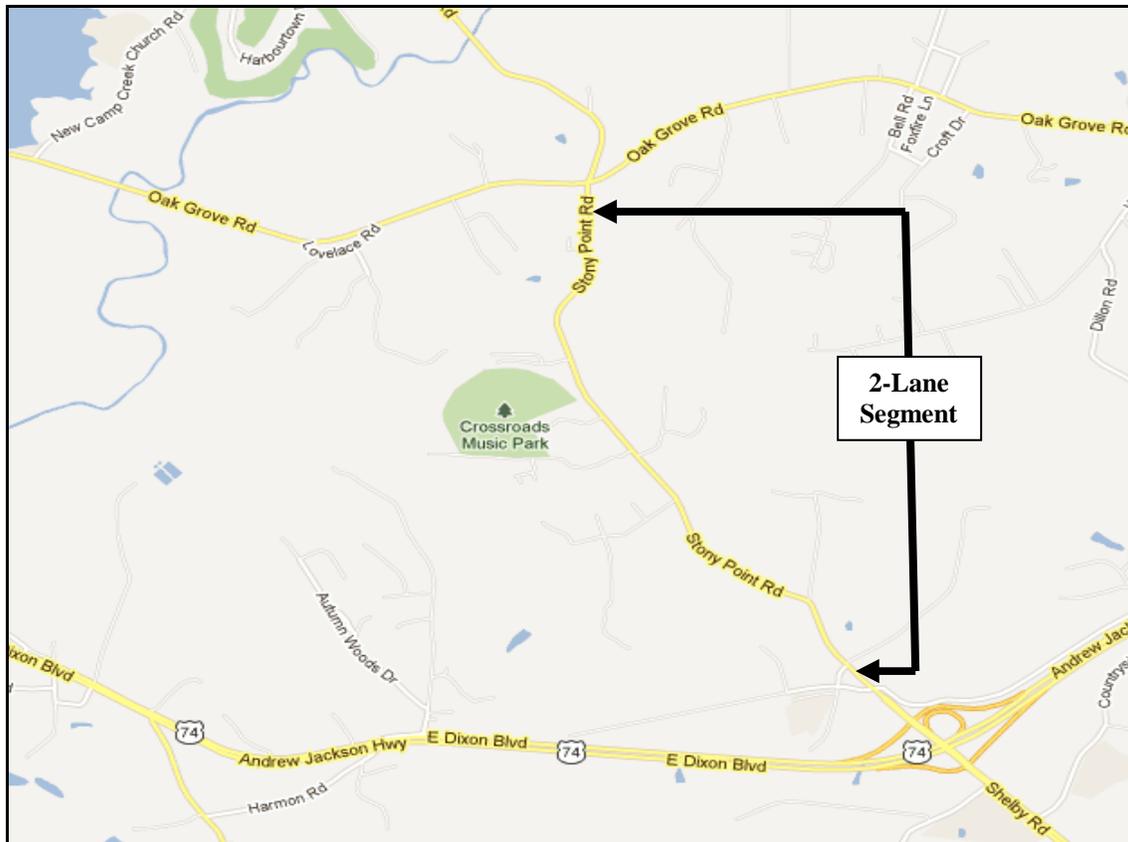
Jason B. Schronce
Traffic Safety Project Engineer

6-11-2012
Date

Hazard Elimination Project Evaluation Documentation

Subject Location

Evaluation of Hazard Elimination Project W-5013 located along the segment of SR 1001 (Stony Point Road) from the US-74 Bypass to SR 2033 (Oak Grove Road) in Cleveland County.



Project Information and Background from the Project File Folder

The hazard elimination project improvements chosen for the subject location was the roadway lane widening by one foot and providing two-foot paved shoulders.

SR 1001 (Stoney Point Road) is a two-lane roadway with a winding horizontal alignment. The before period pavement width was 21-feet with grass shoulders. The roadway has a posted speed limit of 45-mph. The section of SR 1001 between US-74 Bypass and SR 2033 (Oak Grove Road) consists of six (6) intersections, multiple private residential driveways, and one bridge.

The project background information simply stated that this segment was experiencing a significant pattern of lane departure collisions. The countermeasure was aimed at giving motorists more travel lane flexibility and additional paved recovery space in order to increase safety.

The initial crash analysis was completed from January 1, 2002 to December 31, 2006 with 99 total reported crashes and 25 deemed correctible lane departure collisions. The improvement was completed on December 22, 2008 with a total cost of \$650,000. The projected B/C Ratio was 3.68.

