

Spot Safety Project Evaluation

Order # 41000009279

Spot Safety Project # 06-04-217

**Spot Safety Project Evaluation of the Overhead Flasher Installation
At the Intersection of US 74 (Andrew Jackson Highway) and
SR 1166 (Cabinet Shop Road) / SR 1354 (Recreation Center Drive)
West of Pembroke, In 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



Chad J. Neilson

11-8-2010

Date

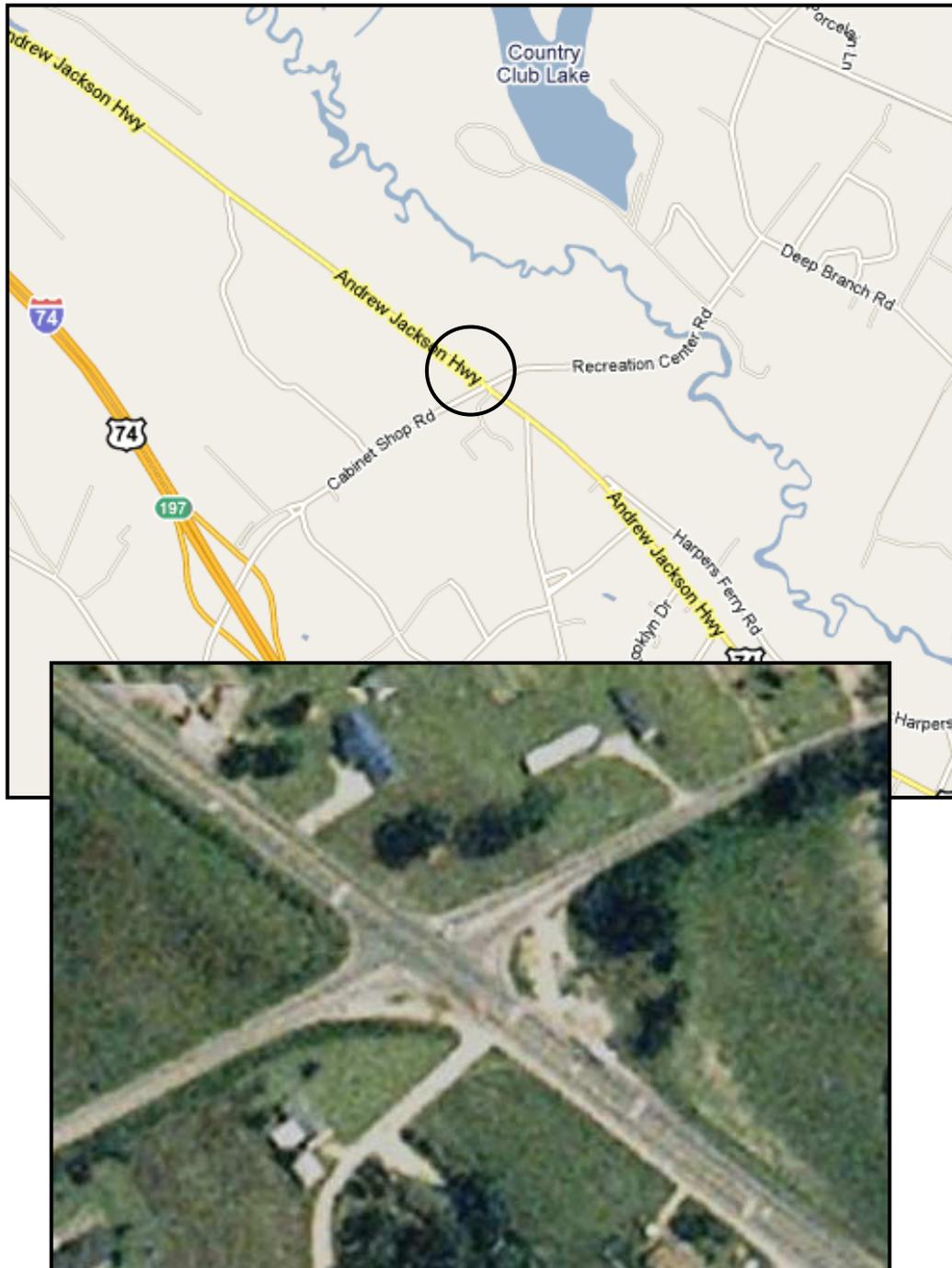
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 06-04-217 located at the intersection of US 74 (Andrew Jackson Highway) and SR 1166 (Cabinet Shop Road) / SR 1354 (Recreation Center Drive) west of Pembroke, Robeson County.

