

Spot Safety Project Evaluation

Order # 41000004040

Spot Safety Project # 07-99-222

Spot Safety Project Evaluation of the Traffic Signal Installation SR 2133 (Pleasant Ridge Rd) at SR 2190 (Carlson Dairy Rd) Guilford 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

4-26-2010

Date

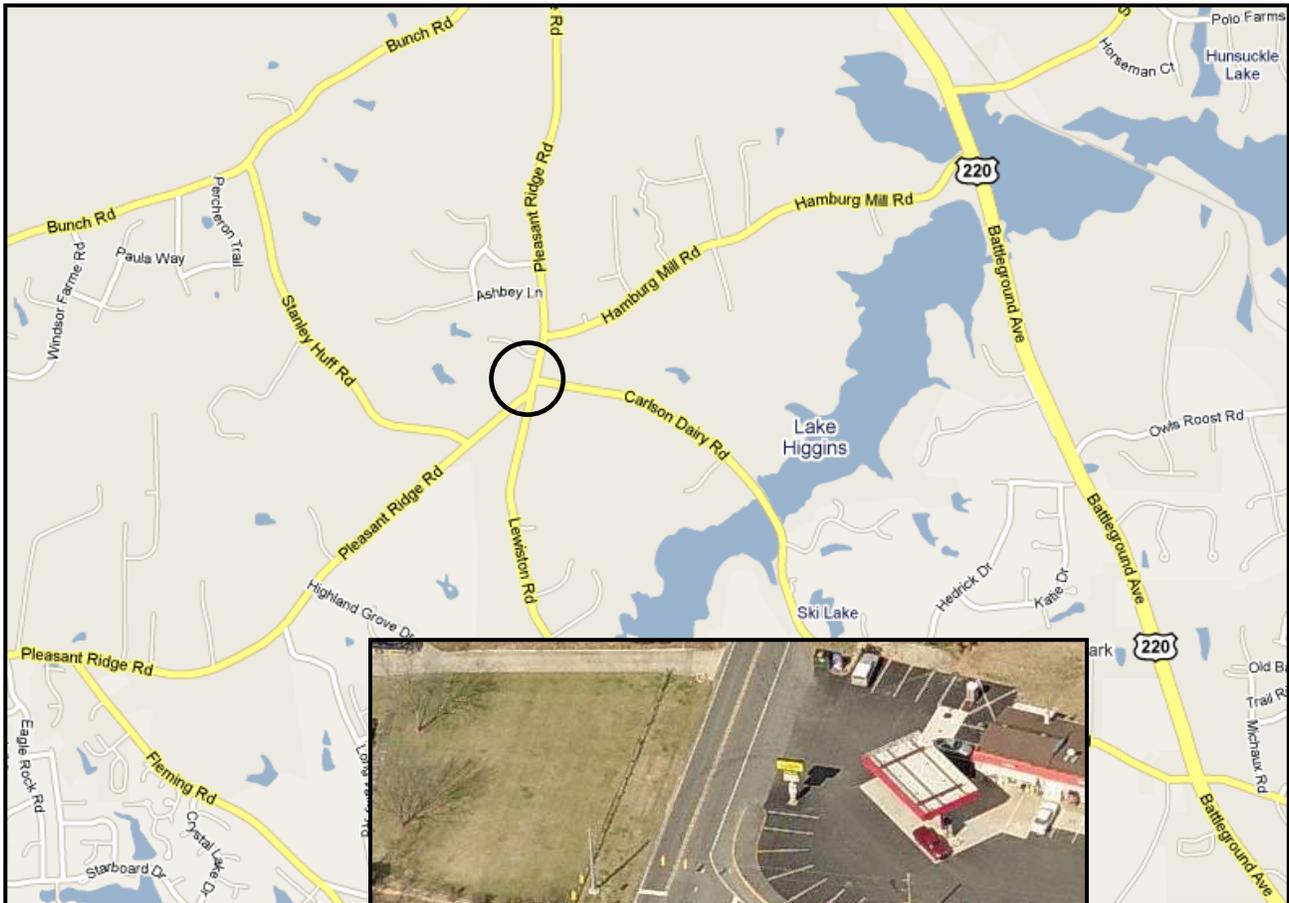
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 07-99-222 located at the Intersection of SR 2133 (Pleasant Ridge Road) and SR 2190 (Carlson Dairy Road) in Guilford County, north of the City of Greensboro, near Lake Higgins.

The Sig ID is 07-0244 for this 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 an intersection traffic signal. SR 2133 (Pleasant Ridge Road) and SR 2190 are both two-lane facilities at the subject intersection with speed limits of 50 mph and 45 mph respectfully. There is a local gas station in the northeast quadrant of the intersection. The subject location is a three-leg intersection, which was controlled by a stop sign on SR 2190 (Carlson Dairy Road) in the before period.

The original statement of problem was the concern that traffic volumes at this location have increased to where motorists cannot maneuver the intersection safely. The intended purpose of the new traffic signal is to alleviate the congestion and delay issues of the intersection.

The initial crash analysis was completed from August 1, 1996 to July 31, 1999 with seven (7) reported crashes, two (2) of which were deemed correctable. The final completion date for the improvement at the subject intersection based on police crash reports was during March or April 2003 with a total cost of \$45,000.

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 March through April 2003. The before period consisted of reported crashes from May 1, 1996 through February 28, 2003 (6 years and 10 months); and the after period consisted of reported crashes from May 1, 2003 through February 28, 2010 (6 years and 10 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	15	9	- 40.0 %
Total Severity Index	4.45	3.47	- 22.0 %
Target Crashes	3	2	- 33.3 %
Target Crash Severity Index	1.00	4.70	200+ %
Volume (1999, 2006)	7,300	10,000	37.0 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	0	N/A
Class B injury Crashes	3	0	- 100.0 %
Class C Injury Crashes	4	3	- 25.0 %
Total Injury Crashes	7	3	- 57.1 %

The naive before and after analysis at the treatment location resulted in a 40 percent decrease in Total Crashes, a 33 percent decrease in Target Crashes, and a 22 percent decrease in the Total Severity Index. The before period ADT year was 1999 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 40 percent decrease in Total Crashes and a 33 percent decrease in Target Crashes. The summary results above demonstrate that both Total and Target Crashes appear to have decreased at the treatment location from the before to the after period.

Referencing the *Collision Diagrams*, the before period presented a small pattern of three (3) frontal impact collisions at the intersection from motorists who improperly accessed SR 2133. After the traffic signal installation, this pattern reduced to two (2) crashes from vehicles running the red light. Since the only injury frontal impact crash occurred in the after period, the target b-c ratio as shown below is a negative value.

The intersection also experienced a slight reduction in southbound SR 2133 rear-end collisions from six (6) in the before period to four (4) after the signal installation. The before period head-on collision north of the intersection was not caused from a southbound vehicle attempting to avoid a rear-end collision; the driver simply lost control.

The calculated benefit to cost ratio for this project is **1.22 considering total crashes**. The benefit to cost ratio **considering only target crashes is (-0.16)**. 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 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



Traveling South on SR 2133 (Pleasant Ridge Rd)



Traveling North on SR 2133 (Pleasant Ridge Rd)



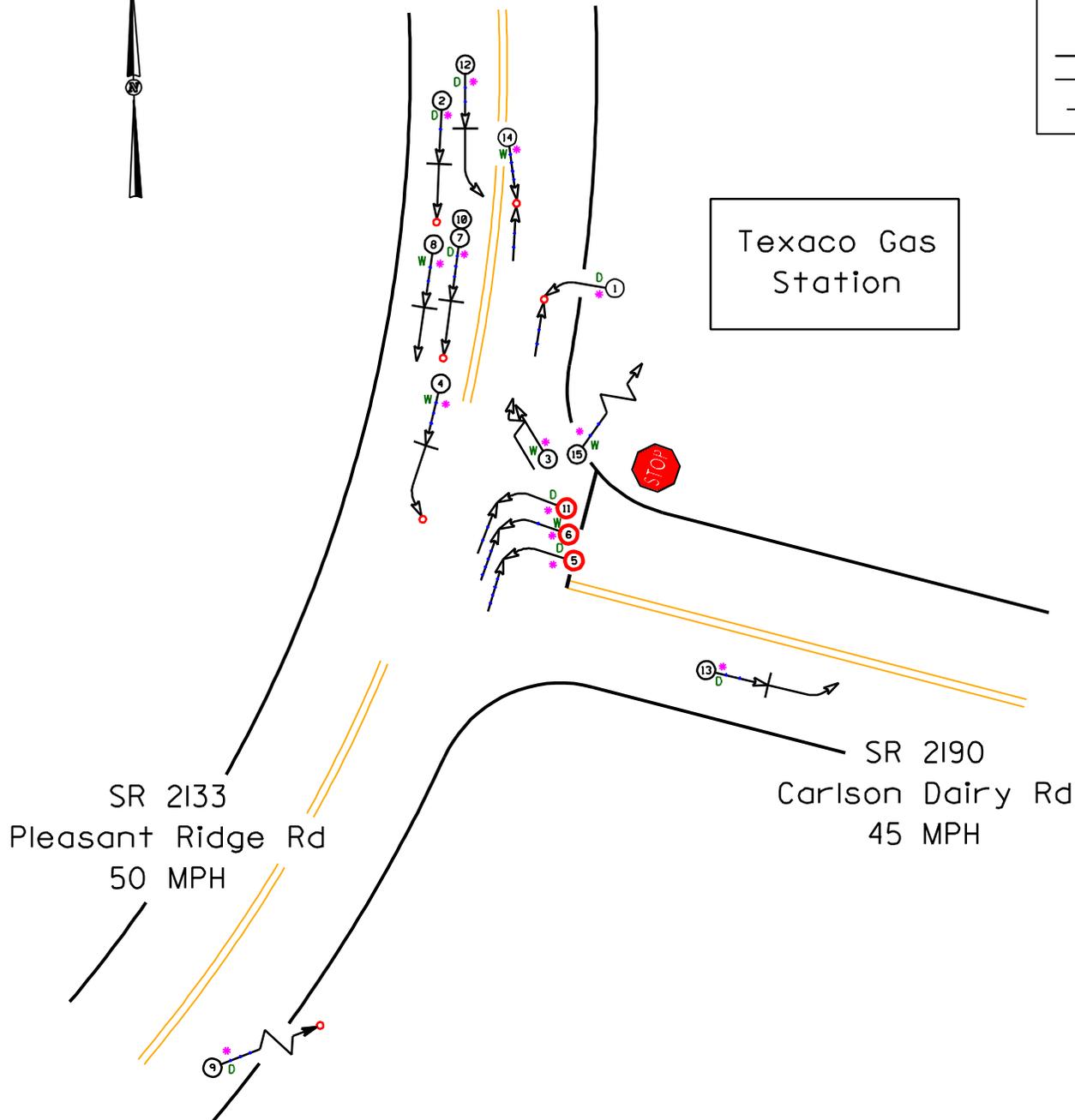
Traveling West on SR 2190 (Carlson Dairy Road)

BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes

LOCATION: SR 2133 at SR 2190		BY: JBS						
COUNTY: Guilford		DATE: 4/21/2010						
FILE NO.: SS 07-99-222		NOTES: Total Crashes						
DETAILED COST:	TYPE IMPROVEMENT - New Traffic Signal							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$45,000	10	0.149	\$6,706			
	Right-of-Way	\$0	0	0.000	\$0			
		\$0	0	0.000	\$0			
	TOTALS	\$45,000	10	0.149	\$6,706			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,000			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900			
	TOTAL ANNUAL COST=				\$9,606			
	TOTAL COST OF PROJECT=				\$45,000			
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	6.83	0	0.00	7	1.02	8	1.17	\$23,016
AFTER	6.83	0	0.00	3	0.44	6	0.88	\$11,332
						Annual Benefits from Crash Cost Savings		\$11,684
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST				=	\$2,077		
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST				=	1.22		
	TOTAL COST OF PROJECT	-	\$45,000	COMPREHENSIVE B/C RATIO	-			1.22

BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes

LOCATION: SR 2133 at SR 2190		BY: JBS						
COUNTY: Guilford		DATE: 4/21/2010						
FILE NO.: SS 07-99-222		NOTES: Target Crashes - Frontal Impact						
DETAILED COST:	TYPE IMPROVEMENT - New Traffic Signal							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$45,000	10	0.149	\$6,706			
	Right-of-Way	\$0	0	0.000	\$0			
		\$0	0	0.000	\$0			
	TOTALS	\$45,000	10	0.149	\$6,706			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,000			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900			
	TOTAL ANNUAL COST=				\$9,606			
	TOTAL COST OF PROJECT=				\$45,000			
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	6.83	0	0.00	0	0.00	3	0.44	\$1,713
AFTER	6.83	0	0.00	1	0.15	1	0.15	\$3,206
						Annual Benefits from Crash Cost Savings		(\$1,493)
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST				=	(\$11,100)		
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST				=	-0.16		
	TOTAL COST OF PROJECT	-	\$45,000	COMPREHENSIVE B/C RATIO	-			-0.16



Texaco Gas Station

SR 2133
Pleasant Ridge Rd
50 MPH

SR 2190
Carlson Dairy Rd
45 MPH

LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAM
	PAKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		D DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		W WET
	HEAD ON		HIT AND RUN		50 MPH TO 59		I ICY OR SNOW
	REAR END		INJURY		60 MPH TO 69		S SPEED UNKNOWN
	RAN OFF ROAD		FATALITY		TO AND UP		O ONLY

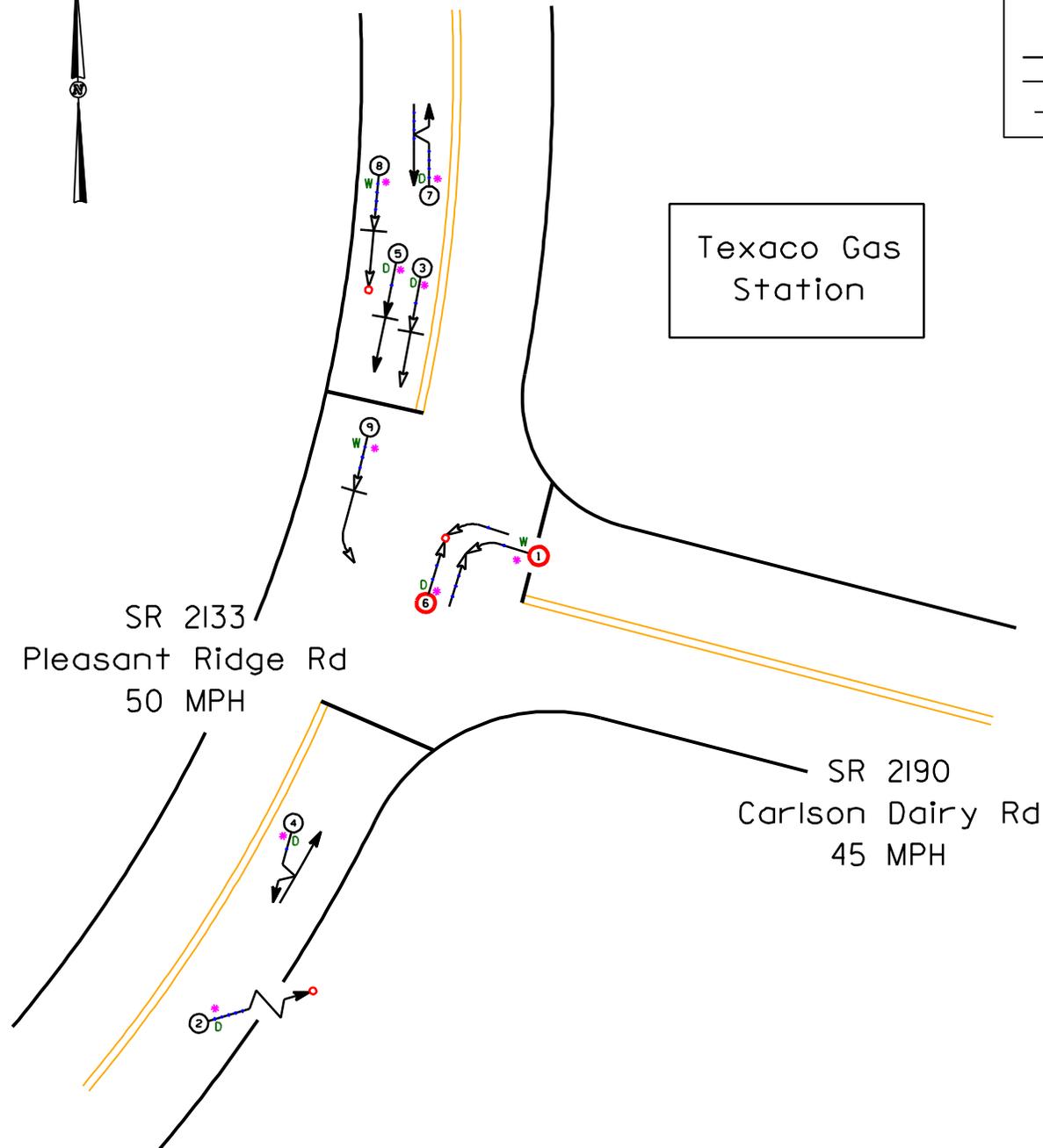
SS# 07-99-222
Guilford County
BEFORE Period
5/1/96 - 2/28/03

Frontal Impact
Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 7	AREA:
	STUDY PERIOD: 5/1/96 - 2/28/2003	
	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: 4-21-2010		
LOG NUMBER: SS* 07-99-222 BEFORE		

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



Texaco Gas Station

SS# 07-99-222
 Guilford County
 AFTER Period
 5/1/03 - 2/28/10



New Signalized Intersection
 Sig ID 07-0244

LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAM
	PAKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		D DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		W WET
	HEAD ON		TO AND UP		50 MPH TO 59		I ICY OR SNOW
	REAR END		INJURY		60 MPH TO 69		F FATALITY
	RAN OFF ROAD		SPEED UNKNOWN		9 MPH OR LESS		O ONLY

Frontal Impact Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 7	AREA:
	STUDY PERIOD: 5/1/2003 - 2/28/2010	
	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: 4-21-2010		
LOG NUMBER: SS* 07-99-222 AFTER		

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