

Spot Safety Project Evaluation

Order # 41000006192

Spot Safety Project # 05-03-220

**Spot Safety Project Evaluation of the Signal Installation
At The Intersection of SR 2215 (Buffaloe Road)
and SR 2917 (Valley Stream Road)
City of 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

7-16-2010

Date

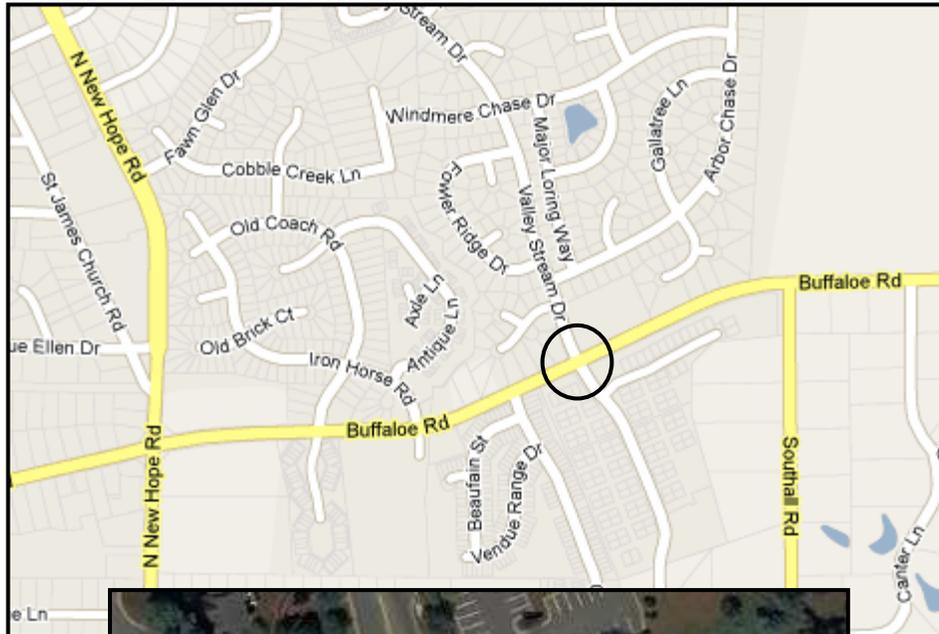
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 05-03-220 located at the intersection of SR 2215 (Buffaloe Road) and SR 2917 (Valley Stream Road) in Wake County, in the city of Raleigh.

The signal ID is 05-2247 for the newly installed traffic signal.



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 2215 (Buffaloe Road) is a five lane facility with a center two-way-left-turn lane and a posted speed limit of 45 mph. SR 2917 (Valley Stream Road) is a two-lane facility at the subject intersection with a speed limit of 35 mph. The subject location was a three-leg intersection, which was controlled by a stop sign on SR 2917 (Valley Stream Road) during the before period. The subject location was modified to a four-leg signalized intersection for the after period. The added northbound leg is a two lane facility with an assumed speed limit of 25 mph.

The original statement of problem was the concern for crashes due to insufficient gaps in traffic along SR 2215 (Buffaloe Road) for vehicles attempting to enter from SR 2917 (Valley Stream Road). The intended purpose of the signal is to alleviate crashes and create gaps in traffic to allow vehicles to enter SR 2215 (Buffaloe Road) from SR 2917 (Valley Stream Road).

The initial crash analysis was completed from June 1, 2000 to May 31, 2003 with eight (8) reported crashes, seven (7) of which were deemed correctable. The final completion date for the improvement at the subject intersection was on May 16, 2005 with a total cost of \$56,250.00.