The signal ID for the newly installed flasher signal is 06-0393.



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 signal at the subject location. US 74 (Andrew Jackson Highway) is a two-lane facility with left-turn bays at the subject intersection and a speed limit of 55 mph for both approaches. SR 1166 (Cabinet Shop Road) / SR 1354 (Recreation Center Drive) are both two-lane facilities with a speed limits of 55 mph for both approaches. The subject location is a stop sign controlled four-leg intersection with SR 1166 (Cabinet Shop Road) / SR 1354 (Recreation Center Drive) approaches encountering the stop signs.

The original statement of problem was vehicles traveling on SR 1166 (Cabinet Shop Road) / SR 1354 (Recreation Center Drive) are failing to yield to vehicles on US 74 (Andrew Jackson Highway) causing crashes.

The initial crash analysis was completed from September 1, 1999 to August 31, 2004 with nine (9) reported angle crashes. The final completion date for the improvement at the subject intersection was on February 7, 2006 with a total cost of \$10,000.00.

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 were the months of January 2006 through March 2006. The before period consisted of reported crashes from July 1, 2001 through December 31, 2005 (4 years and 6 months); and the after period consisted of reported crashes from April 1, 2006 through September 30, 2010 (4 years and 6 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	19	11	- 42.11 %
Total Crash Severity Index	16.86	5.71	- 66.13 %
Target Crashes	16	5	- 68.75 %
Target Crash Severity Index	19.38	5.44	- 71.93 %
Volume (2003, 2008)	14,700	14,700	0.00 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	2	0	- 100.00 %
Class A injury Crashes	1	0	- 100.00 %
Class B injury Crashes	4	0	- 100.00 %
Class C Injury Crashes	6	7	16.67 %
Total Injury Crashes	13	7	- 46.15 %

The naive before and after analysis at the treatment location resulted in a fort-two (42) percent decrease in Total Crashes, sixty-eight (68) percent elimination of Target Crashes, and a sixty-six (66) 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 presented a northbound angle crash pattern that consisted of seven (7) target crashes. There was also a southbound angle crash pattern that consisted of five (5) target crashes. After the overhead flasher installation, the northbound crash pattern was reduced to one (1) target crash and the southbound crash pattern was reduced to two (2) target crashes.

The calculated benefit to cost ratio for this project is **194.28 considering total crashes**. The benefit to cost ratio **considering only target crashes is 200.23**. 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 1166 (Cabinet Shop Road)



Looking West on US 74 (Andrew Jackson Highway)



Looking South on SR 1354 (Recreation Center Drive)



Looking East on US 74 (Andrew Jackson Highway)

BENEFIT-COST ANALYSIS WORKSHEET - TOTAL

LOCATION: US 74 (Andrew Jackson Highway) @ SR 1166 / SR 1354		BY: C Neilson						
COUNTY: Robeson		DATE: 11/5/2010						
FILE NO.: SS 06-04-217								
DETAILED COST:	TYPE IMPROVEMENT -	Overhead Flasher Signal						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$10,000	10	0.149	\$1,490			
		\$0	0	0.000	\$0			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$10,000	10	0.149	\$1,490			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$400			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$350			
	TOTAL ANNUAL COST=				\$2,240			
	TOTAL COST OF PROJECT=				\$10,000			
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	4.50	3	0.67	10	2.22	6	1.33	\$470,178
AFTER	4.50	0	0.00	7	1.56	4	0.89	\$34,933
							Annual Benefits from Crash Cost Savings	\$435,244
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST							\$433,004
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST							194.28
	TOTAL COST OF PROJECT	-	\$10,000	COMPREHENSIVE B/C RATIO	-			194.28