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 from October through December 2008. The before period consisted of reported crashes from August 1, 2005 through September 30, 2008 (3 years, 2 months); and the after period consisted of reported crashes from January 1, 2009 through February 29, 2012 (3 years, 2 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 1001 with a zero (0) foot y-line from 150 feet south of SR 2033 (Oak Grove Road) to 150 feet north of SR 2604 (Reliance Road). The study was from milepost 13.212 to 15.118 with a total length of 1.906 miles. This section was chosen for the study limits due to its two-lane configuration. *Please see attached location map for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment segment. Please note that Lane Departure Crashes were the target crashes for the applied countermeasure. The Lane Departure Crash types considered are as follows: Ran-Off Road (Right, Left, Straight), Fixed Object, Jackknife, Overturn/Rollover, Sideswipe (Opposite Direction), and Head-On. Each Lane Departure target crash was verified by the crash report for this evaluation.

<u>Treatment Information</u>	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes – Both Directions	31	31	0.0 %
Total Severity Index	6.79	5.83	- 14.1 %
Lane Departure Crashes – Both Directions	20	21	5.0 %
Lane Departure Severity Index	8.12	3.82	- 53.0 %

The naive before and after analysis at the treatment location resulted in a zero percent change of the Total Crashes, a 5 percent increase in Lane Departure Target Crashes, but a 14 percent decrease in the Total Severity Index. The before period ADT year was 2007 and the after period ADT year was 2010.

SR 1001: MP 13.212 – 15.118	Before	After	Percent Reduction (-)/ Percent Increase (+)
Volume (2007, 2010)	4,700	4,800	2.1 %
Total Crash Rate (per 100 Million Miles)	299.09	293.37	- 1.9 %
Injuries			
Fatal Injury Crashes	0	0	N/A
Class-A Injury Crashes	1	1	0.0 %
Class-B Injury Crashes	2	4	100.0 %
Class-C Injury Crashes	12	6	- 50.0%
Property Damage Only Crashes	16	20	25.0%
Contributing Factors			
Night Crashes	10	12	20.0 %
Wet Road Crashes	8	5	- 37.5 %
Alcohol Related	4	3	- 25.0 %
Lane Departure Crash Types			
Fixed Object	16	18	12.5 %
Head On	3	0	- 100.0 %
Overturn / Rollover	0	3	300.0 %
Sideswipe, Opposite Direction	1	0	- 100.0 %

Results and Discussion

Overall, Total Crashes and Lane Departure Collisions on this roadway segment remained constant through the evaluation periods. There was however a 53 percent reduction in the lane departure severity index with the elimination of severe injury crashes in the after period. From the charts above, head-on crashes were eliminated in the after period but the total number of target crashes increased by one (1) collision.

The calculated benefit to cost ratio for the project is **0.30** considering Total Crashes. The benefit to cost ratio considering only Target Crashes is **3.05**. 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 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

