

Spot Safety Project Evaluation

Project Log # 200703089

Spot Safety Project # 03-99-213

**Spot Safety Project Evaluation of the Installation of a Traffic Signal at the Intersection of
SR 1302 (23rd St) at SR 1318/1319 (Blue Clay Rd/Gordon Rd)
New Hanover 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

6/16/2008
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 03-99-213 – The Intersection of SR 1302 (23rd St) and SR 1318/1399 (Blue Clay Rd/Gordon Rd) in New Hanover County.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was to install a two-phase traffic signal with railroad pre-emption. The subject location is a four-leg intersection which was controlled by stop signs on SR 1318/1399 (Blue Clay Rd/Gordon Rd) in the before period. All approaches to the intersection are single lane, with SR 1302 having a speed limit of 45 mph, and SR 1318/SR 1399 having speed limits of 55mph and 35 mph, respectively.

The original statement of problem was that there was a pattern of Angle and Left Turn Crashes resulting from motorists being unable to safely enter SR 1302. The original investigation revealed that the intersection met signal warrants 1, 2, 8, 9, and 11.

The initial crash analysis was conducted from March 1, 1996 to February 28, 1999 with a total of 33 crashes, 22 of which were considered correctable by the chosen countermeasure. The final completion date for the improvements at the subject intersection was on January 8, 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 November 1, 2001 to February 28, 2002. The before period consisted of reported crashes from March 1, 1996 through October 31, 2001 (5 years and 8 months) and the after period consisted of reported crashes from March 1, 2002 through October 31, 2007 (5 years and 8 months). The ending date for this analysis was limited 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 crash types were the Target Crashes for the applied countermeasure. These crash types considered are as follows: Left Turn, same roadway; Left Turn, different roadway; Right Turn, same roadway; Right Turn, different roadway; Head On and Angle. The target crashes are clearly identified in the before and after period collision diagrams.

Treatment Information			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	58	19	-67.2
Total Severity Index	4.7	4.89	4.0
Target Crashes	44	11	-75.0
Target Crash Severity Index	4.87	5.04	3.5
Volume	13,900	17,800	28.1
Crash Severity Summary			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	5	3	-40.0
Class C Crashes	24	7	-70.8
PDO Crashes	29	9	-69.0

The naive before and after analysis at the treatment location resulted in a 67 percent decrease in Total Crashes, a 75 percent decrease in Target Crashes, and a 28 percent increase in Average Daily Traffic (ADT). The before period ADT year was 1998 and the after period ADT year was 2004.

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 67 percent decrease in Total Crashes and a 75 percent decrease in Target Crashes. The Total Severity Index increased by 4 percent and the Target Crash Severity Index also increased by 4 percent. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have decreased at the treatment location from the before to the after period.

The calculated benefit to cost ratio for this project is 7.55 considering total crashes. The benefit to cost ratio considering only target crashes is 6.62. 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*, it is apparent that the signal installation helped to significantly reduce Target Crashes at the subject intersection. In the before period there were large patterns of Angle and Left Turn-Different Roadway Crashes between all four approaches. In the after period all of these patterns were reduced, most significantly between south-eastbound SR 1302 (23rd St) vehicles and south-westbound SR 1318 (Blue Clay Rd) which was reduced 94 percent (from 18 to 1).

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.

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1302 at SR 1318
 COUNTY: New Hanover
 FILE NO.: SS 03-99-213

BY: Brad Robinson
 DATE: 6/6/2008

DETAILED COST: TYPE IMPROVEMENT - Signal

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 = \$2,000
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$900
 TOTAL ANNUAL COST= \$10,351
 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	0	0.00	29	5.11	29	5.11	\$118,148
AFTER	5.67	0	0.00	10	1.76	9	1.59	\$40,018

Annual Benefits from Crash Cost Savings \$78,131

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$67,779

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 7.55

TOTAL COST OF PROJECT - \$50,000 COMPREHENSIVE B/C RATIO - 7.55

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1302 at SR 1318
 COUNTY: New Hanover
 FILE NO.: SS 03-99-223 Target Crashes