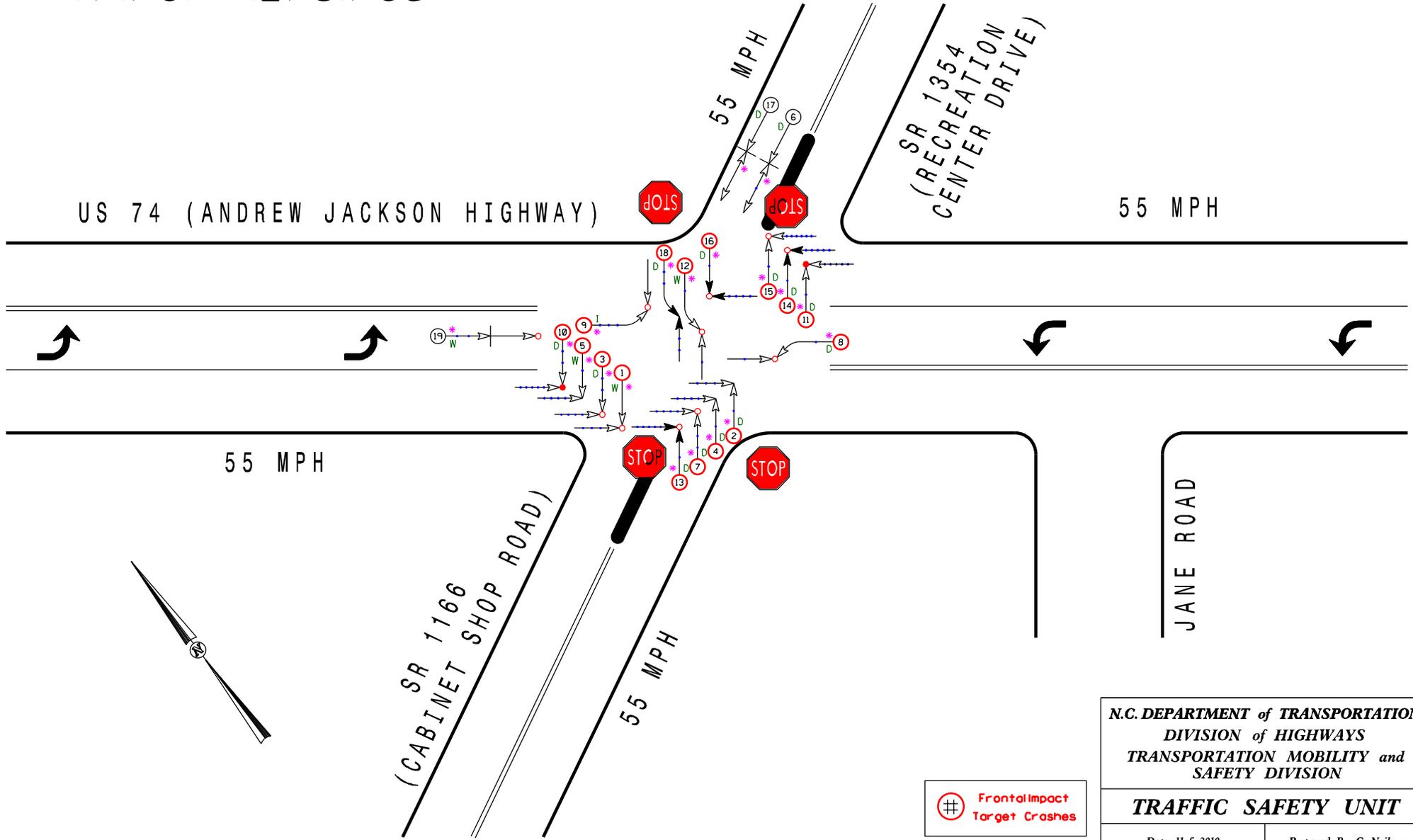
BENEFIT-COST ANALYSIS WORKSHEET - TARGET

LOCATION: US 74 (Andrew Jackson Highway) @ SR 1166 / SR 1354		BY: C Neilson						
COUNTY: Robeson		DATE: 11/5/2010						
FILE NO.: SS 06-04-217								
DETAILED COST:	TYPE IMPROVEMENT -	Overhead Flasher Signal						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$10,000	10	0.149	\$1,490			
		\$0	0	0.000	\$0			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$10,000	10	0.149	\$1,490			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$400			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$350			
	TOTAL ANNUAL COST=				\$2,240			
	TOTAL COST OF PROJECT=				\$10,000			
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	4.50	3	0.67	9	2.00	4	0.89	\$463,822
AFTER	4.50	0	0.00	3	0.67	2	0.44	\$15,244
							Annual Benefits from Crash Cost Savings	\$448,578
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST							\$446,337
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST							200.23
	TOTAL COST OF PROJECT	-	\$10,000	COMPREHENSIVE B/C RATIO	-			200.23

SS# 06-04-217
 Order# 41000009279
 Robeson County
 BEFORE Period
 7/1/01 - 12/31/05

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		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		INJURY		60 MPH TO 69		SPEED UNKNOWN
	RAN OFF ROAD		FATALITY		9 MPH OR LESS		ONLY