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 May 2005 through April 2006. The before period consisted of reported crashes from June 1, 2001 through April 30, 2005 (3 years and 11 months); and the after period consisted of reported crashes from May 1, 2006 through March 31, 2010 (3 years and 11 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	36	10	- 72.22 %
Total Severity Index	3.67	2.48	- 32.43 %
Target Crashes	25	8	- 68.00 %
Target Crash Severity Index	4.55	2.85	- 37.36 %
Volume	19,500	25,300	29.74 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal Injury Crashes	0	0	0.00 %
Class A Injury Crashes	0	0	0.00 %
Class B Injury Crashes	6	1	- 83.33 %
Class C Injury Crashes	7	1	- 85.71 %
Total Injury Crashes	13	2	- 84.62 %

The naive before and after analysis at the subject location resulted in a seventy-two (72) percent decrease in Total Crashes, an sixty-eight (68) percent decrease in Target Crashes, and a thirty-two (32) percent decrease in the Total Severity Index. The before period ADT year was 2003 and the after period ADT year was 2008.

Results and Discussion

Referencing the *Collision Diagrams*, the before period left-turn, different roadway crash pattern at the intersection consisted of twenty-five (25) crashes and was the only defined crash pattern. After the signal installation, this pattern was reduced to four (4) crashes. Out of these four (4) crashes, two (2) crashes were caused by a red light violation on SR 2215 (Buffaloe Road) and zero (0) were injury crashes.

The calculated benefit to cost ratio for this project is **6.43 considering total crashes**. The benefit to cost ratio **considering only target crashes is 5.20**. 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 all four 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 East on SR 2215 (Buffaloe Road)



Looking West on SR 2215 (Buffaloe Road)



Looking North on SR 2917 (Valley Stream Road)



Looking South on SR 2917 (Valley Stream Road)

BENEFIT-COST ANALYSIS WORKSHEET - TOTAL CRASHES

LOCATION: SR 2215 (Buffaloe Rd) @ SR 2917 (Valley S)		BY: C Neilson						
COUNTY: Wake		DATE: 5/24/2010						
FILE NO.: SS 05-03-220								
DETAILED COST:	TYPE IMPROVEMENT - Signal Installation							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$56,250	10	0.149	\$8,383			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$56,250	10	0.149	\$8,383			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,000			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900			
	TOTAL ANNUAL COST=				\$11,283			
	TOTAL COST OF PROJECT=				\$56,250			
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	3.92	0	0.00	13	3.32	23	5.87	\$91,556
AFTER	3.92	0	0.00	2	0.51	8	2.04	\$18,980
						Annual Benefits from Crash Cost Savings		\$72,577
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$61,294		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	6.43		
TOTAL COST OF PROJECT		-	\$56,250	COMPREHENSIVE B/C RATIO		-	6.43	