BY: Brad Robinson
 DATE: 6/6/2008

DETAILED COST: TYPE IMPROVEMENT - Signal

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 = \$2,000
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$900
 TOTAL ANNUAL COST= \$10,351
 TOTAL COST OF PROJECT= \$50,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

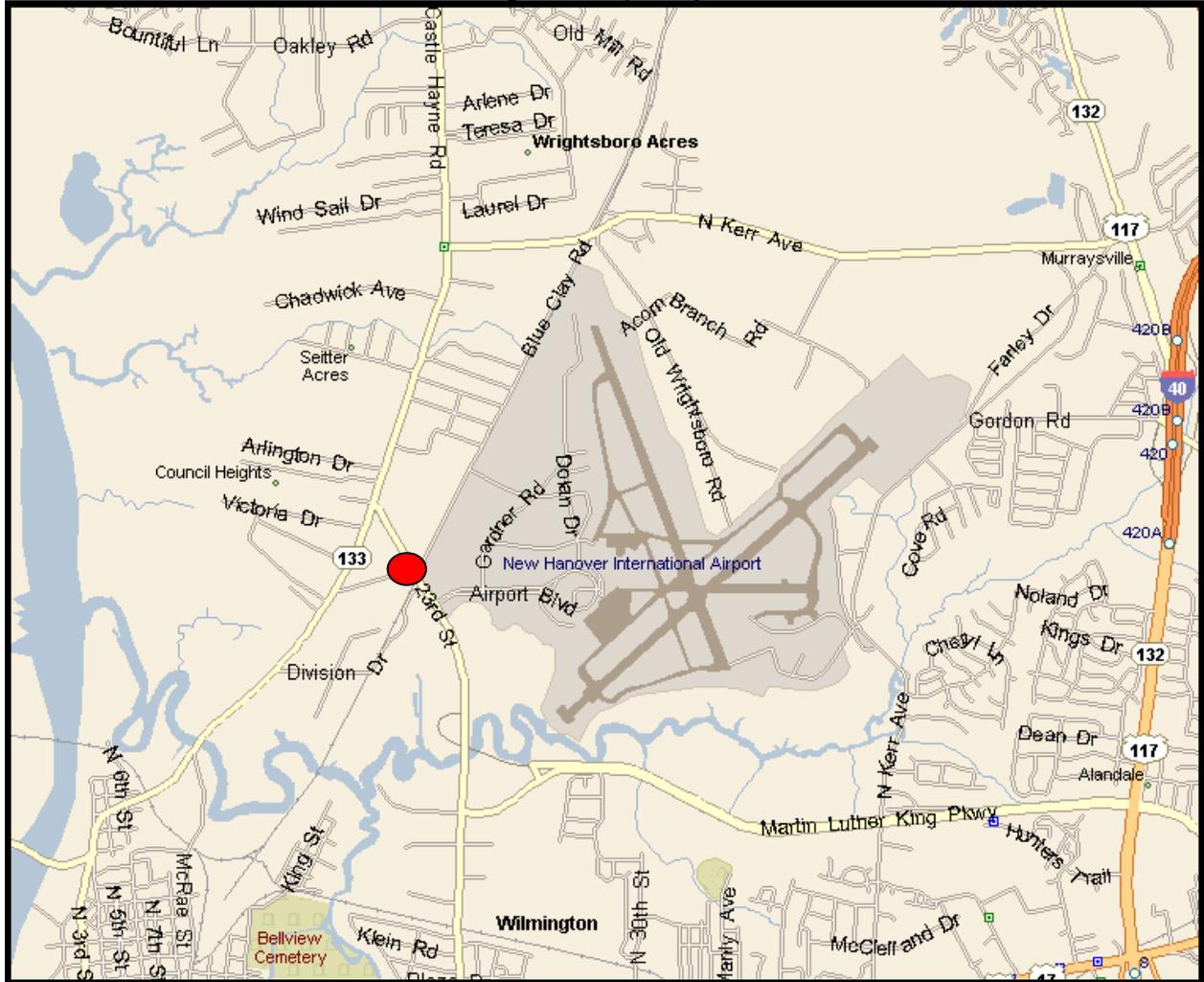
TIME PERIOD	YEARS	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES				PDO		ANNUAL COSTS
		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	CRASHES	CRASHES PER YR	
BEFORE	5.67	0	0.00	23	4.06	21	3.70	\$92,257
AFTER	5.67	0	0.00	6	1.06	5	0.88	\$23,721

