Spot Safety Project Evaluation

Project Log # 200512148

Spot Safety Project # 07-95-229

Spot Safety Project Evaluation of the Fully Actuated Traffic Signal Installation at the Intersection of NC 49 and SR 1136 / Bellemont Mount Hermond Rd / Bellmont Alamance Rd Alamance 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

_____ _____
Majed S Bazzari, EI Date

Traffic Safety Project Engineer

Reviewed By:

_____ 03-02-2006
Carrie L Simpson, EI Date

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 07-95-229 - The Intersection of NC 49 and SR 1136 / Bellemont Mount Hermond Rd / Bellemont Alamance Rd in Alamance County.

Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naive before and after analysis and an Odds Ratio comparison analysis has been completed to measure the effectiveness of the spot safety improvement. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of a fully actuated traffic signal at the intersection of NC 49 and SR 1136 / Bellmont Mount Hermond Rd / Bellmont Alamance Rd in Alamance county. The project improvement was originally requested by V.E. Barham, Division Traffic Engineer. Prior to the improvement, the intersection was controlled by a flashing traffic signal and stop signs located on SR 1136. NC 49 and SR 1136 are both two-lane facilities at the treatment intersection. Both NC 49 and SR 1136 have speed limits of 35 mph within the vicinity of the subject location. The subject intersection meets Warrants 9 and 11 for signalization, along with the stated accident history.

The time period for the initial crash analysis was three years and three months, with a total of nine reported crashes. There were eight Angle crashes that were deemed correctable by the signal installation. The completion date for the improvement was on June 11, 1998 at a total estimated cost of $34,000.

Naïve 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 May 1, 1998 through July 31, 1998. The before period consisted of reported crashes from March 1, 1991 through April 30, 1998 (7 Years, 2 Months) and the after period consisted of reported crashes from August 1, 1998 through September 30, 2005 (7 Years, 2 Months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The analysis also consisted of two different sets of data, the treatment and the comparison data. The treatment data consisted of all crashes within 150 feet of the subject intersection. The comparison data consisted of all crashes within 150 feet of the intersection of NC 49 and SR 1157 / SR 2317. The following data tables depict the Naive Before and After Analysis for the treatment and comparison intersections. 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.

Crash Data Summary:

Treatment Information			
	Before	**After**	**Percent Reduction (-) / Percent Increase (+)**
Total Crashes	25	24	-4.0
Total Severity Index	7.6	3.8	-50.3
Frontal Impact Crashes	19	15	-21.1
Frontal Severity Index	8.9	4.5	-49.9
Volume	5800	9300	60.3
Comparison Information			
	Before	**After**	**Percent Reduction (-) / Percent Increase (+)**
Total Crashes	20	21	5.0
Total Severity Index	14.2	4.5	-68.2
Frontal Impact Crashes	15	11	-26.7
Frontal Severity Index	17.6	4.4	-75.3
Volume	6000	7500	25.0
Odds Ratio: Treatment versus Comparison			
	Before	**After**	**Percent Reduction (-) / Percent Increase (+)**
Treatment Total Crashes	25	24	-8.6
Comparison Total Crashes	20	21	
Treatment F.I. Crashes	19	15	7.7
Comparison F.I. Crashes	15	11	

Treatment Data Summary:

	Before Period	After Period	Percent Reduction (-) / Percent Increase (+)
Total Crashes	**25**	**24**	**-4.0**
Fatal Crashes	0	0	N/A
Non Fatal Injury Crashes	13	9	-30.8
Total Injury Crashes	13	9	-30.8
PDO Crashes	12	15	25.0
Night Crashes	3	4	33.3
Wet Crashes	4	2	-50.0
Alcohol/ Drug Crashes	0	1	N/A
Fatal Injuries	0	0	N/A
Class A	1	0	-100.0
Class B	5	3	-40.0
Class C	11	10	-9.1
Non-Fatal Injuries	17	13	-23.5
Total Injuries	17	13	-23.5
	Before Period	**After Period**	**Percent Reduction (-) / Percent Increase (+)**
Total Target Crashes	**19**	**15**	**-21.1**
Fatal Crashes	0	0	N/A
Non Fatal Injury Crashes	11	7	-36.4
Total Injury Crashes	11	7	-36.4
PDO Crashes	8	8	0.0
Night Crashes	1	2	100.0
Wet Crashes	3	0	-100.0
Alcohol/ Drug Crashes	0	1	N/A
Fatal Injuries	0	0	N/A
Class A	1	0	-100.0
Class B	5	3	-40.0
Class C	9	8	-11.1
Non-Fatal Injuries	15	11	-26.7
Total Injuries	15	11	-26.7