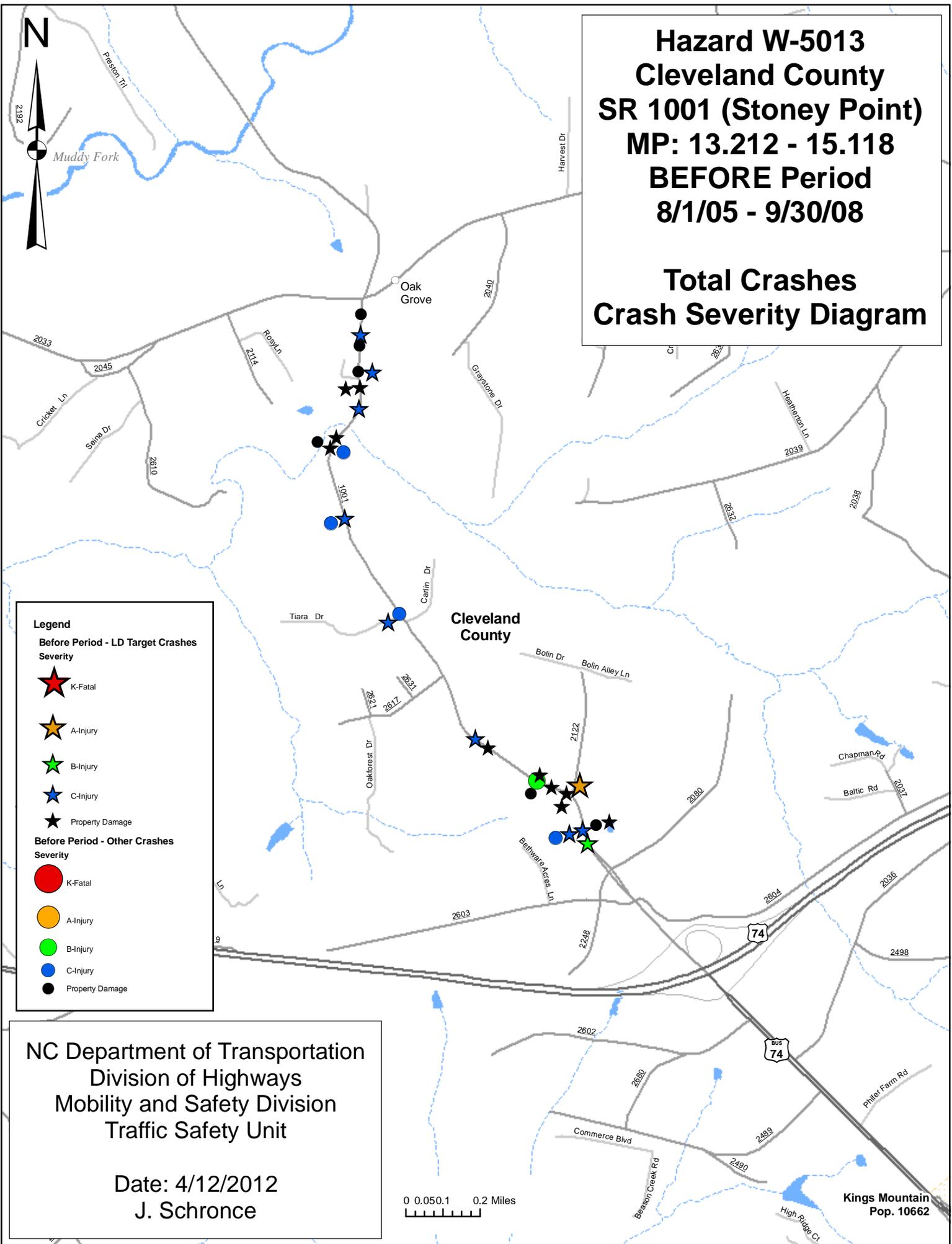
LOCATION: SR 1001 near Shelby		BY: JBS						
COUNTY: Cleveland		DATE: 4/20/2012						
FILE NO.: W-5013								
DETAILED COST:	TYPE IMPROVEMENT - Widen Roadway & Paved Shoulders							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$650,000	20	0.102	\$66,204			
		\$0	0	0.000	\$0			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$650,000	20	0.102	\$66,204			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$0			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$66,204			
	TOTAL COST OF PROJECT=				\$650,000			
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	3.16	1	0.32	14	4.43	16	5.06	\$309,747
AFTER	3.16	1	0.32	10	3.16	20	6.33	\$289,873
							Annual Benefits from Crash Cost Savings	\$19,873
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST						=	(\$46,331)	
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST						=	0.30	
TOTAL COST OF PROJECT		-	\$650,000	COMPREHENSIVE B/C RATIO		-	0.30	

BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes

LOCATION: SR 1001 near Shelby		BY: JBS						
COUNTY: Cleveland		DATE: 4/20/2012						
FILE NO.: W-5013		Target Crashes - Lane Departure						
DETAILED COST:	TYPE IMPROVEMENT - Widen Roadway & Paved Shoulders							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$650,000	20	0.102	\$66,204			
		\$0	0	0.000	\$0			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$650,000	20	0.102	\$66,204			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$0			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$66,204			
	TOTAL COST OF PROJECT=				\$650,000			
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	3.16	1	0.32	9	2.85	10	3.16	\$269,937
AFTER	3.16	0	0.00	8	2.53	13	4.11	\$68,323
							Annual Benefits from Crash Cost Savings	\$201,614
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST						=	\$135,410	
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST						=	3.05	
TOTAL COST OF PROJECT		-	\$650,000	COMPREHENSIVE B/C RATIO		-	3.05	

**Hazard W-5013
Cleveland County
SR 1001 (Stoney Point)
MP: 13.212 - 15.118
BEFORE Period
8/1/05 - 9/30/08**

**Total Crashes
Crash Severity Diagram**



Legend

Before Period - LD Target Crashes Severity

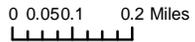
- K-Fatal
- A-Injury
- B-Injury
- C-Injury
- Property Damage