Annual Benefits from Crash Cost Savings \$68,536

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$58,185
 BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 6.62

TOTAL COST OF PROJECT - \$50,000 COMPREHENSIVE B/C RATIO - 6.62

Location Map
New Hanover County
Evaluation of Spot Safety Project #03-99-213



Treatment Location: SR 1302 (23rd) at SR 1318/1399 (Blue Clay/Gordon)

Treatment Site Photos Taken May 14, 2008



Traveling Northwest on SR 1302 (23rd St)



Traveling Northwest on SR 1302 (23rd St)



Traveling Southeast on SR 1302 (23rd St)



Traveling Southeast on SR 1302 (23rd St)



Traveling Southwest on SR 1318 (Blue Clay Rd)



Traveling Southwest on SR 1318 (Blue Clay Rd)



Traveling Northeast on Gordon Rd



Traveling Northeast on Gordon Rd

New Hanover County
 SR 1302 (23rd) at SR 1318/1399
 (Blue Clay/Gordon)
 Before Period
 From 3/1/1996-10/31/2001

SR 1318
 (BLUE CLAY ROAD)
 55 mph

SR 1302
 (23rd STREET)
 45 mph

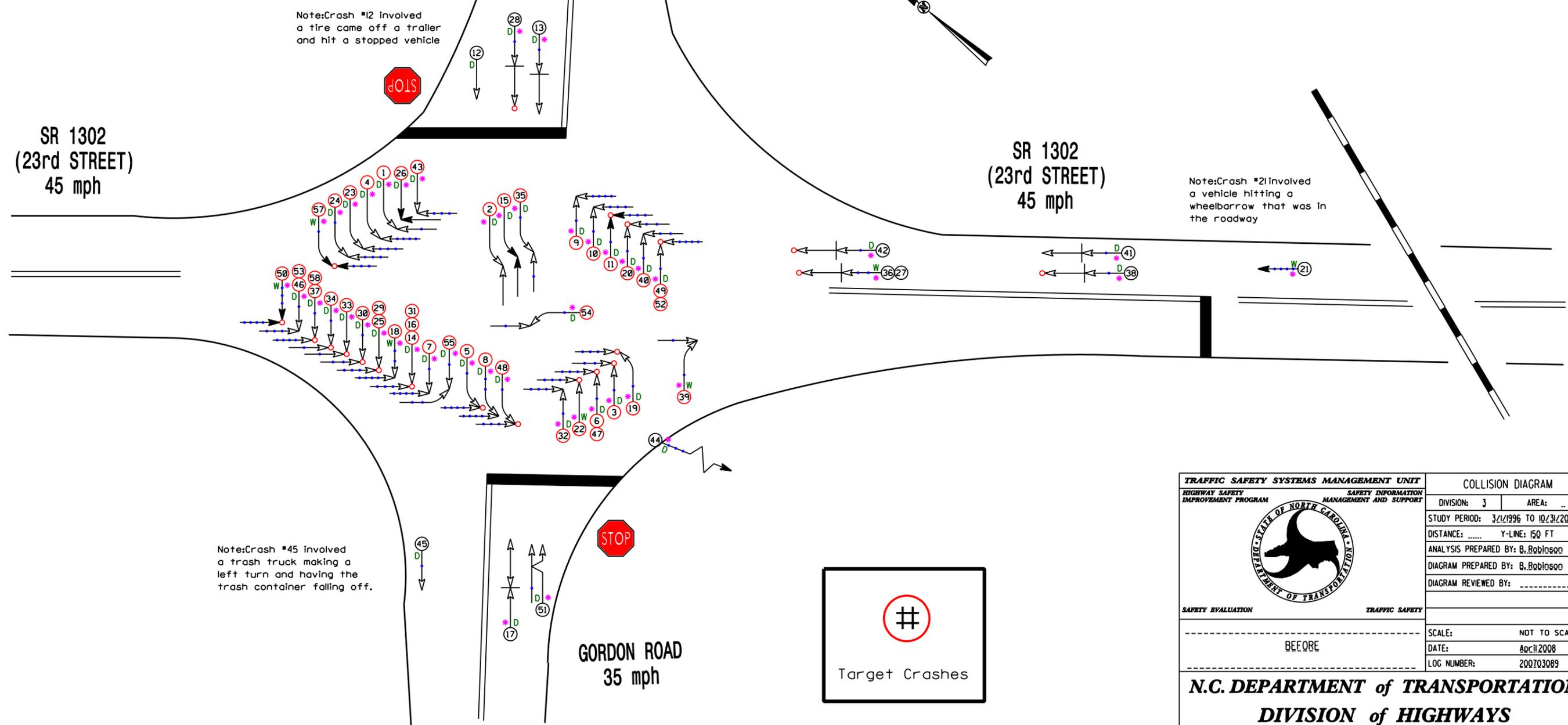
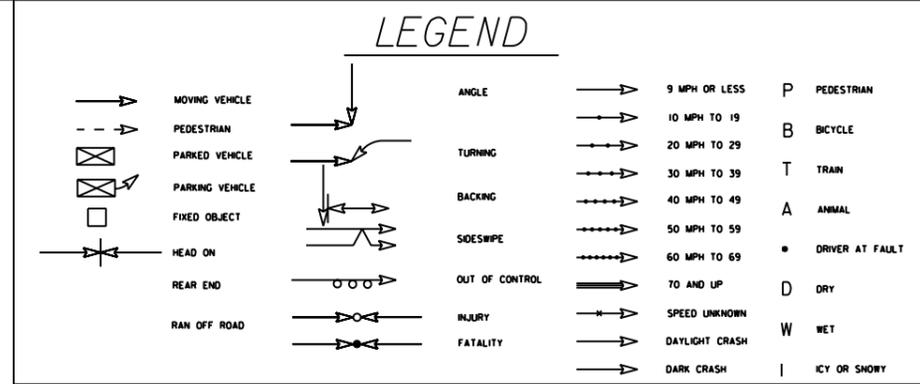
SR 1302
 (23rd STREET)
 45 mph

GORDON ROAD
 35 mph

Note: Crash #12 involved
 a tire came off a trailer
 and hit a stopped vehicle

Note: Crash #21 involved
 a vehicle hitting a
 wheelbarrow that was in
 the roadway

Note: Crash #45 involved
 a trash truck making a
 left turn and having the
 trash container falling off.



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT <small>HIGHWAY SAFETY IMPROVEMENT PROGRAM SAFETY INFORMATION MANAGEMENT AND SUPPORT</small>		COLLISION DIAGRAM	
		DIVISION: 3	AREA: ..
		STUDY PERIOD: 3/1/1996 TO 10/31/2001	
		DISTANCE: Y-LINE: 150 FT	
		ANALYSIS PREPARED BY: B. Robison	
		DIAGRAM PREPARED BY: B. Robison	
		DIAGRAM REVIEWED BY:	
SAFETY EVALUATION TRAFFIC SAFETY			
BEFORE		SCALE: NOT TO SCALE	
		DATE: Apr 11 2008	
		LOG NUMBER: 200703089	
N.C. DEPARTMENT of TRANSPORTATION DIVISION of HIGHWAYS TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH			

