

Spot Safety Project Evaluation

Project Log # 200704294

Spot Safety Project # 07-99-205

Spot Safety Project Evaluation of the Traffic Signal Installation and Realignment at the Intersection of SR 3006 (Franklin Blvd) and Besemmer Ave at SR 3163 (Burlington Rd) Guilford County

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

Brad Robinson, EI

10/9/2008
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 07-99-205 – The Intersection of SR 3006 (Franklin Blvd) and Bessemer Ave at SR 3163 (Burlington Rd) in Guilford County.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasures chosen for the subject location was the installation of a traffic signal with railroad preemption and the realignment of SR 3006 (Franklin Blvd). The subject intersection is a 4 leg intersection that was originally controlled by stop signs on SR 3006 (Franklin Blvd) and Bessemer Ave. Bessemer Ave intersects SR 3163 (Burlington Rd) at a skew and was offset from SR 3006 (Franklin Blvd) in the before period. SR 3006 was realigned as part of the project so that the thru lane, left turn lane, and receiving lane were aligned with Bessemer Ave. A right turn slip-lane was left in place at the old alignment. Eastbound SR 3163 (Burlington Rd) had a right turn lane and westbound SR 3163 had a left turn lane at the intersection in both the before and after periods.

The original statement of problem was that vehicles could not safely enter the intersection due to insufficient gaps in traffic. The original investigation was conducted at the request of a local neighborhood group in Greensboro.

The initial crash analysis was conducted from January 1, 1996 to December 31, 1998 with a total of 14 crashes, all of which were considered correctable by the chosen countermeasures. The final completion date for the improvements at the subject intersection was on October 4, 2002 with a total cost of \$50,000.00.

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 was from August 1, 2002 to November 30, 2002. The before period consisted of reported crashes from December 1, 1996 through July 31, 2002 (5 years, 8 months) and the after period consisted of reported crashes from December 1, 2002 through July 31, 2008 (5 years, 8 months). The ending date for this analysis was determined by the available crash data at the time the analysis was completed.

The treatment data consisted of all reported crashes within 150 feet of the subject intersection.

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	34	24	-29.4
Total Severity Index	5.84	6.01	2.9
Target Crashes	25	12	-52.0
Target Crash Severity Index	7.29	3.47	-52.4
Volume	8,000	7,900	-1.3
<u>Crash Severity Summary</u>			
Fatal Crashes	0	1	N/A
Class A Crashes	1	0	-100.0
Class B Crashes	5	1	-80.0
Class C Crashes	7	5	-28.6
PDO Crashes	21	17	-19.0

The naive before and after analysis at the treatment location resulted in a 29 percent decrease in Total Crashes, a 52 percent decrease in Target Crashes, and a 1 percent decrease in Average Daily Traffic (ADT). The before period ADT year was 1999 and the after period ADT year was 2005.

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 29 percent decrease in Total Crashes and a 52 percent decrease in Target Crashes. The Total Severity Index increased by 3 percent and the Target Crash Severity Index decreased by 52 percent. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have decreased from the before to the after period at the treatment location.

The calculated benefit to cost ratio for this project is 2.14 considering total crashes. The benefit to cost ratio considering only target crashes is 11.21. 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.

Referencing the *Collision Diagrams* and the above table, it is apparent that the installation of the signal was effective in reducing Frontal Impact Crashes at the intersection. In the before period there was a pattern of 20 crashes between vehicles from northbound SR 3006 and vehicles traveling on SR 3163. There were only two crashes of this type in the after period.

Two smaller crash patterns developed in the after period. The first is Angle Crashes between southbound Bessemer Ave vehicles and eastbound SR 3163 crashes. The other were Left Turn-Different Roadway crashes involving left turning vehicles from Bessemer Rd. There were four of

each of these patterns in the after period and none in the before period. These increases might be due to the realignment changing the crossing patterns of vehicles in the 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 roadway.

