

Spot Safety Project Evaluation

Order # 41000010229

Spot Safety Project # 05-05-203

**Spot Safety Project Evaluation of the Installation of a Traffic Signal
At the Intersection of SR 2697 (S. New Hope Road) and SR 5233 (Old Poole Road)
In Raleigh, Wake County**

Documents Prepared By:

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

Principal Investigator



Chad J. Neilson

12-21-2010

Date

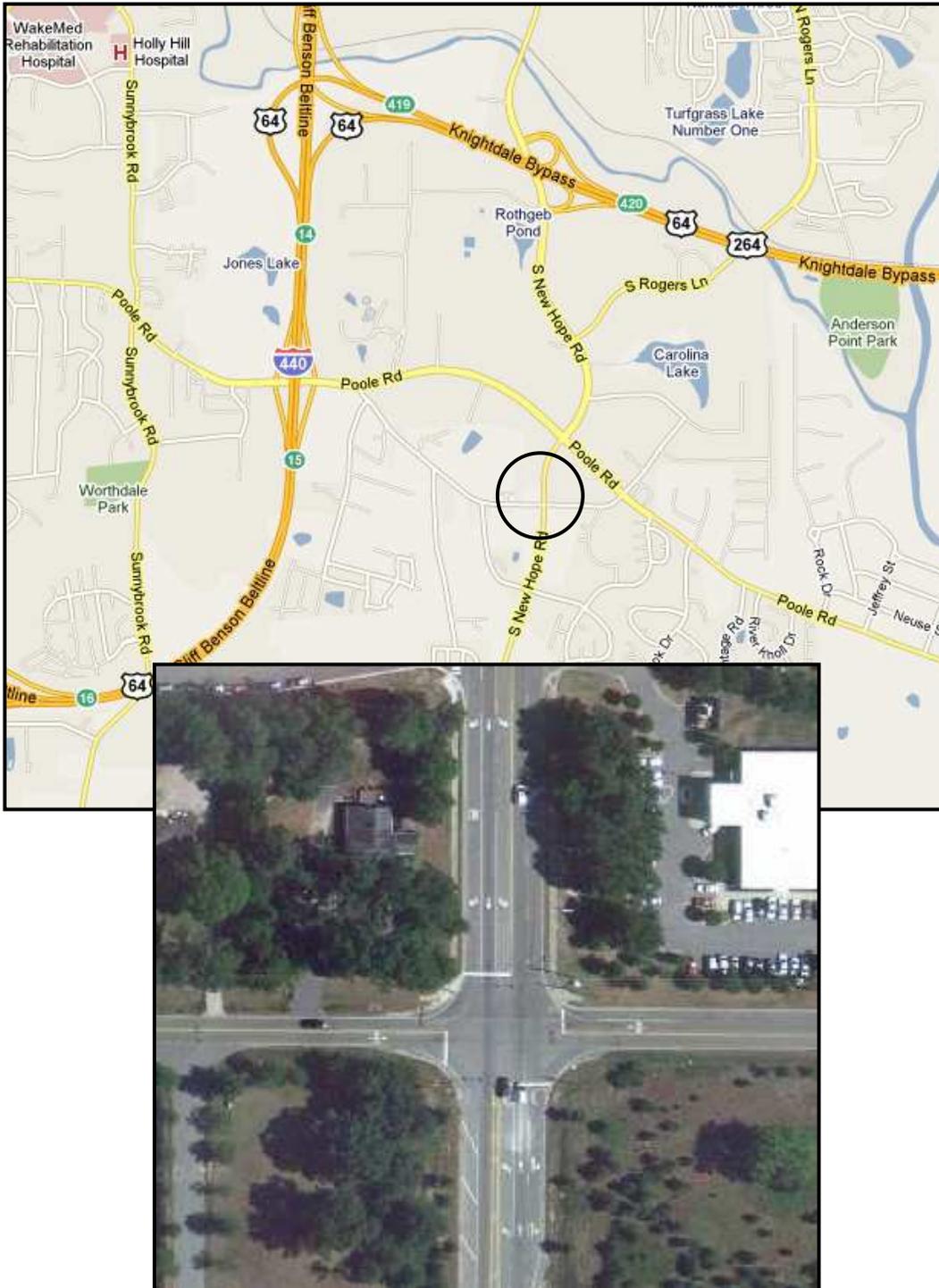
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 05-05-203 located at the intersection of SR 2697 (S. New Hope Road) and SR 5233 (Old Poole Road) in Raleigh, Wake County.