The naive before and after analysis at the treatment location resulted in a 4.0 percent decrease in Total Crashes, a 50.3 percent decrease in the Total Severity Index, a 21.1 percent decrease in Target Crashes, a 49.9 percent decrease in the Target Severity Index, and a 60.3 percent increase in Average Daily Traffic (ADT). The comparison location experienced a 5.0 percent increase in Total Crashes, a 68.2 percent decrease in the Total Severity Index, a 26.7 percent decrease in Target Crashes, a 75.3 percent decrease in the Target Severity Index, and a 25.0 percent increase in ADT. The before period ADT year was 1994 and the after period ADT year was 2002.

The Odds Ratio is used as another means of calculating the treatment effect. The number of crashes in the before and after period from the comparison location is used to calculate the percent reduction in crashes for the Treatment Intersection. As shown in the previous table, using the Odds Ratio calculation, there is an 8.6 percent decrease in Total Treatment Intersection crashes and a 7.7 percent increase in Target Treatment Intersection crashes from the before to the after period.

Results and Discussion

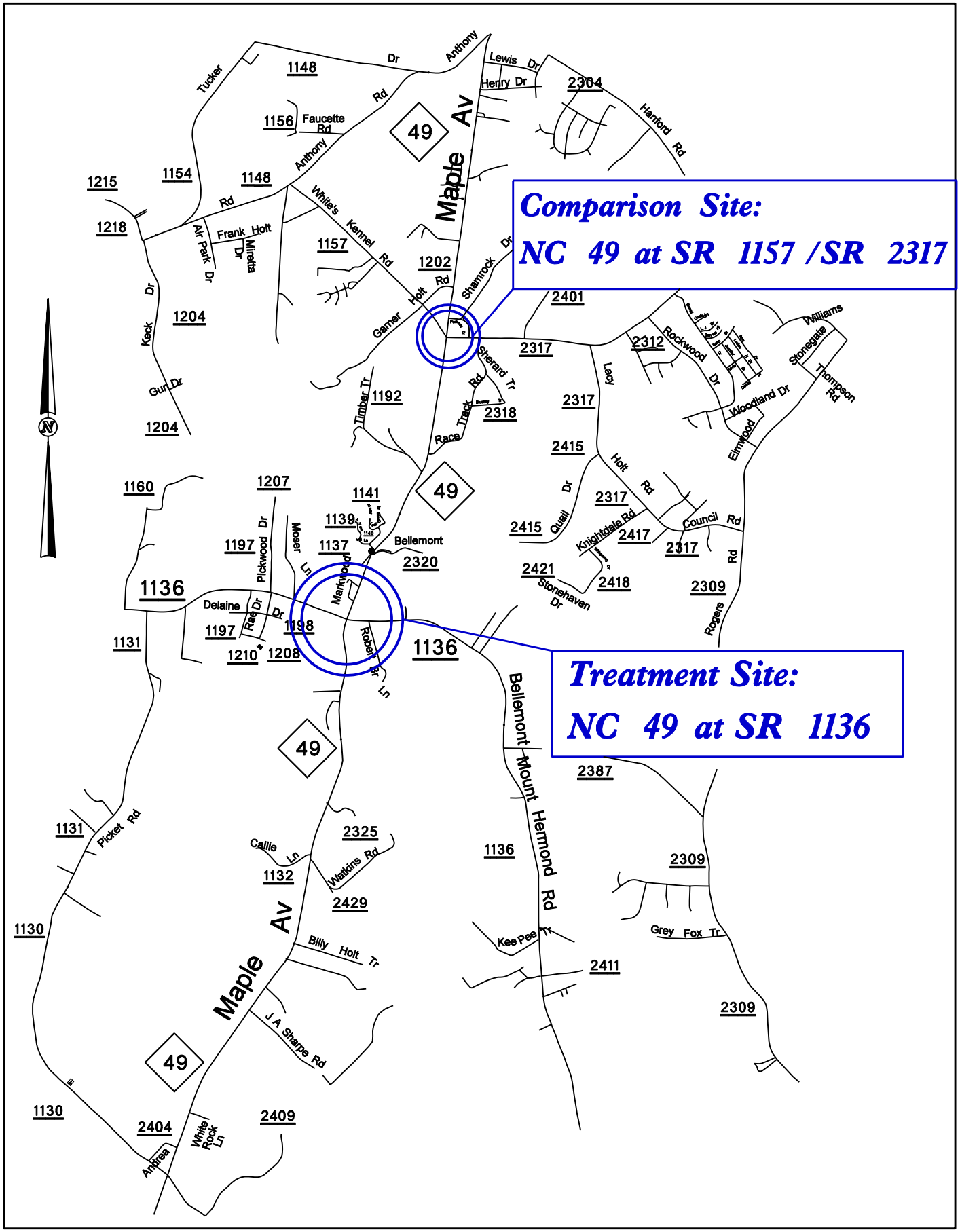
The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 4.0 percent decrease in Total Crashes and a 21.1 percent decrease in Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in an 8.6 percent decrease in Total Crashes and a 7.7 percent increase in the Frontal Impact Crashes at the Treatment Intersection. The summary results above demonstrate that when using naïve analysis methods, the treatment location appears to have had a minor decrease in the number of Total Crashes from the before to the after period.