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 3006/Bessemer at SR 3163
 COUNTY: Guilford
 FILE NO.: SS 07-99-205

BY: BDR
 DATE: 10/7/2008

DETAILED COST: TYPE IMPROVEMENT - Signal and Realignment

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$50,000	10	0.149	\$7,451
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$50,000	10	0.149	\$7,451

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$2,400
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$900
 TOTAL ANNUAL COST= \$10,751
 TOTAL COST OF PROJECT= \$50,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES				PDO		ANNUAL COSTS
		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	CRASHES	CRASHES PER YR	
BEFORE	5.67	1	0.18	12	2.12	21	3.70	\$148,871
AFTER	5.67	1	0.18	6	1.06	17	3.00	\$125,873

Annual Benefits from Crash Cost Savings \$22,998

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$12,247

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 2.14

TOTAL COST OF PROJECT - \$50,000 COMPREHENSIVE B/C RATIO - 2.14

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 3006/Bessemer at SR 3163
 COUNTY: Guilford
 FILE NO.: SS 07-99-205 Target Crashes

BY: BDR
 DATE: 10/7/2008

DETAILED COST: TYPE IMPROVEMENT - Signal and Realignment

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$50,000	10	0.149	\$7,451
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$50,000	10	0.149	\$7,451

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$2,400
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$900
 TOTAL ANNUAL COST= \$10,751
 TOTAL COST OF PROJECT= \$50,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES				PDO		ANNUAL COSTS
		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	CRASHES	CRASHES PER YR	
BEFORE	5.67	1	0.18	11	1.94	13	2.29	\$139,735
AFTER	5.67	0	0.00	4	0.71	8	1.41	\$19,189

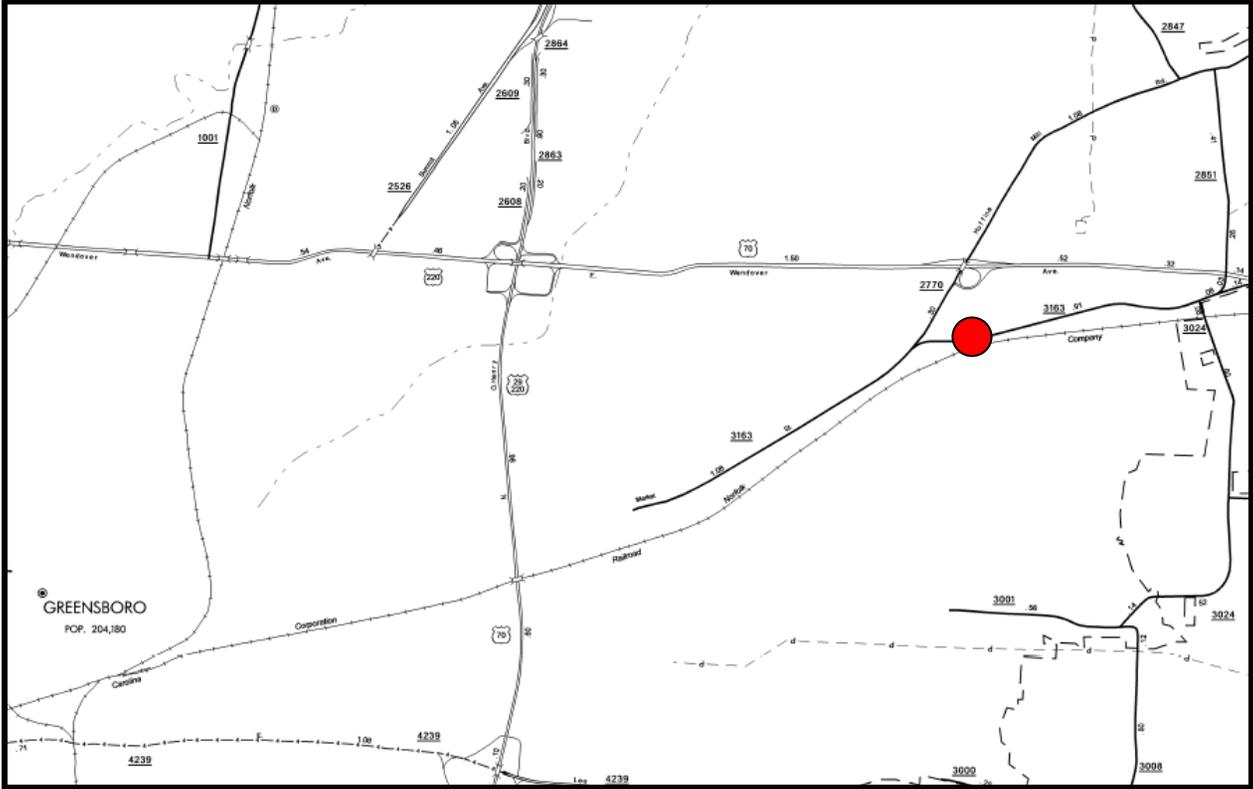
Annual Benefits from Crash Cost Savings \$120,547