The signal ID for the newly installed signal is 05-2265.



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 traffic signal. SR 2697 (S. New Hope Road) is a two-lane facility south of the subject intersection and a five-lane facility with a center two-way-left-turn lane north of the intersection with speed limits of 45 mph for both directions. SR 5233 (Old Poole Road) is a two-lane facility with a speed limit of 45 mph for both approaches. The subject location is a stop sign controlled four-leg intersection with the SR 5233 (Old Poole Road) approaches encountering the stop sign condition.

The original statement of problem was the pattern of angle type crashes on the eastbound approach of SR 5233 (Old Poole Road).

The initial crash analysis was completed from May 1, 2001 to August 31, 2004 with twenty-two (22) reported angle crashes. The final completion date for the improvement at the subject intersection was on July 7, 2006 with a total cost of \$87,700.00.

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 June 2006 through August 2006. The before period consisted of reported crashes from April 1, 2002 through May 31, 2006 (4 years and 2 months); and the after period consisted of reported crashes from September 1, 2006 through October 31, 2010 (4 years and 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 within 150 feet of the subject intersection. *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 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; and Angle.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	28	14	- 50.00 %
Total Crash Severity Index	9.26	4.17	- 54.97 %
Target Crashes	26	5	- 80.77 %
Target Crash Severity Index	9.61	6.92	- 27.99 %
Volume (2004, 2008)	10,000	12,500	25.00 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	1	0	- 100.00 %
Class A injury Crashes	0	0	N/A
Class B injury Crashes	11	1	- 90.91 %
Class C Injury Crashes	10	5	- 50.00 %
Total Injury Crashes	22	6	- 72.73%

The naive before and after analysis at the treatment location resulted in a fifty (50) percent decrease in Total Crashes, eighty (80) percent decrease of Target Crashes, and a fifty-four (54) percent decrease in the Total Severity Index. The before period ADT year was 2004 and the after period ADT year was 2008.

Results and Discussion

Referencing the *Collision Diagrams*, the before period presented twenty-six (26) target crashes. There were two eastbound angle crash patterns at the intersection. One angle crash pattern consisted of southbound vehicles that accounted for fourteen (14) target crashes. The other eastbound angle crash pattern was comprised with northbound vehicles that accounted for ten (10) target crashes. After the installation of the signal, there were five (5) target crashes. The eastbound angle crash pattern that involved southbound vehicles was eliminated. The eastbound angle crash pattern that included northbound vehicles was reduced to two (2) target crashes.

The calculated benefit to cost ratio for this project is **13.89 considering total crashes**. The benefit to cost ratio **considering only target crashes is 14.59**. 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 all four approaches of this 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 North on SR 2697 (S. New Hope Road)



Looking West on SR 5233 (Old Poole Road)



Looking South on SR 2697 (S. New Hope Road)



Looking East on SR 5233 (Old Poole Road)

BENEFIT-COST ANALYSIS WORKSHEET - TOTAL

LOCATION: SR 2697 (S. New Hope Road) at SR 5233 (Old Poole Road)		BY: C Neilson						
COUNTY: Wake		DATE: 12/13/2010						
FILE NO.: SS 05-05-203								
DETAILED COST:	TYPE IMPROVEMENT -	Signal Install						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$86,700	10	0.149	\$12,921			
		\$0	0	0.000	\$0			
	Right-of-Way	\$1,000	50	0.082	\$82			
	TOTALS	\$87,700	10	0.148	\$13,003			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,000			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900			
	TOTAL ANNUAL COST=				\$15,903			
	TOTAL COST OF PROJECT=				\$87,700			
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	4.17	1	0.24	21	5.04	6	1.44	\$257,986
AFTER	4.17	0	0.00	6	1.44	8	1.92	\$37,026
							Annual Benefits from Crash Cost Savings	\$220,959
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST				=	\$205,057		
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST				=	13.89		
	TOTAL COST OF PROJECT	-	\$87,700	COMPREHENSIVE B/C RATIO	-			13.89

