

Spot Safety Project Evaluation

Order # 41000004915
Project Log# 200901017

Spot Safety Project # 07-02-241

**Spot Safety Project Evaluation of the Traffic Signal Installation
SR 2182 (Horse Pen Creek Road) at Drawbridge Parkway
Guilford County, City of Greensboro**

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

3-5-2010
Date

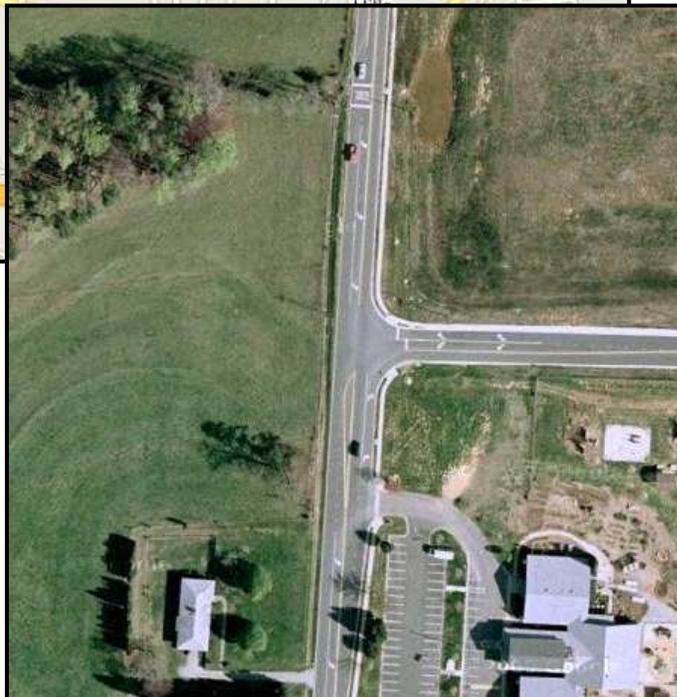
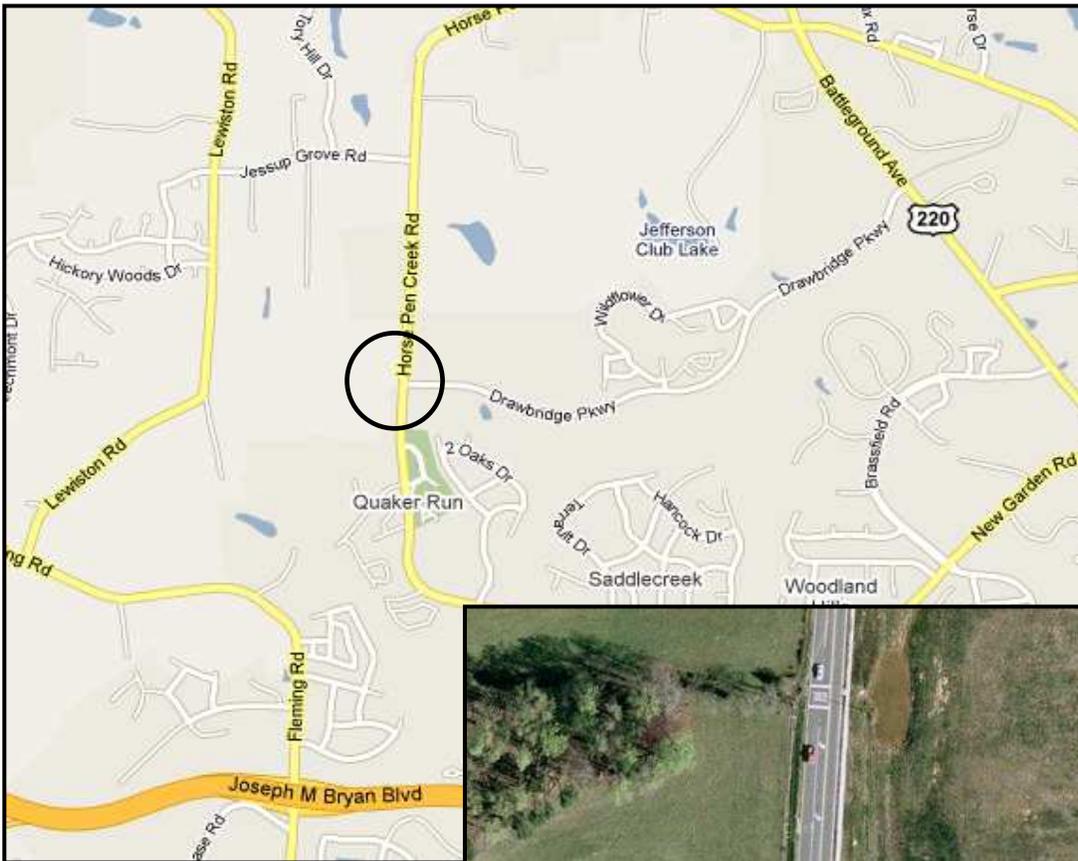
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 07-02-241 located at the Intersection of SR 2182 (Horse Pen Creek Road) and Drawbridge Parkway in Guilford County, City of Greensboro.