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 DIVISION of HIGHWAYS
 TRANSPORTATION MOBILITY and
 SAFETY DIVISION

TRAFFIC SAFETY UNIT

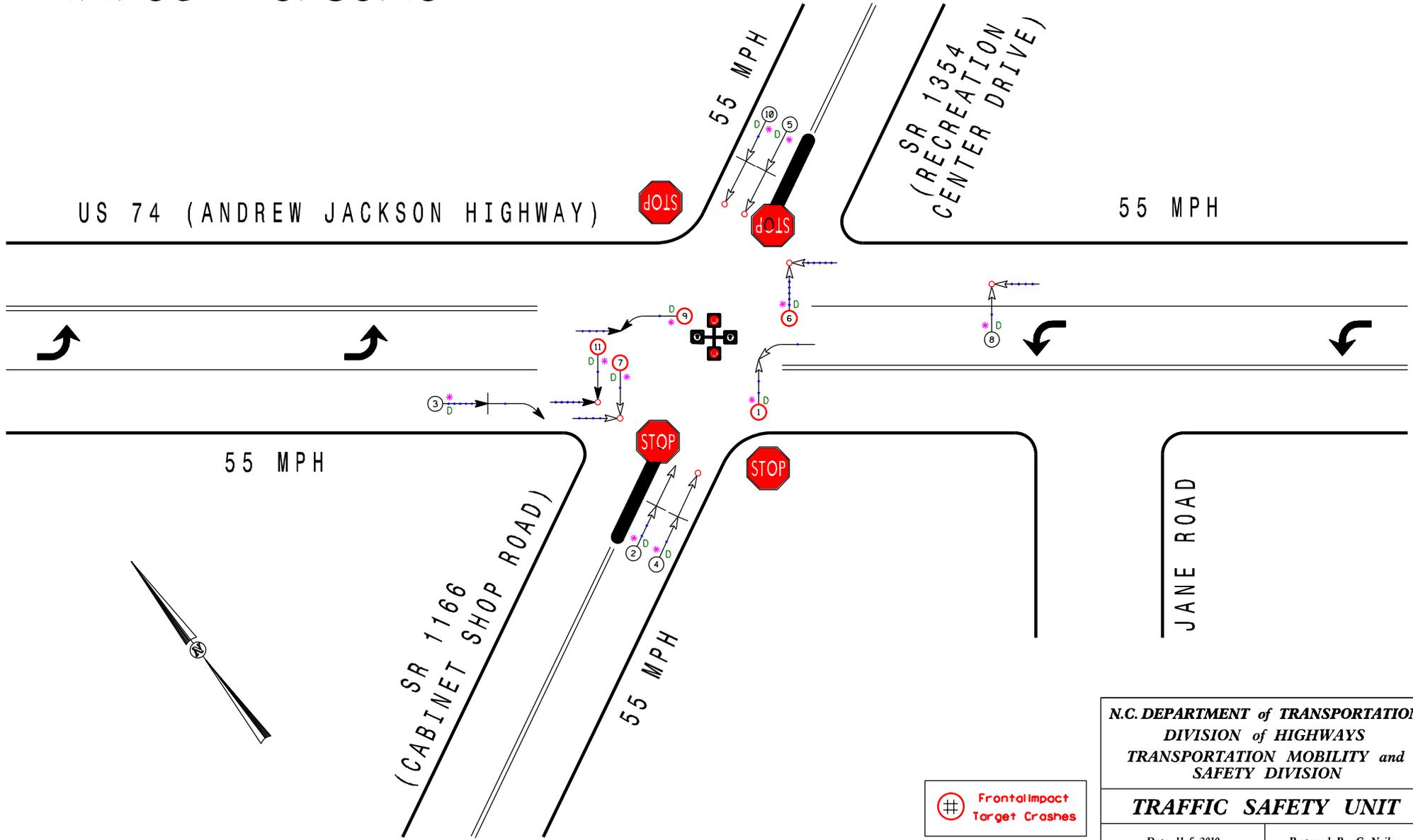
Date: 11-5-2010 Prepared By: C Neilson

Frontal Impact
Target Crashes

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 Robeson County
 AFTER Period
 4/1/06 - 9/30/10

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 SNOWY
	REAR END		FATALITY		60 MPH TO 69		TO AND LIP
	RAN OFF ROAD		SPEED UNKNOWN		70 AND UP		ONLY



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Frontal Impact Target Crashes