

# Spot Safety Project Evaluation

Project Log # 200811212

Spot Safety Project # 06-02-202

**Spot Safety Project Evaluation of the Overhead Flasher Installation  
SR 1003 (Chicken Road) at SR 1339 (Deep Branch Road)  
Robeson 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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Jason B. Schronce

5-11-2009

Date

Traffic Safety Project Engineer



## Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of an overhead flasher. SR 1003 (Chicken Road) and SR 1339 (Deep Branch Road) are both two-lane facilities at the subject intersection with no turn lanes and speed limits of 55 mph on all approaches. The subject location is a crossroads type intersection, which is controlled by the stop condition on SR 1003 (Chicken Road).

The original statement of problem was that a pattern of angle type collisions are occurring at this location from vehicles on both approaches of SR 1003. The intended purpose of the new overhead flasher is to alleviate the accident pattern and help reduce the severity of the crashes by bringing more awareness to the subject intersection.

The initial crash analysis was completed from July 31, 1998 to July 31, 2001 with twenty-four (24) reported crashes, sixteen (16) of which were deemed correctable including two fatality crashes. The improvement was requested by the Accident Investigation Engineer. The final completion date for the improvement at the subject intersection was on January 23, 2003 with a total cost of \$15,000.00.

## 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 was the month of January 2003. The before period consisted of reported crashes from January 1, 1997 through December 31, 2002 (6 years); and the after period consisted of reported crashes from February 1, 2003 through January 31, 2009 (6 years). 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 within 150 feet of the subject intersection. *Please see attached location map, and photos for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; Angle; and Ran-off roadway crashes from avoidance of an angle collision.

<b><u>Treatment Information</u></b>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total crashes	50	34	- 32.0 %
Total Severity Index	10.73	5.57	- 48.1 %
Target Crashes	39	34	- 12.8 %
Target Crash Severity Index	12.71	5.57	- 56.2 %
Volume	6,100	6,200	1.6 %

<u>Injury Crash Summary</u>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Fatal injury Crashes	2	0	- 100.0 %
Class A injury Crashes	1	0	- 100.0 %
Class B injury Crashes	12	5	- 58.3 %
Class C Injury Crashes	23	16	- 30.4 %
Total Injury Crashes	38	21	- 44.7 %

The naive before and after analysis at the treatment location resulted in a 32 percent decrease in Total Crashes, a 13 percent decrease in Target Crashes, and a 48 percent increase in the Total Severity Index. The before period ADT year was 2000 and the after period ADT year was 2006.

## **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 32 percent decrease in Total Crashes and an 13 percent decrease in Target Crashes. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have decreased at the treatment location from the before to the after period.

Referencing the *Collision Diagrams*, both the before and after periods show angle crash patterns from vehicles improperly crossing SR 1339 (Deep Branch Road) from SR 1003 (Chicken Road). However, the number of vehicles running the stop sign has decreased from seven (Crashes 1, 10, 31, 32, 41, 43, 47) in the before period to only one (Crash 15) in the after period. The reduction of these higher impact speed collisions, including two fatality crashes in the before period, have assisted in giving this project a large benefit-cost ratio. Nevertheless, the number of target crashes has remained steady through the analysis.

The calculated benefit to cost ratio for this project is **104.60 considering total crashes**. The benefit to cost ratio **considering only target crashes is 98.66**. 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. The significant benefit-cost ratios result from the elimination of severe injury crashes in the after period.

Please see the attached *Treatment Site Photos*. Photos are provided for all three approaches to the treatment intersection. 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 intersection.

## TREATMENT SITE PHOTOS



Looking South on SR 1003 (Chicken Road)



Looking North on SR 1003 (Chicken Road)



Traveling Northwest on SR 1339 (Deep Branch Road)



Traveling Southeast on SR 1339 (Deep Branch Road)

**BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes**

LOCATION: SR 1003 at SR 1339		BY: JBS						
COUNTY: Robeson		DATE: 5/7/2009						
FILE NO.: SS 06-02-202		NOTES: Total Crashes						
DETAILED COST: TYPE IMPROVEMENT - <b>New Overhead Flasher</b>								
ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
Construction	\$15,000	10	0.149	\$2,235				
Right-of-Way	\$0	0	0.000	\$0				
TOTALS	\$15,000	10	0.149	\$2,235				
ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$400				
ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$150				
TOTAL ANNUAL COST=				\$2,785				
TOTAL COST OF PROJECT=				\$15,000				
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	6.00	3	0.50	35	5.83	12	2.00	\$362,800
AFTER	6.00	0	0.00	21	3.50	13	2.17	\$71,450
Annual Benefits from Crash Cost Savings								\$291,350
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$288,565		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	104.60		
TOTAL COST OF PROJECT		-	\$15,000	COMPREHENSIVE B/C RATIO		-	104.60	

**BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes**

LOCATION: SR 1003 at SR 1339		BY: JBS						
COUNTY: Robeson		DATE: 5/7/2009						
FILE NO.: SS 06-02-202		NOTES: Target Crashes - Frontal Impact						
DETAILED COST: TYPE IMPROVEMENT - <b>New Overhead Flasher</b>								
ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
Construction	\$15,000	10	0.149	\$2,235				
Right-of-Way	\$0	0	0.000	\$0				
TOTALS	\$15,000	10	0.149	\$2,235				
ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$400				
ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$150				
TOTAL ANNUAL COST=				\$2,785				
TOTAL COST OF PROJECT=				\$15,000				
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	6.00	3	0.50	31	5.17	5	0.83	\$346,250
AFTER	6.00	0	0.00	21	3.50	13	2.17	\$71,450
Annual Benefits from Crash Cost Savings								\$274,800
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$272,015		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	98.66		
TOTAL COST OF PROJECT		-	\$15,000	COMPREHENSIVE B/C RATIO		-	98.66	