The Sig ID is 07-2045 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 2182 and Drawbridge Parkway are both two-lane facilities near the subject intersection with speed limits of 45 mph and 35 respectively. SR 2182 (Horse Pen Creek Rd) widens to provide a southbound left turn lane and a northbound right turn lane. Drawbridge Parkway also provides a left turn lane at the intersection. The subject location is a three-leg intersection, which was formally controlled by a stop sign on Drawbridge Parkway.

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

The initial crash analysis was completed from August 1, 1999 to July 31, 2002 with one (1) reported crash. The final completion date for the improvement at the subject intersection was on December 23, 2003 with a total cost of \$25,150.

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 December 2003 through January 2004. The before period consisted of reported crashes from March 1, 2001 through November 30, 2003 (2 years and 9 months); and the after period consisted of reported crashes from February 1, 2004 through December 31, 2009 (5 years and 11 months). The ending date for this analysis was determined by the date of available crash data at the time of analysis and the before period was limited by installation of the intersection.

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 2.75 Years	After 5.92 Years	Percent Reduction (-) Percent Increase (+)
Total Crashes	3	4	
Total Crashes per Year	1.09	0.68	- 37.6 %
Total Severity Index	1.00	4.70	100+ %
Target Crashes	1	1	
Target Crashes per Year	0.36	0.17	- 52.8 %
Target Crash Severity Index	1.00	8.40	100+ %
Volume	7,200	11,900	65.3 %

<u>Injury Crash Summary</u>	Before 2.75 Yrs	After 5.92 Yrs	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	0	N/A
Class B injury Crashes	0	0	N/A
Class C Injury Crashes	0	2	100.0 %
Total Injury Crashes	0	2	100.0 %
Total Injury Crashes per Year	0.00	0.34	100.0 %

The naive before and after analysis at the treatment location resulted in a 38 percent decrease in Total Crashes per year, a 53 percent decrease in Target Crashes per year, but over a 100 percent increase in the Total Severity Index. The before period ADT year was 2002 and the after period ADT year was 2007.

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 38 percent decrease in Total Crashes per year and a 53 percent decrease in Target Crashes per year. The summary results above demonstrate that both Total and Target Crashes per year appear to have decreased at the treatment location from the before to the after period.

Referencing the *Collision Diagrams*, the intersection saw a reduction in crashes per year through the analysis from 1.09 to 0.68. This location has no crash patterns to mention since the signal was installed to alleviate the congestion and delay issue. Multiple schools, residential houses, and a retirement community are located in a close proximity to the intersection. The project resulted in a negative benefit-cost ratio, as seen below, due to the rise in injury crashes per year from 0.0 in the before period to 0.34 during the after period.

The calculated benefit to cost ratio for this project is **(-0.46) considering total crashes**. The benefit to cost ratio **considering only target crashes is (-0.24)**. 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 the SR 2182 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 2182 (Horse Pen Creek Road)