Further analysis of crash types at the Treatment Location reveals that the number of Angle crashes decreased (by 57.1 percent) from 14 crashes in the before period to 6 crashes in the after period. The number of Rear-End crashes increased (by 50.0 percent) from 4 crashes in the before period to 6 crashes in the after period at the Treatment Intersection. Further, the number of Left-Turn, Same Roadway Crashes increased (by 350.0 percent) from 2 crashes in the before period to 9 crashes in the after period. The increased number of Left-Turn, Same Roadway Crashes may be attributed to an increased volume of left-turning vehicles at the subject intersection and a lack of sufficient gaps for left turning vehicles. Several residential and commercial developments at the subject site have contributed to the increased traffic volumes. The volume at the Treatment Location increased by 60.3 percent from the before to the after period. Please see the attached *Site Photos* and *Collision Diagrams* for more detail.

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.

Evaluation of Spot Safety Project Number 07–95–229

Location Map, Alamance County



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Treatment Site Photos Taken on February 9, 2006

Travelling East on SR 1136 / Bellmont Alamance Rd

Travelling East on SR 1136 / Bellmont Alamance Rd

Travelling West on SR 1136 / Bellmont Alamance Rd

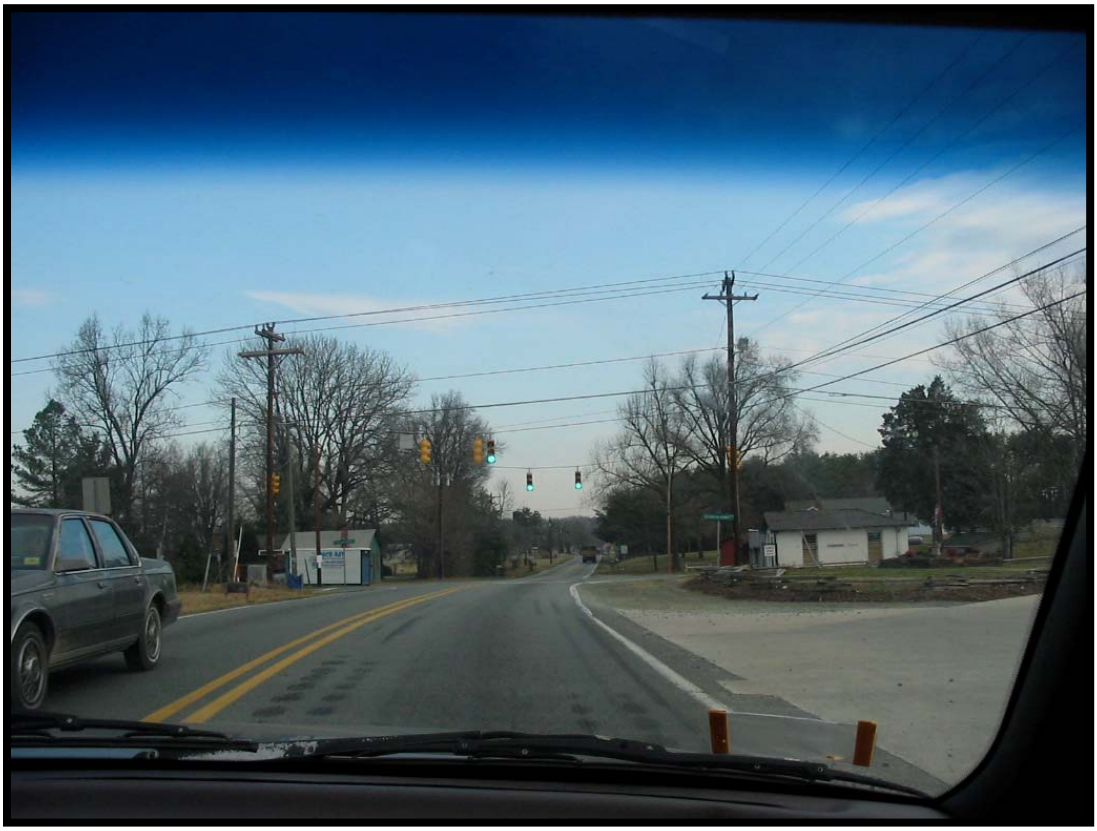
Travelling West on SR 1136 / Bellmont Alamance Rd