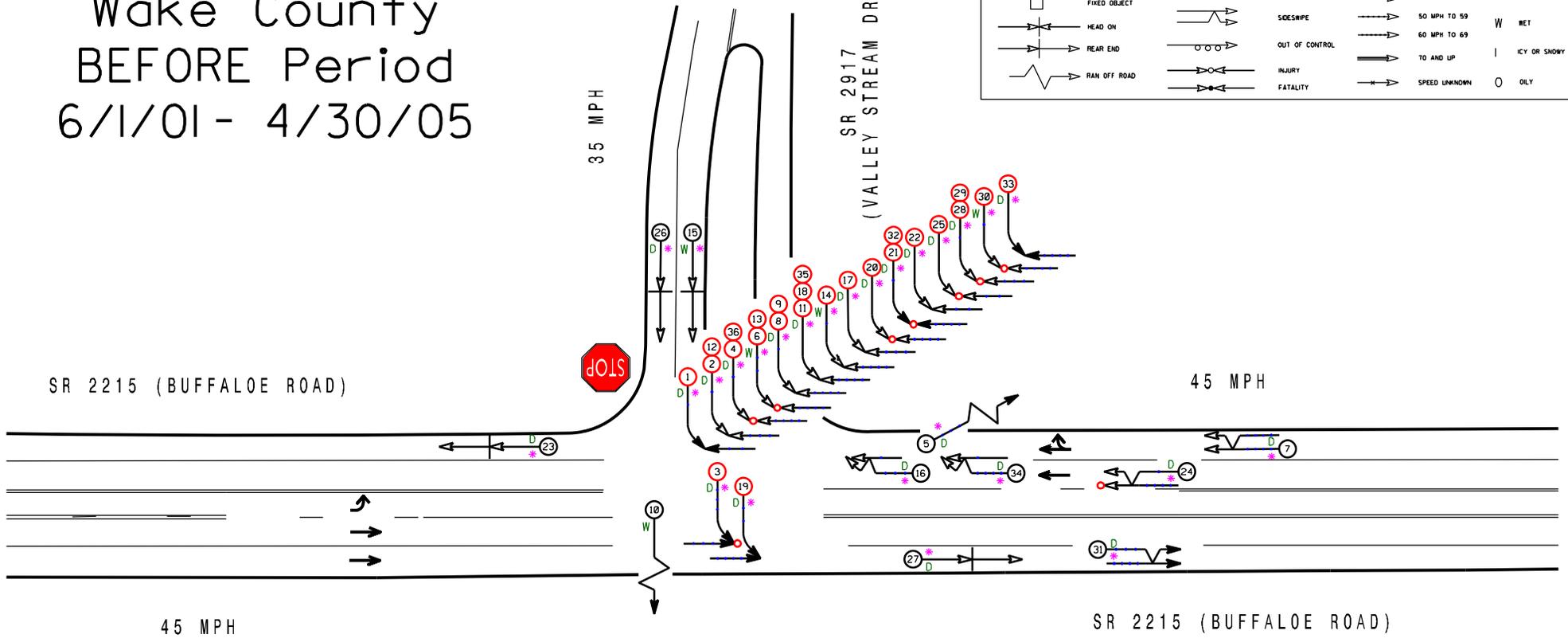
BENEFIT-COST ANALYSIS WORKSHEET - TARGET CRASHES

LOCATION: SR 2215 (Buffaloe Rd) @ SR 2917 (Valley S)		BY: C Neilson						
COUNTY: Wake		DATE: 5/24/2010						
FILE NO.: SS 05-03-220								
DETAILED COST:	TYPE IMPROVEMENT - Signal Installation							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$56,250	10	0.149	\$8,383			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$56,250	10	0.149	\$8,383			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,000			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900			
	TOTAL ANNUAL COST=				\$11,283			
	TOTAL COST OF PROJECT=				\$56,250			
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	3.92	0	0.00	12	3.06	13	3.32	\$75,485
AFTER	3.92	0	0.00	2	0.51	6	1.53	\$16,786
						Annual Benefits from Crash Cost Savings		\$58,699
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$47,416		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	5.20		
TOTAL COST OF PROJECT		-	\$56,250	COMPREHENSIVE B/C RATIO		-	5.20	

SS# 05-03-220
 Order# 41000006192
 Wake County
 BEFORE Period
 6/1/01 - 4/30/05

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		SHOULDER		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		TO AND LIP		SPEED UNKNOWN
	RAN OFF ROAD				SPEED UNKNOWN		ONLY