Looking North on SR 2182 towards Drawbridge



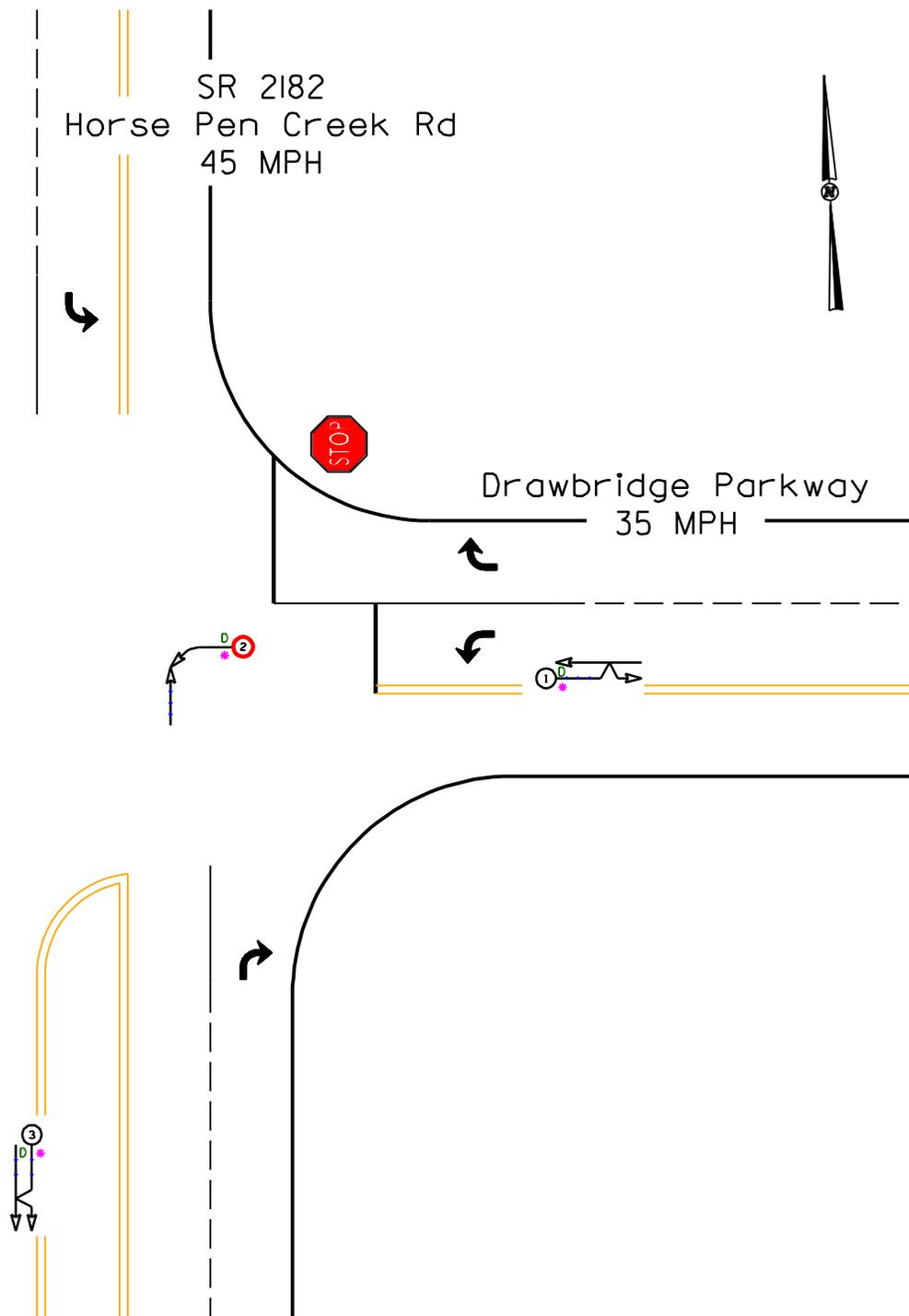
Looking East down Drawbridge Parkway

BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes

LOCATION: Horse Pen Creek at Drawbridge		BY: JBS						
COUNTY: Guilford		DATE: 3/5/2010						
FILE NO.: SS 07-02-241		NOTES: Total Crashes						
DETAILED COST:	TYPE IMPROVEMENT - New Signal							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$25,150	10	0.149	\$3,748			
		\$0	0	0.000	\$0			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$25,150	10	0.149	\$3,748			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,200			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900			
	TOTAL ANNUAL COST=				\$6,848			
	TOTAL COST OF PROJECT=				\$25,150			
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	2.75	0	0.00	0	0.00	3	1.09	\$4,255
AFTER	5.92	0	0.00	2	0.34	2	0.34	\$7,399
						Annual Benefits from Crash Cost Savings		(\$3,144)
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	(\$9,992)		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	-0.46		
TOTAL COST OF PROJECT		-	\$25,150	COMPREHENSIVE B/C RATIO		-		-0.46

BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes

LOCATION: SR 2182 at Drawbridge		BY: JBS						
COUNTY: Guilford		DATE: 3/5/2010						
FILE NO.: SS 07-02-241		NOTES: Target Crashes - Frontal Impact						
DETAILED COST:	TYPE IMPROVEMENT - New Traffic Signal							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$25,150	10	0.149	\$3,748			
		\$0	0	0.000	\$0			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$25,150	10	0.149	\$3,748			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,000			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900			
	TOTAL ANNUAL COST=				\$6,648			
	TOTAL COST OF PROJECT=				\$25,150			
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	2.75	0	0.00	0	0.00	1	0.36	\$1,418
AFTER	5.92	0	0.00	1	0.17	0	0.00	\$3,041
						Annual Benefits from Crash Cost Savings		(\$1,622)
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	(\$8,270)		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	-0.24		
TOTAL COST OF PROJECT		-	\$25,150	COMPREHENSIVE B/C RATIO		-		-0.24



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		SKIDSLOPE		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		TO AND UP		50 MPH TO 59		ICY OR SNOW
	REAR END		FATALITY		60 MPH TO 69		SPEED UNKNOWN
	RAN OFF ROAD		HURRY		70 MPH TO 79		ONLY

