

Spot Safety Project Evaluation

Project Log # 200501266

Spot Safety Project # 05-99-205

**Spot Safety Project Evaluation of the Actuated Flashing Traffic Signal Installation with
“Vehicles Entering When Flashing” Signs at the Intersection of US 401 and
SR 1103 (Flat Rock Church Rd/Clifton Pond Rd) in Franklin County.**

Documents Prepared By:

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Traffic Safety Systems Management Section
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Principal Investigator

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10/11/2005
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 05-99-205 – The Intersection of US 401 and SR 1103-Flat Rock Church Rd / Clifton Pond Rd in Franklin 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 of the treatment versus comparison data 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 Actuating the existing standard flasher and installing “vehicles entering when flashing” signs. US 401 is a two-lane facility with no left turn lanes at the intersection with SR 1103. SR 1103 is a two-lane facility with no left turn lanes. US 401 has a posted speed limit of 55 mph and 45 mph when approaching the subject intersection while SR 1103 has a speed limit of 45 mph. A Standard Flasher and stop signs on SR 1103 control the crossroad type intersection. Slip right turn lanes under yield control exists for all approaches. The original problem statement was angle crashes that have occurred at the subject location also the lack of motorists caution when crossing through the intersection because they have become accustom with the existing standard flasher.

The initial crash analysis for US 401 at SR 1103 was completed from Nonmember 1, 1995 through October 31, 1998 with a total of Twenty reported crashes. There were 13 Angle crashes and 2 Left Turn crashes, which were deemed correctable by the flasher installation. There were one Fatality, six class B and fifteen class C injuries resulted from these crashes. The final completion date for Actuating the existing standard flasher and installing “vehicles entering when flashing” signs at the subject intersection was on April 26, 2000.

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 March 1, 2000 through May 31, 2000. The before period consisted of reported crashes from May 1, 1996 through February 28, 2000 (3 years and 10 months) and the after period consisted of reported crashes from June 1, 2000 through March 31, 2004 (3 years and 10 months). The ending date for

this analysis was determined by the installation of a standard traffic signal in the second quarter of the year 2004. The April 2004 accident was omitted from the study since it occurred during the construction period of the traffic signal.

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 intersections of US 401 and SR 1100-Tarboro Rd. *Please see attached location map for further details.*

The following data table depicts the Naive Before and After Analysis for the above information. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. These 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	26	23	-11.5
Total Severity Index	14.0	11.8	-16.0
Frontal Impact Crashes	23	17	-26.1
Frontal Severity Index	12.1	14.7	21.6
Volume	8300	9100	9.6
<u>Comparison Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	19	17	-10.5
Total Severity Index	17.3	4.9	-71.5
Frontal Impact Crashes	14	13	-7.1
Frontal Severity Index	21.5	5.6	-74.1
Volume	8900	9800	10.1
<u>Odds Ratio: Treatment versus Comparison</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Treatment Total Crashes	26	23	-1.1
Comparison Total Crashes	19	17	
Treatment F.I. Crashes	23	17	-20.4
Comparison F.I. Crashes	14	13	

The naive before and after analysis at the treatment location resulted in an 11.5 percent decrease in Total Crashes, a 26.1 percent decrease in Frontal Impact Crashes, a 16.0 percent decrease in the Total Severity Index, a 21.6 percent increase in the Frontal Severity Index, and a 9.6 percent increase in Average Daily Traffic (ADT). The comparison locations resulted in a 10.5 percent decrease in Total Crashes, a 7.1 percent decrease in Frontal Impact Crashes, a 71.5 percent decrease in the Total Severity Index, a 74.1 percent decrease in the Frontal Severity Index, and a 10.1 percent increase in ADT. The before period ADT year was 1998 and the after period ADT year was 2002.