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$109,795

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 11.21

TOTAL COST OF PROJECT - \$50,000 COMPREHENSIVE B/C RATIO - 11.21

Location Map
Guilford County
Evaluation of Spot Safety Project #07-99-205



Treatment Location: SR 3163 (Burlington Rd) at SR 3006* (Franklin Rd) and Bessemer Av
**Franklin Rd is no longer a state maintained Rd*

Treatment Site Photos Taken February 18, 2008



Traveling East on SR 3163 (Burlington Rd)



Looking West on SR 3163 (Burlington Rd)



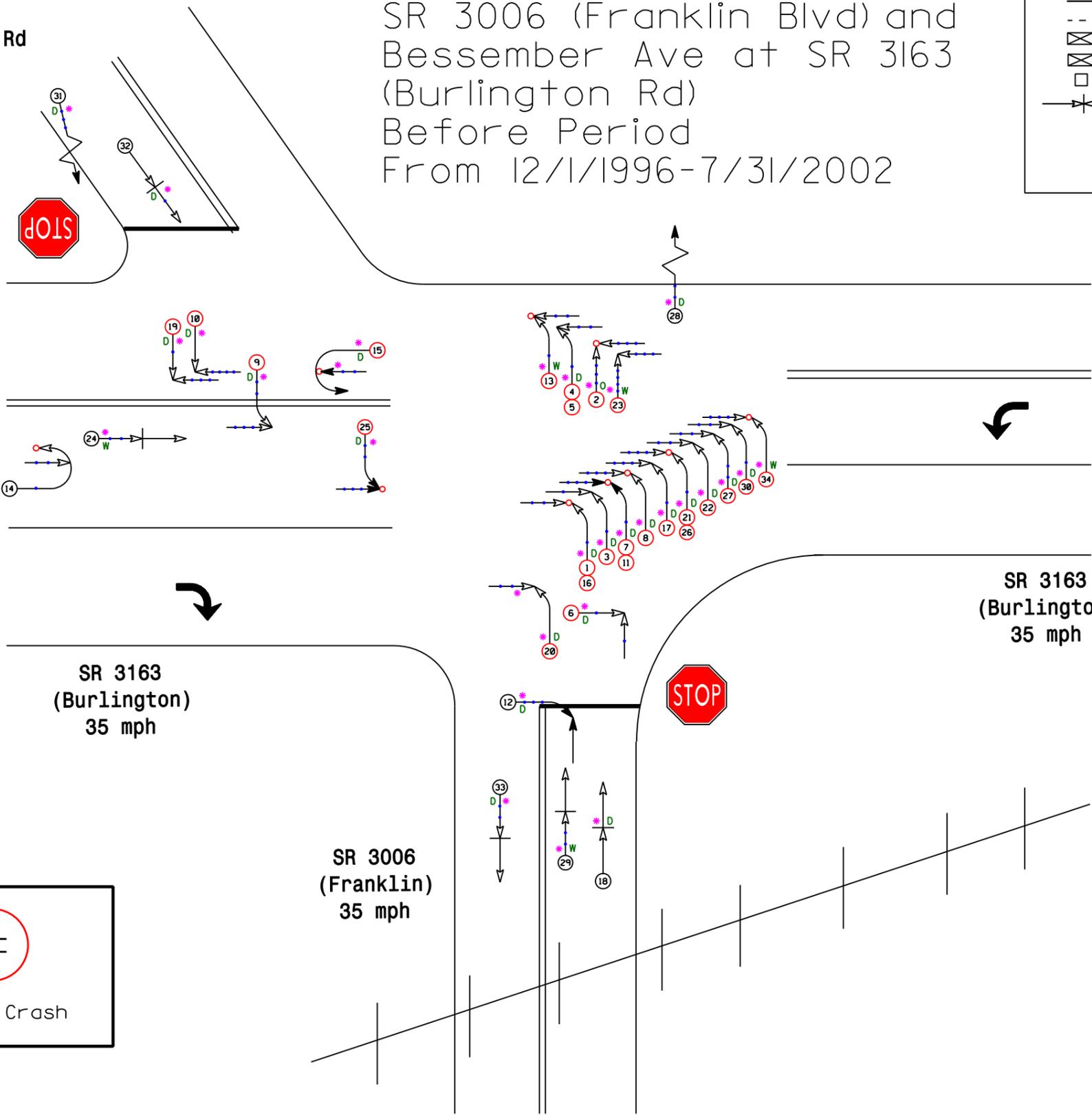
Traveling North on SR 3006 (Franklin Rd)