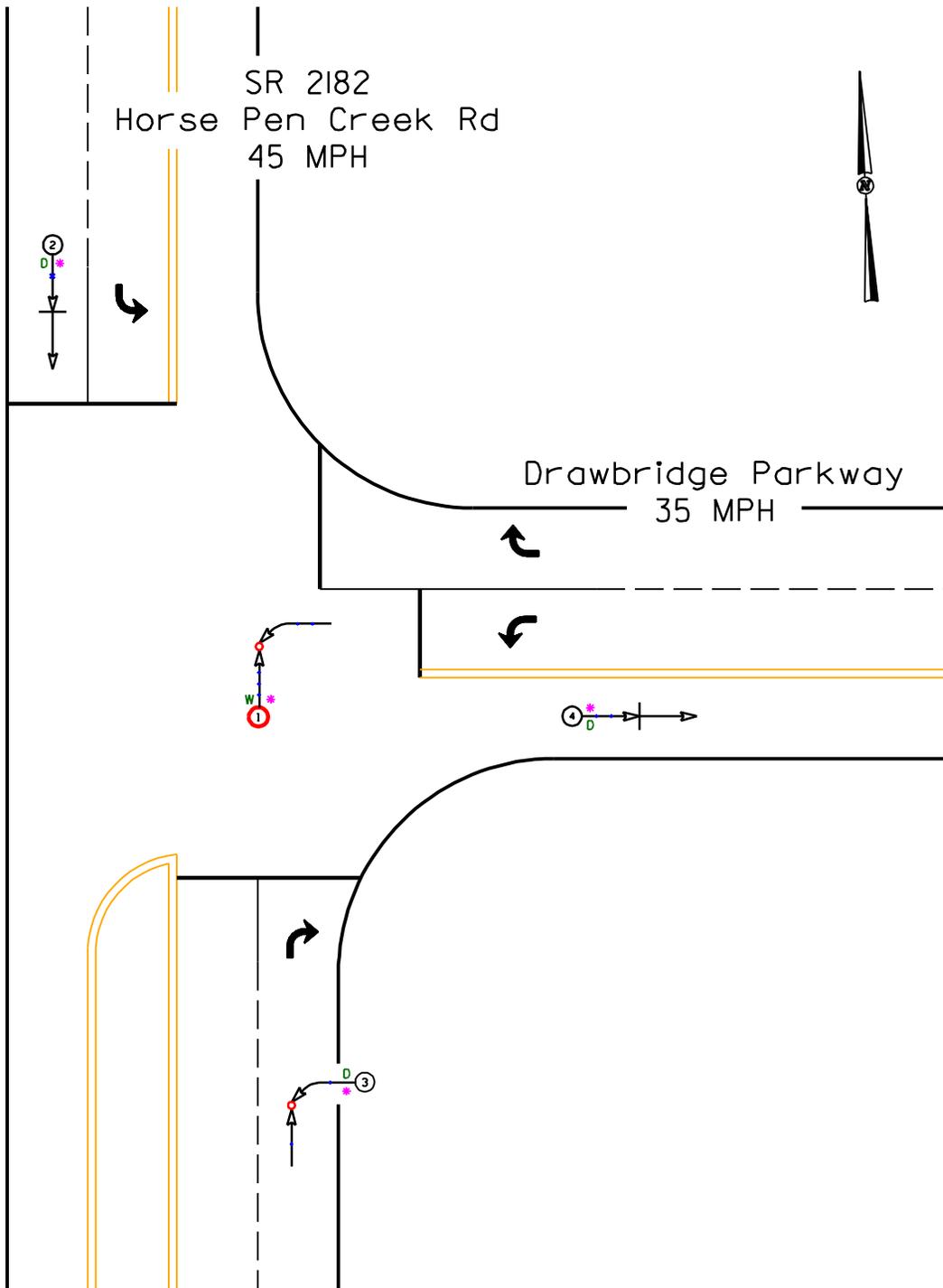
SS# 07-02-241
 Guilford County
 City of Greensboro
 BEFORE Period
 3/1/01 - 11/30/03
 2.75 Years

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 7	AREA:
	STUDY PERIOD: 3/1/2001 - 11/30/2003	
	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: 3-4-2004		
LOG NUMBER: SS* 07-02-241 BEFORE		

Frontal Impact Target Crashes

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



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		SKIDSHIPE		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		HURRY		60 MPH TO 69		S SPEED UNKNOWN
	RAN OFF ROAD		FATALITY		70 MPH OR MORE		O ONLY

SS# 07-02-241
 Guilford County
 City of Greensboro
 AFTER Period
 2/1/04 - 12/31/09
 5.92 Years



New Signalized
 Intersection
 Sig ID 07-2045

Frontal Impact
 Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 7	AREA:
STUDY PERIOD: 2/1/2004 - 12/31/2009		
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: 3-4-2010		
LOG NUMBER: SS* 07-02-241 AFTER		

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