BENEFIT-COST ANALYSIS WORKSHEET - TARGET

LOCATION: SR 2697 (S. New Hope Road) at SR 5233 (Old Poole Road)		BY: C Neilson						
COUNTY: Wake		DATE: 12/13/2010						
FILE NO.: SS 05-05-203								
DETAILED COST:	TYPE IMPROVEMENT -	Signal Install						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$86,700	10	0.149	\$12,921			
		\$0	0	0.000	\$0			
	Right-of-Way	\$1,000	50	0.082	\$82			
	TOTALS	\$87,700	10	0.148	\$13,003			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,000			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900			
	TOTAL ANNUAL COST=				\$15,903			
	TOTAL COST OF PROJECT=				\$87,700			
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	4.17	1	0.24	20	4.80	5	1.20	\$252,158
AFTER	4.17	0	0.00	4	0.96	1	0.24	\$20,216
							Annual Benefits from Crash Cost Savings	\$231,942
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST				=	\$216,040		
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST				=	14.59		
	TOTAL COST OF PROJECT	-	\$87,700	COMPREHENSIVE B/C RATIO	-			14.59

SS# 05-05-203
 Order# 41000010229
 Wake County
 BEFORE Period
 4/1/02 - 5/31/06

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
	PARKED 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		TO AND LIP		SPEED UNKNOWN
	RAN OFF ROAD				SPEED UNKNOWN		O ONLY

SR 2697
 (S. NEW HOPE ROAD)

SR 5233 (OLD POOLE ROAD)

45 MPH

45 MPH

45 MPH

SR 5233 (OLD POOLE ROAD)

SR 2697
 (S. NEW HOPE ROAD)

45 MPH



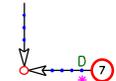
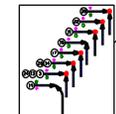
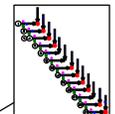
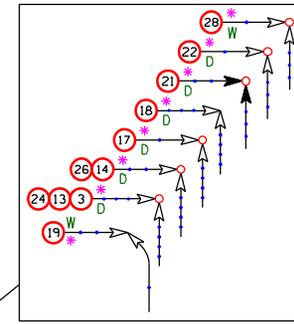
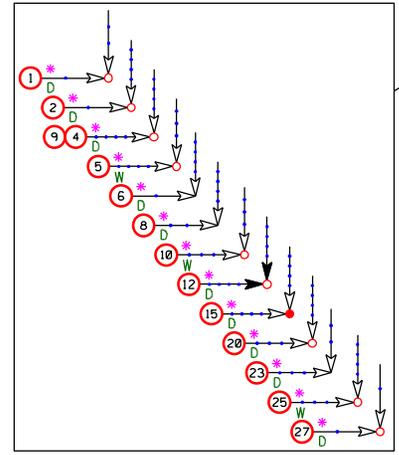
Frontal Impact
Target Crashes