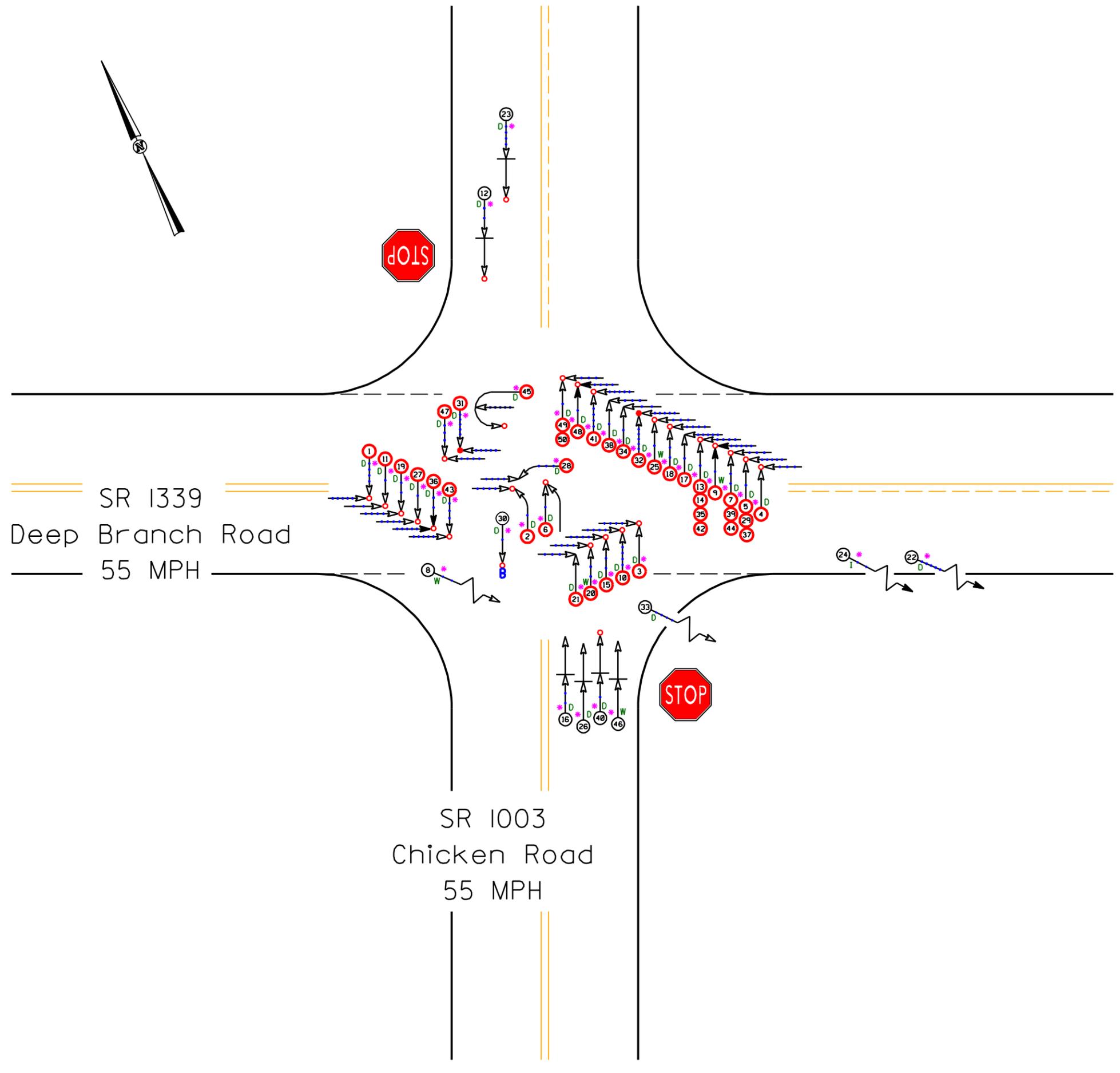
LEGEND

	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		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		INJURY		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		OILY
	RAN OFF ROAD				70 AND UP		

SS# 06-02-202  
 Robeson County  
 BEFORE Period  
 1/1/97 - 12/31/02

SR 1339  
 Deep Branch Road  
 55 MPH

SR 1003  
 Chicken Road  
 55 MPH



Frontal Impact  
 Target Crashes

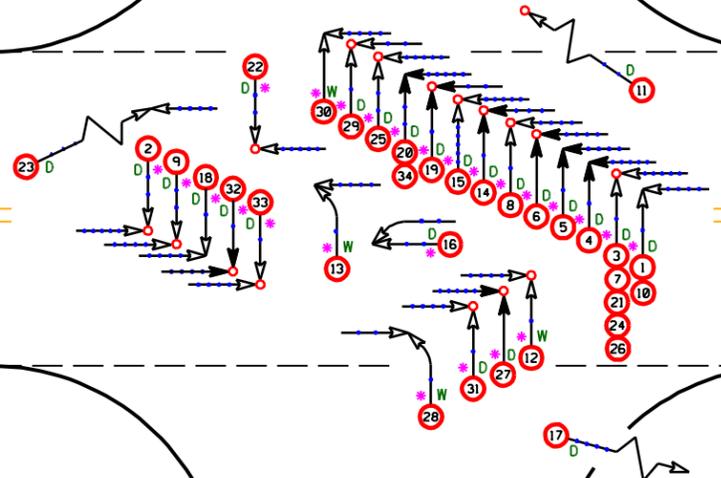
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 6	AREA: 2
	STUDY PERIOD: 1/1/1997 - 12/31/2002	
	DISTANCE: Y-LINE = 150 FT	
	ANALYSIS PREPARED BY: JBS	
	ANALYSIS CHECKED BY: N/A	
	DIAGRAM PREPARED BY: JBS	
	DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE		
DATE: 5-6-2009		
LOG NUMBER: SS* 06-02-202 BEFORE		

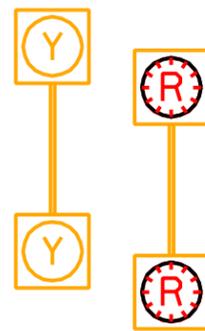
**N.C. DEPARTMENT of TRANSPORTATION**  
 DIVISION of HIGHWAYS  
 TRANSPORTATION MOBILITY and  
 SAFETY DIVISION



SR 1339  
Deep Branch Road  
55 MPH



SR 1003  
Chicken Road  
55 MPH



New Installed  
Overhead Flasher



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		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		INJURY		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		OILY
	RAN OFF ROAD		70 AND UP		SPEED UNKNOWN		

SS# 06-02-202  
Robeson County  
AFTER Period  
2/1/03 - 1/31/09

**TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT**

COLLISION DIAGRAM	
DIVISION: 6	AREA:
STUDY PERIOD: 2/1/2003 - 1/31/2009	
DISTANCE: Y-LINE : 150FT	
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: N/A	
DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE	
DATE: 5-6-2009	
LOG NUMBER: SS* 06-02-202 AFTER	

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