The Odds Ratio is used as another means of calculating the treatment effect. The total crashes in the before and after period from the Comparison intersections are used to calculate the percent reduction in total crashes for the Treatment Intersection. As shown in the table above, using the

Odds Ratio calculation, there is a 1.1 percent decrease in Total Crashes and a 20.4 percent decrease in Frontal Impact Crashes at the treatment intersection.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in an 11.5 percent decrease in Total Crashes and a 26.1 percent decrease in Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 1.1 percent decrease in Total Crashes and a 20.4 percent decrease in Frontal Impact Crashes. The summary results above demonstrate that the treatment location appears to have had a decrease in the number of both Total and Frontal Impact Crashes from the before to the after period.

The crash statistics shows that actuating the existing standard flasher and installing “vehicles entering when flashing” signs had a positive effect on reducing the number of both Total Crashes and Frontal Impact Crashes from the before to the after period. From the crash analysis there were two fatal crashes in the before period one of them was due an angle type crash and the other involved a pedestrian while in the after period there was one fatality due to an angle type crash. A closer look at the injury statistics shows a 75.0 percent decrease in class A injuries, a 21.4 percent decrease in class B injuries and a 4.3 percent increase in class C injuries.

A Standard traffic signal was installed in the second quarter of the year 2004. Geometric changes have also been applied to the subject intersection including removal of the islands and adding left turn lane for all approaches at the subject intersection. Additionally, a center left turn lane was added for both the SR 1103 West leg and US 401 North leg of the treatment site. *Please see attached location photos.*

The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of a 1.1 percent decrease to a 11.5 percent decrease in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection can be in the range of an 20.4 percent decrease to a 26.1 percent decrease in crashes. 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 Taken on (September 29, 2005)