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

TRAFFIC SAFETY UNIT

Date: 12-13-2010

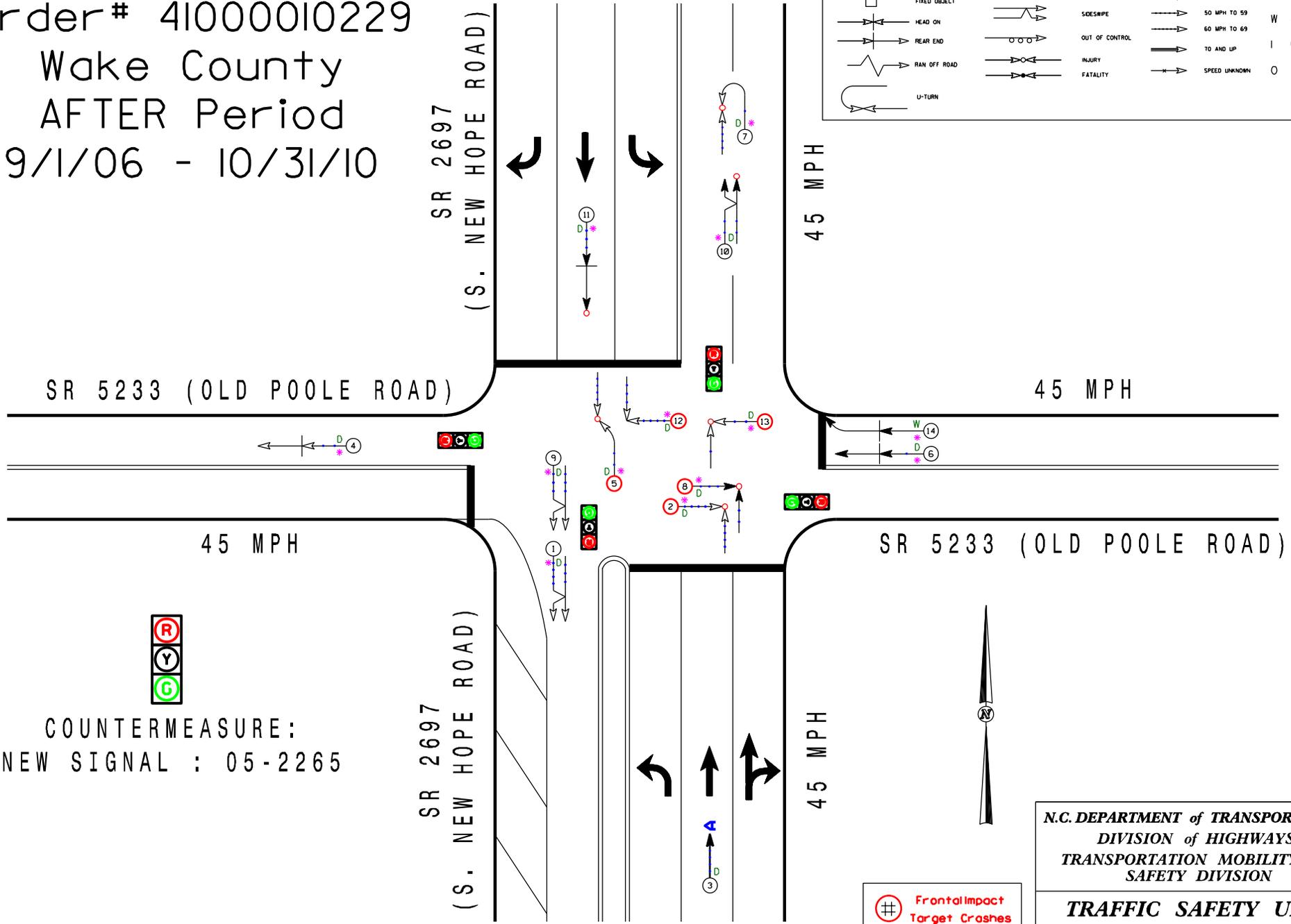
Prepared By: C Neilson



SS# 05-05-203
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 Wake County
 AFTER Period
 9/1/06 - 10/31/10

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		TO AND LIP		50 MPH TO 59		ICY OR SNOWY
	REAR END		SPEED UNKNOWN		60 MPH TO 69		ONLY
	RAN OFF ROAD		INJURY		FATALITY		
	U-TURN						



COUNTERMEASURE:
 NEW SIGNAL : 05-2265

Frontal Impact
 Target Crashes

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

TRAFFIC SAFETY UNIT

Date: 12-13-2010 Prepared By: C Neilson