Before Period - Other Crashes Severity

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

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

Date: 4/12/2012
J. Schronce



Kings Mountain
Pop. 10662



**Hazard W-5013
Cleveland County
SR 1001 (Stoney Point)
MP: 13.212 - 15.118
AFTER Period
1/1/09 - 2/29/12**

**Total Crashes
Crash Severity Diagram**

After Period Countermeasure
Widen Travel Lanes by 1 Foot and
Add 2 Foot Paved Shoulders
Total Section Length = 1.906 Miles

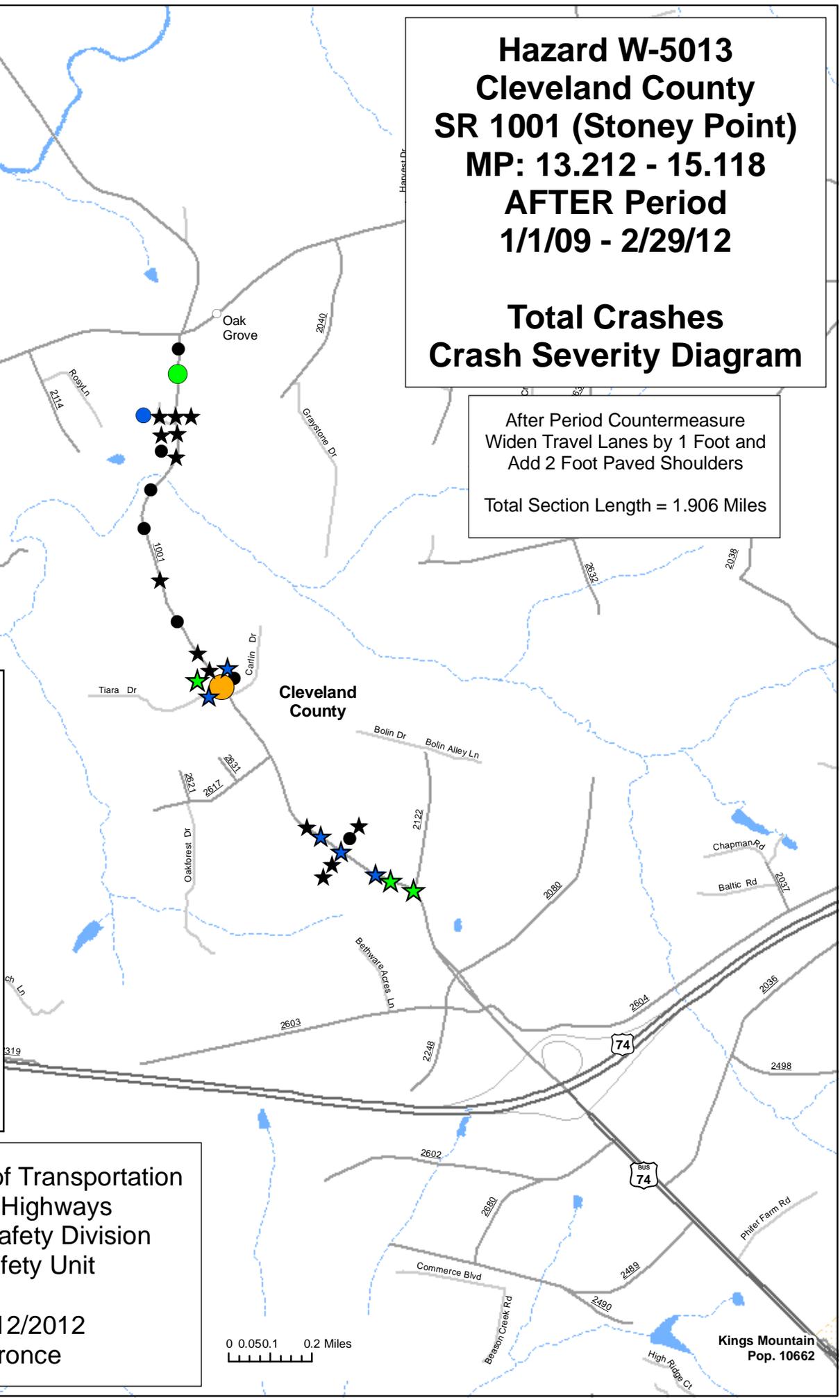
Legend

After Period - LD Target Crashes 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



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Kings Mountain
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