Driving East on SR 1103



Driving West on SR 1103



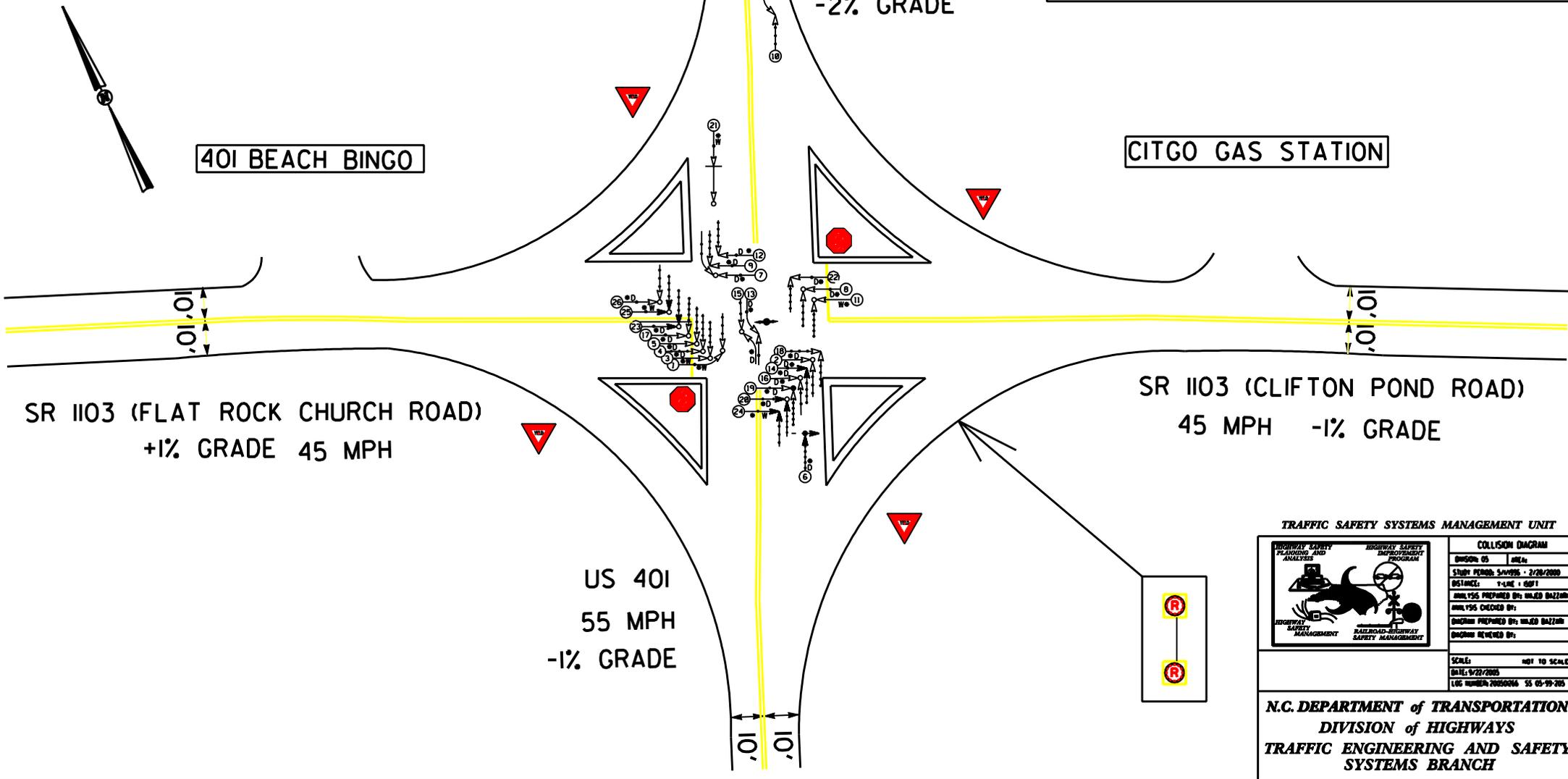
Driving North on US 401



Driving South on US 401

FRANKLIN COUNTY
 US 401 at SR 1103-Flat Rock Church/Clifton Pond
 Treatment Site in The Before Period
 From 5/1/1996 To 2/28/2000

LEGEND			
	MOVING VEHICLE		ANGLE
	PEDESTRIAN		TURNING
	PAKED VEHICLE		BACKING
	FIXED OBJECT		SWERVE
	HEAD ON		OUT OF CONTROL
	REAR END		RISKY
	RUN OFF ROAD		FATALITY
	9 MPH OR LESS		P PEDESTRIAN
	10 MPH TO 19		T TRUCK
	20 MPH TO 29		O OTHER AT FAULT
	30 MPH TO 39		D DRIVER
	40 MPH TO 49		W HIT
	50 MPH TO 59		I ICY OR SLIPY
	60 MPH TO 69		O ONLY
	70 MPH OR MORE		
	SPEED UNKNOWN		

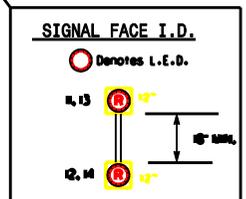
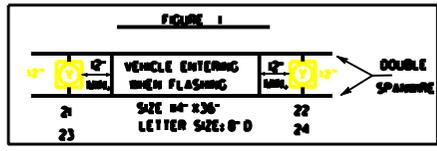
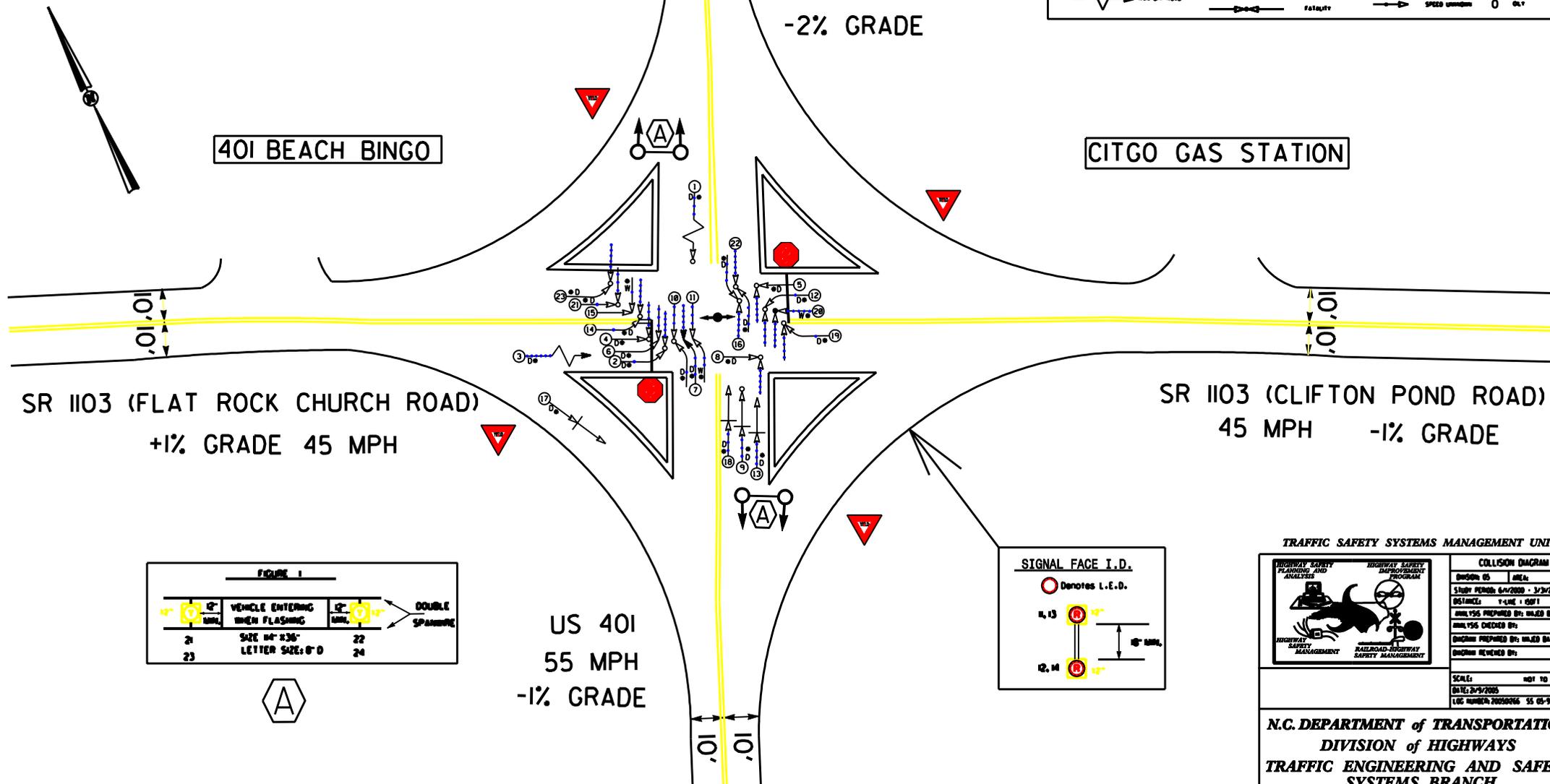
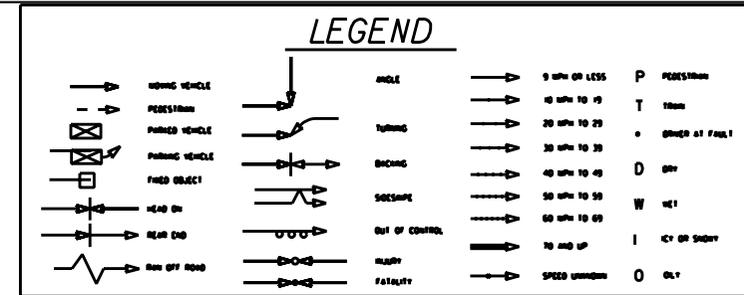


FRANKLIN COUNTY

US 401 at SR 1103-Flat Rock Church/Clifton Pond

Treatment Site in The After Period

From 6/1/2000 To 3/31/2004



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM	
Division: 05	Area:
Study Period: 6/1/2000 - 3/31/2004	
Distance: T-10E + 00FT	
Analysis Prepared By: WAJED BAZZAN	
Analysis Checked By: WAJED BAZZAN	
Diagram Reviewed By:	
Scale: NOT TO SCALE	
Date: 2/9/2005	
Log Number: 20050066	SS 05-99-205

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