NOTE: CRASH #10 -
 VEHICLE CAUGHT FIRE BEFORE
 RUNNING OFF ROAD



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

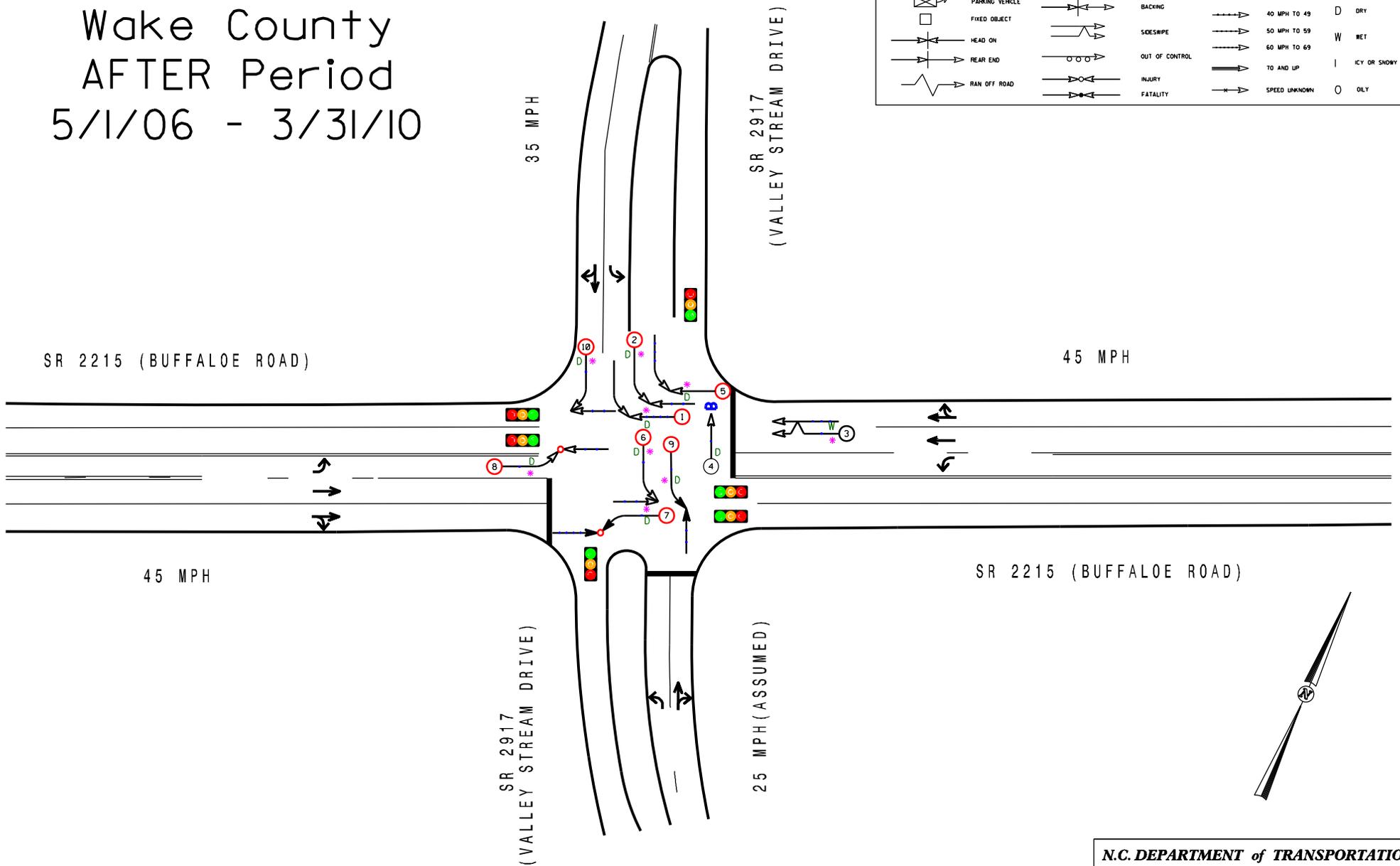
TRAFFIC SAFETY UNIT

Date: 7-16-2010

Prepared By: C Neilson

SS# 05-03-220
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 Wake County
 AFTER Period
 5/1/06 - 3/31/10

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		INJURY		50 MPH TO 59		ICY OR SNOW
	REAR END		FATALITY		60 MPH TO 69		TO AND LIP
	RAN OFF ROAD		SPEED UNKNOWN		9 MPH OR LESS		ONLY



Frontal Impact
Target Crashes

N.C. DEPARTMENT of TRANSPORTATION
 DIVISION of HIGHWAYS
 TRANSPORTATION MOBILITY and
 SAFETY DIVISION
TRAFFIC SAFETY UNIT
 Date: 5-24-2010 Prepared By: C Neilson