Traveling South on Bessemer

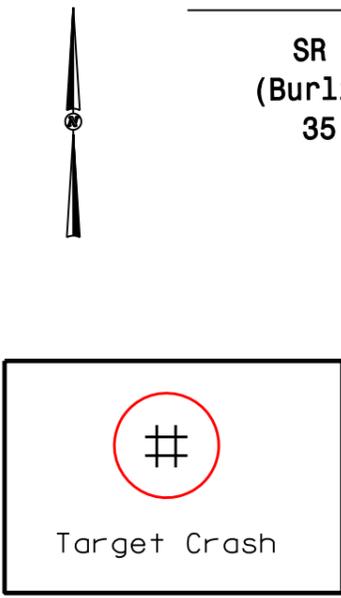
Guilford County
 SR 3006 (Franklin Blvd) and
 Bessemer Ave at SR 3163
 (Burlington Rd)
 Before Period
 From 12/1/1996-7/31/2002

Bessemer Rd
 35 mph



LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		BICYCLE
	PARKED VEHICLE		BACKING		20 MPH TO 29		TRAIN
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		ANIMAL
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		DRIVER AT FAULT
	HEAD ON		INJURY		50 MPH TO 59		DRY
	REAR END		FATALITY		60 MPH TO 69		WET
	RAN OFF ROAD		DARK CRASH		70 AND UP		ICY OR SNOWY



SR 3163
 (Burlington)
 35 mph

SR 3163
 (Burlington)
 35 mph

SR 3006
 (Franklin)
 35 mph

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT <small>HIGHWAY SAFETY IMPROVEMENT PROGRAM</small>		COLLISION DIAGRAM <small>SAFETY INFORMATION MANAGEMENT AND SUPPORT</small>	
		DIVISION: I	AREA: ..
		STUDY PERIOD: 12/1/1996 TO 7/31/2002	DISTANCE: Y-LINE: 150 FT
SAFETY EVALUATION		TRAFFIC SAFETY	
BEFORE		SCALE: NOT TO SCALE	DATE: October_2008
		LOG NUMBER: 200704294	
N.C. DEPARTMENT of TRANSPORTATION DIVISION of HIGHWAYS TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH			

Guilford County
 SR 3006 (Franklin Blvd) and
 Bessemer Ave at SR 3163
 (Burlington Rd)
 After Period
 From 12/1/2002-7/31/2008

LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		BICYCLE
	PARKED VEHICLE		BACKING		20 MPH TO 29		TRAIN
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		ANIMAL
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		DRIVER AT FAULT
	HEAD ON		INJURY		50 MPH TO 59		DRY
	REAR END		FATALITY		60 MPH TO 69		WET
	RAN OFF ROAD				70 AND UP		
					SPEED UNKNOWN		
					DAYLIGHT CRASH		

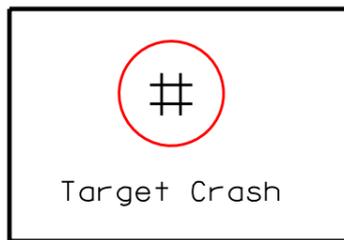
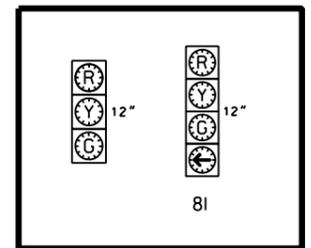
Bessemer Rd
35 mph

SR 3163
(Burlington)
35 mph

SR 3163
(Burlington)
35 mph

SR 3006
(Franklin)
35 mph

Note: Vehicle was traveling at an excessive speed
and jumped the railroad tracks.



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT		COLLISION DIAGRAM	
<small>HIGHWAY SAFETY IMPROVEMENT PROGRAM</small>	<small>SAFETY INFORMATION MANAGEMENT AND SUPPORT</small>	DIVISION: I	AREA: ..
		STUDY PERIOD: 12/1/2002 TO 7/31/2008	
		DISTANCE: Y-LINE: 150 FT	
		ANALYSIS PREPARED BY: G. Robiosoo	
		DIAGRAM PREPARED BY: G. Robiosoo	
		DIAGRAM REVIEWED BY:	
SAFETY EVALUATION		SCALE: NOT TO SCALE	
AEIER		DATE: October 2008	
		LOG NUMBER: 200704294	

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH