

Spot Safety Project Evaluation

Project Log # 200501237

Spot Safety Project # 05-97-013

**Spot Safety Project Evaluation, of the Flashing Traffic Signal Installation,
At the Intersection of US 158 and SR 1305-Warren Plains Rd, Warren County**

Documents Prepared By:

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Traffic Safety Systems Management Section
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Principal Investigator

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08/29/2005
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 05-97-013 – The Intersection of US 158 and SR 1305-Warren Plains Rd, Warren 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 an overhead flashing traffic signal. Loria Williams, Warren County Manager, and Highway Patrol Trooper J.K. Aiken originally requested the improvement. Both US 158 and SR 1305-Warren Plains Rd are two-lane facilities at the treatment intersection. US 158 has a speed limit of 55 mph on both approaches. SR 1305-Warren Plains Rd has a speed limit of 55 mph on the north approach and a speed limit of 45 mph on the south approach. The subject location is controlled by stop signs on SR 1305-Warren Plains Rd, with stop ahead signs provided on both approaches.

The initial crash analysis for this location was completed from June 1, 1995 through May 31, 1998 with a total of six reported crashes. According to the initial crash analyses, five of the six were Angle crashes considered correctable by the installation of a flashing traffic signal. One fatality, one class A injury, and seven class B injuries resulted from the “correctable” crashes. Motorists were running the stop condition on SR 1305-Warren Plains Rd. The fatality was the result of a tractor-trailer running the stop sign on the northbound approach of SR 1305-Warren Plains Rd. The final completion date for the improvement at the subject intersection was on January 7, 2000.

Comparison 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, 1999 through February 28, 2000. The before period consisted of reported crashes from June 1, 1995 through October 31, 1999 (4 Years, 5 Months) and the after period consisted of reported crashes from March 1, 2000 through July 31, 2004 (4 Years, 5 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 US 158 and SR 1309-Frazier Rd-Oakville Rd. Please see attached *Location Map* for further detail.

The following data table depicts 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.

Treatment Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	10	15	50.0
Total Severity Index	13.02	3.96	- 69.6
Frontal Impact Crashes	9	13	44.4
Frontal Severity Index	14.36	3.85	- 73.2
Volume	4100	5500	34.1

Comparison Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	8	3	- 62.5
Total Severity Index	24.58	28.73	16.9
Frontal Impact Crashes	6	2	- 66.7
Frontal Severity Index	19.80	42.60	115.2
Volume	2900	3300	13.8

Odds Ratio: Treatment versus Comparison

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Treatment Total Crashes	10	15	---
Comparison Total Crashes	8	3	300.0 %
Treatment Frontal Impact Crashes	9	13	---
Comparison Frontal Impact Crashes	6	2	333.3 %

The naive before and after analysis at the treatment location resulted in an 50.0 percent increase in Total Crashes, a 69.6 percent decrease in the Total Severity Index, and a 34.1 percent increase in Average Daily Traffic (ADT). The comparison location experienced a 62.5 percent decrease in Total Crashes, a 16.9 percent increase in the Total Severity Index, and a 13.8 percent increase in ADT. The before period ADT year was 1997 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 Intersection are 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 a 300.0 percent increase in Total Treatment Intersection crashes and a 333.3 percent increase in Frontal Impact Treatment Intersection crashes.

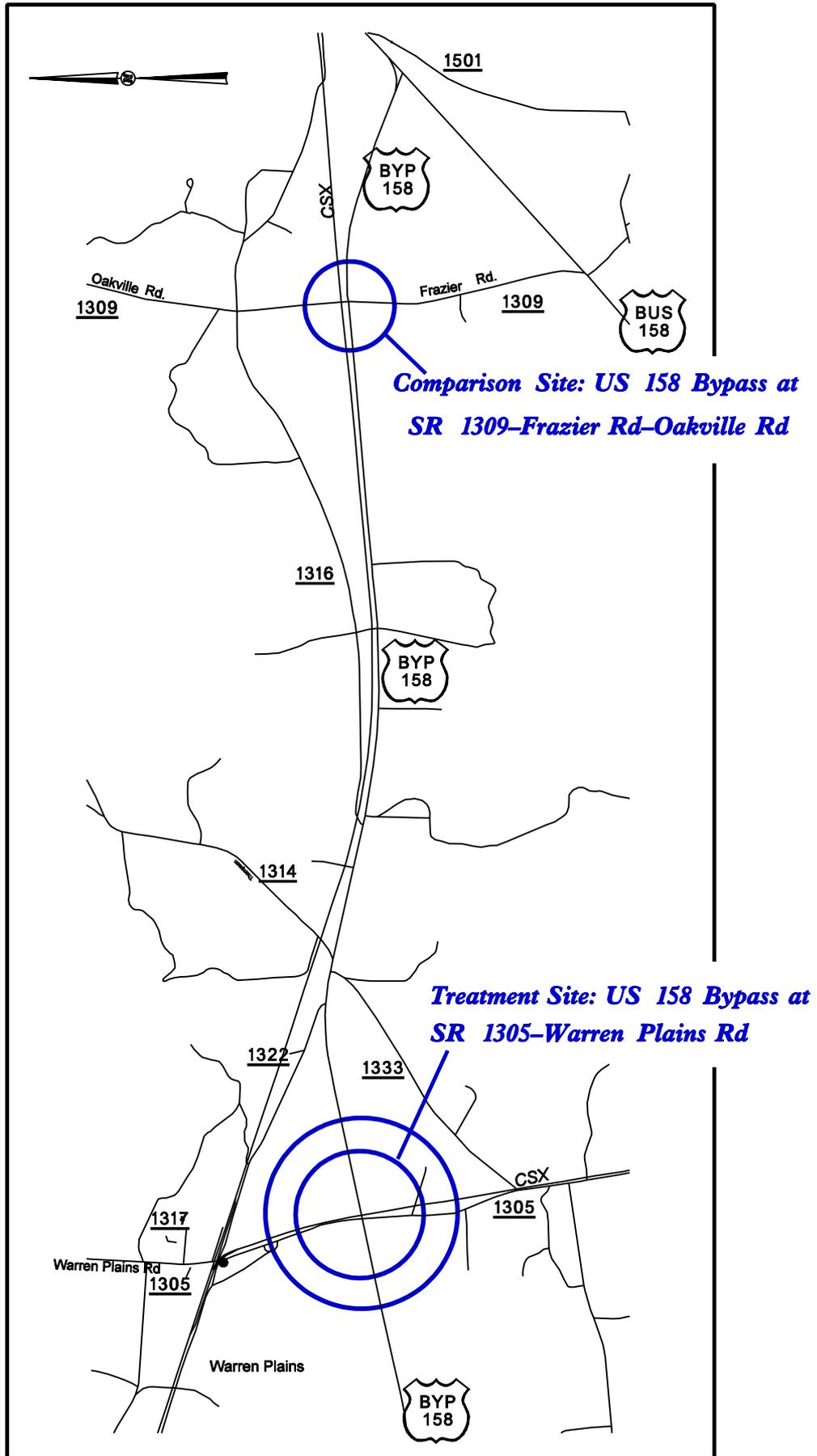
Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 50.0 percent increase in Total Crashes and a 44.4 percent increase in Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 300.0 percent increase in Total Crashes and a 333.3 percent increase in Frontal Impact Crashes at the Treatment Intersection. The summary results above demonstrate that the treatment location appears to have had an increase in the number of crashes from the before to the after period using both analysis methods. Note, however, that the crash severity decreased dramatically (69.6 percent for Total Crashes and 73.2 percent for Frontal Impact Crashes) from the before to the after period. Please see the attached Treatment Site Photos. Photos are provided for each leg of the intersection.

The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of a 50.0 percent increase to a 300.0 percent increase in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection can be in the range of a 44.4 percent increase to a 333.3 percent increase 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.

Evaluation of Spot Safety Project Number 05-97-013

Location Map, Warren County



Treatment Site Photo (Taken on February 5, 2005)



Looking north on SR 1305-Warren Plains Rd



Looking south on SR 1305-Warren Plains Rd

Treatment Site Photo (Taken on February 5, 2005)



Looking west on US 158



Looking east on US 158

Treatment Site Photo (Taken on February 5, 2005)

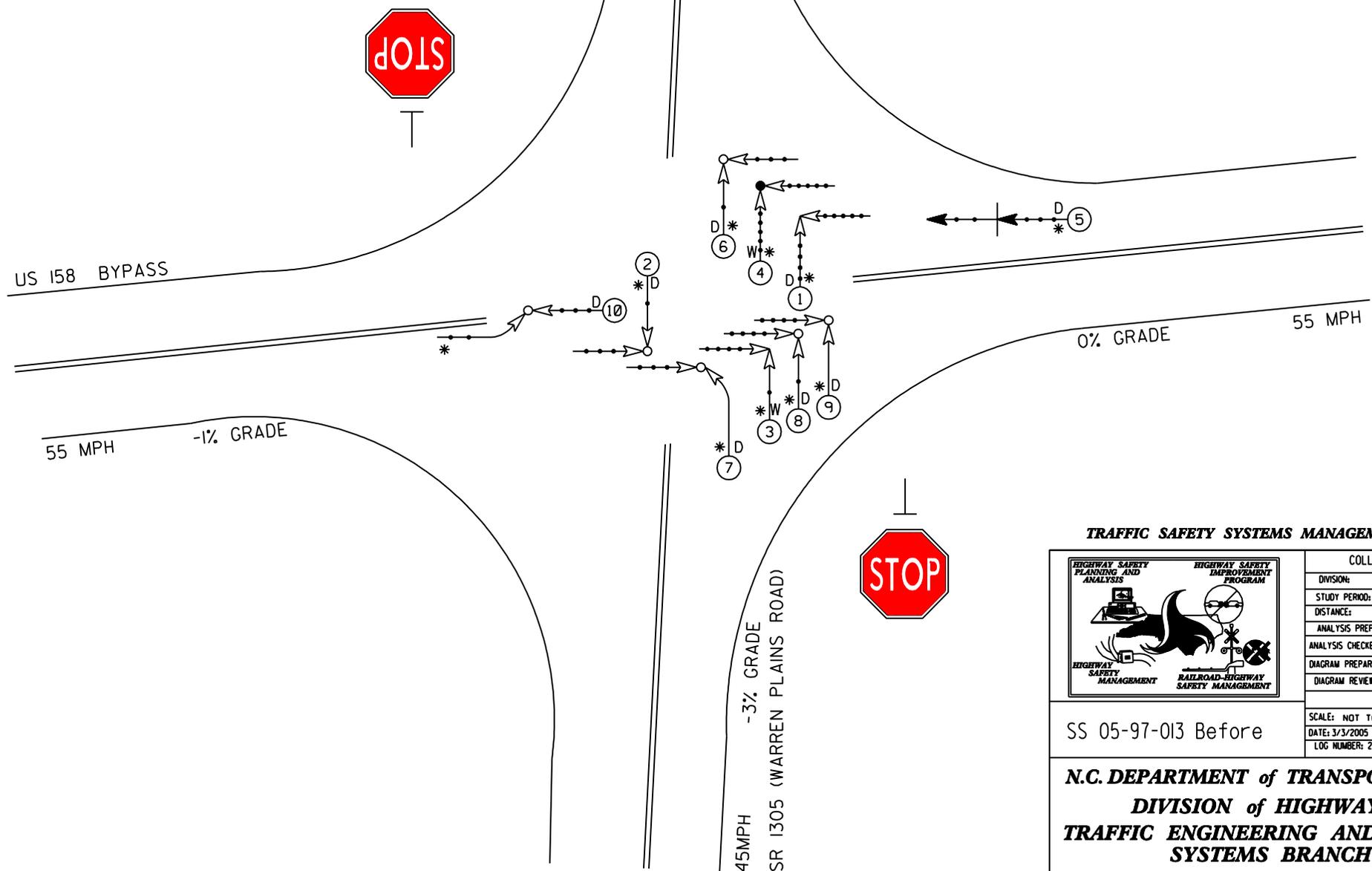
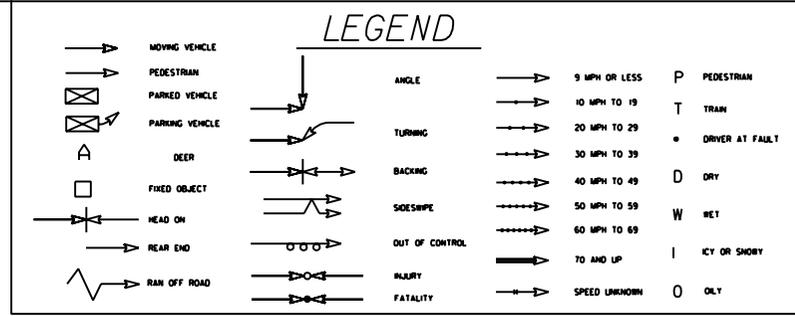


Driving east on US 158 toward the intersection. Notice the Intersection Ahead sign.



Driving north on SR 1305-Warren Plains Rd toward the intersection. Notice the Stop Ahead sign.

SS 05-97-013
 Treatment Site - TotalCrashes
 Before Period
 6/1/1995 - 10/31/1999
 (4 years, 5 months)



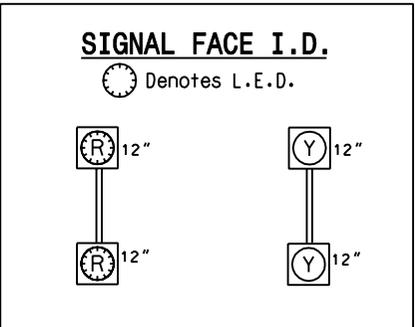
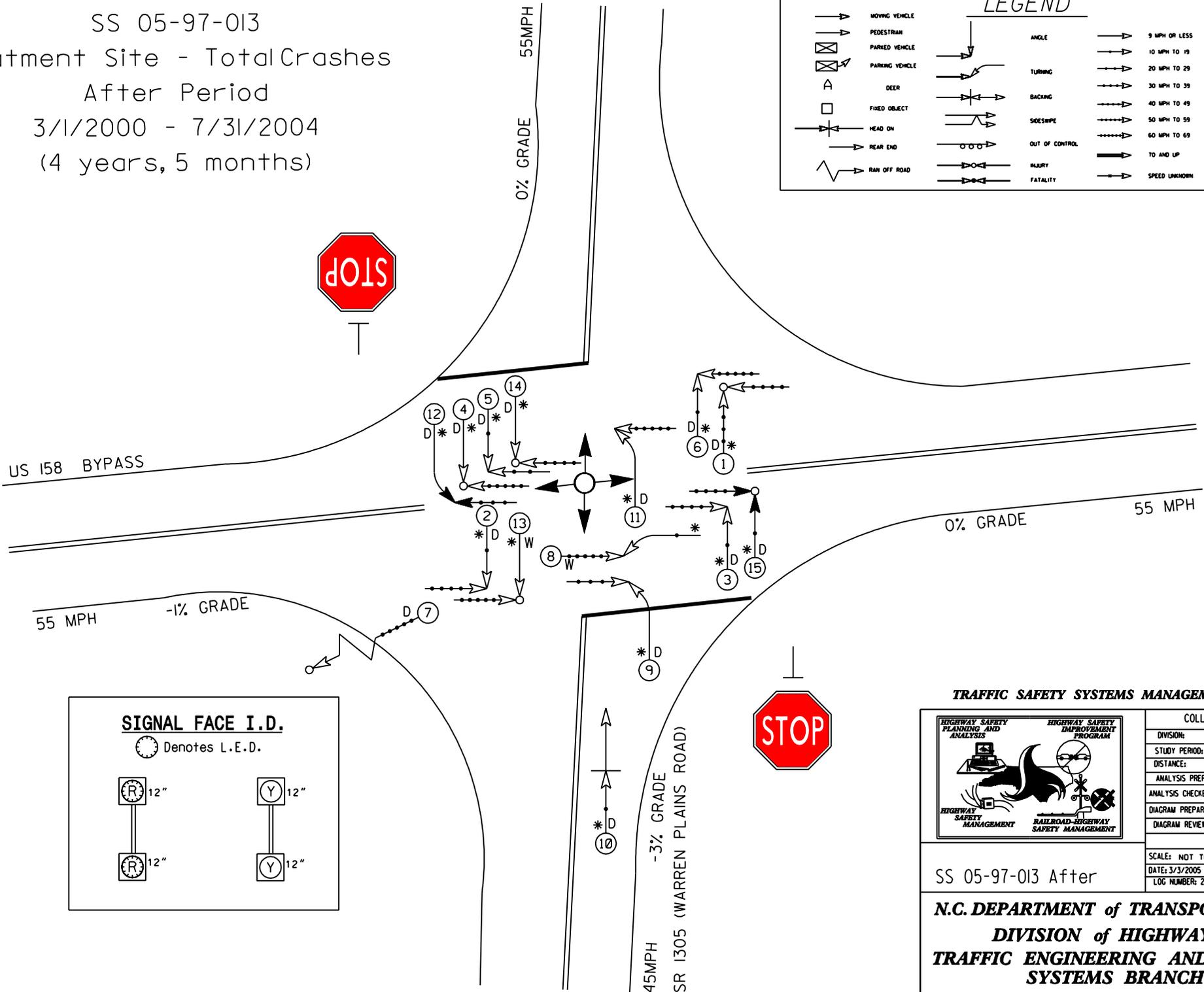
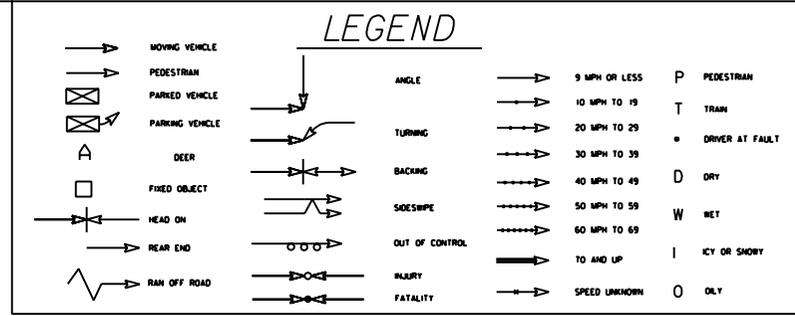
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION:	AREA:
	STUDY PERIOD: 06/01/95 - 10/31/99	
	DISTANCE: Y-LINE = 150 ft	
	ANALYSIS PREPARED BY: CLG	
ANALYSIS CHECKED BY:		
DIAGRAM PREPARED BY: CLG		
DIAGRAM REVIEWED BY:		
SCALE: NOT TO SCALE		
DATE: 3/3/2005		
LOG NUMBER: 2005023T		

SS 05-97-013 Before

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

SS 05-97-013
 Treatment Site - TotalCrashes
 After Period
 3/1/2000 - 7/31/2004
 (4 years, 5 months)



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM	
DIVISION:	AREA:
STUDY PERIOD: 03/01/00 - 07/31/04	
DISTANCE: Y-LINE = 150 ft	
ANALYSIS PREPARED BY: CLG	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: CLG	
DIAGRAM REVIEWED BY:	
SCALE: NOT TO SCALE	
DATE: 3/3/2005	
LOG NUMBER: 20050237	

SS 05-97-013 After

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