Travelling North on NC 49

Travelling North on NC 49

Travelling North on NC 49

Travelling South on NC 49

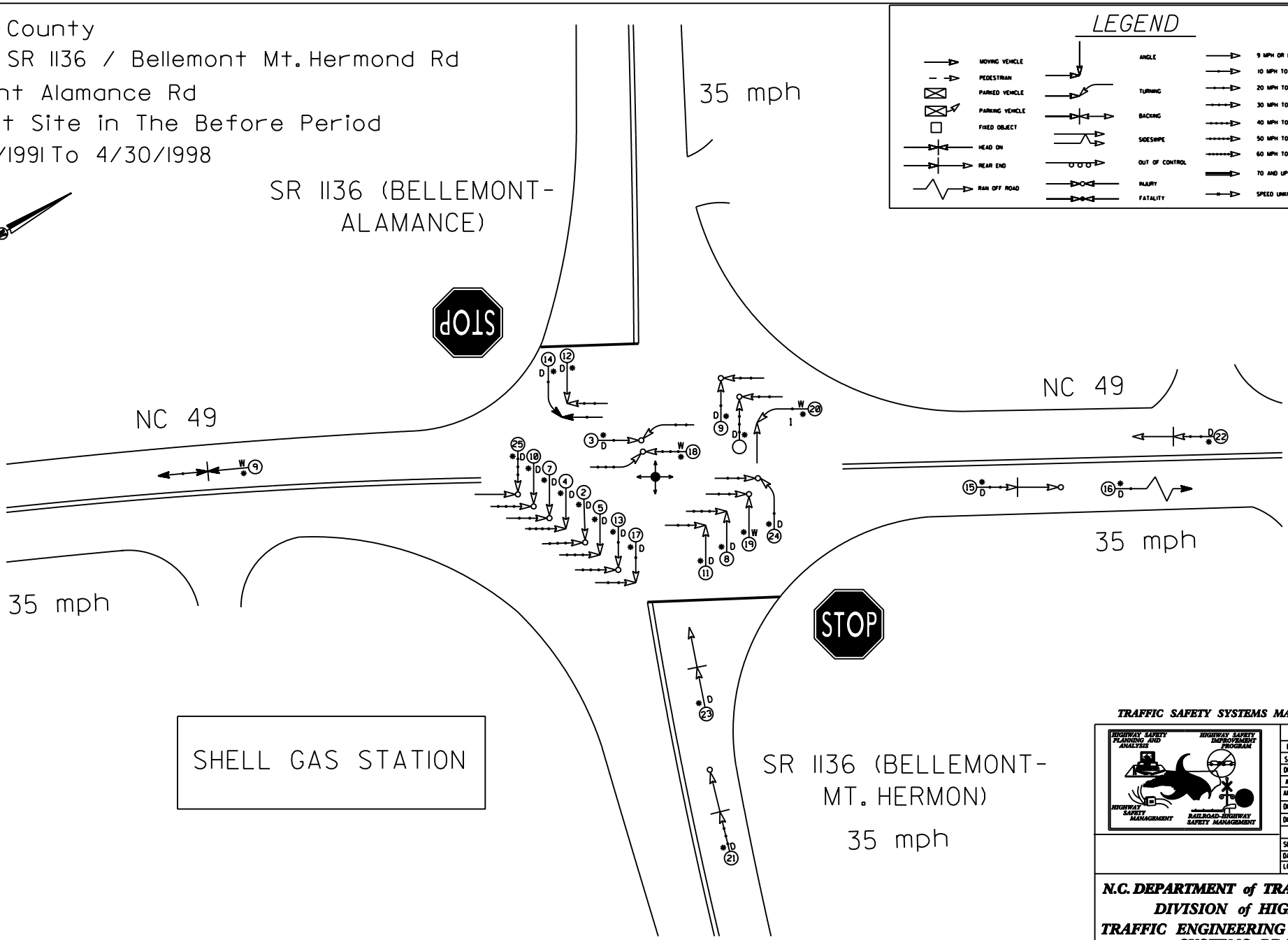


Travelling South on NC 49

Sight Distance looking on NC 49 from SR 1136 East Leg.

Sight Distance looking on NC 49 from SR 1136 West Leg.

Alamance County
NC 49 at SR 1136 / Bellemont Mt. Hermond Rd
/ Bellemont Alamance Rd
Treatment Site in The Before Period
From 3/1/1991 To 4/30/1998



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM
	DIVISION: 7 AREA:
	STUDY PERIOD: 3/1/1991 - 4/30/1998
	DISTANCE: Y-LINE ± 150FT
	ANALYSIS PREPARED BY: MAJED BAZZARI
	ANALYSIS CHECKED BY:
	DIAGRAM PREPARED BY: MAJED BAZZARI
	DIAGRAM REVIEWED BY:
	SCALE: NOT TO SCALE
	DATE: 2/17/2006
	LOG NUMBER: 20052148 SS 07-95-229

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

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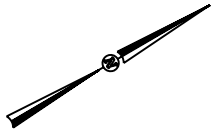
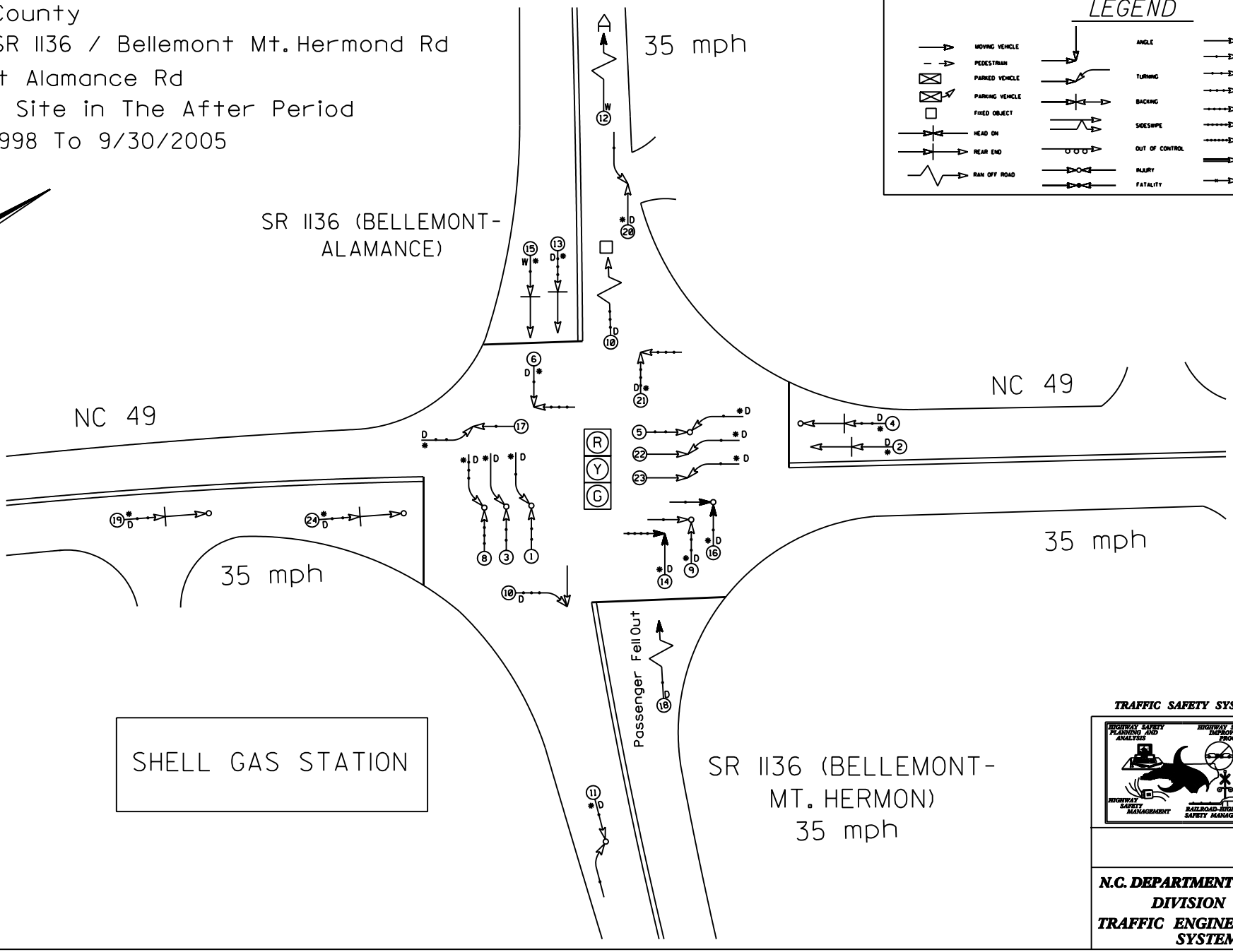
Alamance County
NC 49 at SR 1136 / Bellemont Mt. Hermond Rd
/ Bellemont Alamance Rd
Treatment Site in The After Period
From 8/1/1998 To 9/30/2005





TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM
DIVISION: 7 | AREA:
STUDY PERIOD: 8/1/1998 - 9/30/2005
DISTANCE: Y-LINE ± 150FT
ANALYSIS PREPARED BY: MAJED BAZZARI
ANALYSIS CHECKED BY:
DIAGRAM PREPARED BY: MAJED BAZZARI
DIAGRAM REVIEWED BY:
SCALE: NOT TO SCALE
DATE: 2/17/2006
LOG NUMBER: 20052148 SS 07-95-229

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DIVISION of HIGHWAYS
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