

Spot Safety Project Evaluation

Project Log # 200501242

Spot Safety Project # 04-97-239

**Spot Safety Project Evaluation, of the Flashing Traffic Signal Installation,
At the Intersection of SR 1534-Big Daddy's Rd and SR 1543-Lancaster Rd
Near Pikeville, Wayne County**

Documents Prepared By:

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04/13/2005
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 04-97-239 – The Intersection of SR 1534-Big Daddy's Rd and SR 1543-Lancaster Rd, near Pikeville, Wayne 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 of the treatment 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 the installation of an overhead flashing traffic signal. A private citizen originally requested the improvement. Both SR 1534-Big Daddy's Rd and SR 1543-Lancaster Rd are two-lane facilities with a posted speed limit of 55 mph at the treatment intersection. The subject location is controlled by dually indicated stop signs on SR 1543-Lancaster Rd.

The initial crash analysis for this location was completed from February 1, 1991 through January 31, 1997 with a total of thirteen reported crashes. According to the initial crash analysis, there were eleven Angle crashes and two "Random in Nature" crashes, resulting in one fatality, five class A injuries and twelve class C injuries. The Spot Safety Justification Sheet states motorists travelling on SR 1543 had difficulty recognizing the stop condition on SR 1543-Lancaster Rd. Therefore, it was felt that the installation of a flashing traffic signal would greatly reduce the accident potential at the treatment location. The final completion date for the improvement at the subject intersection was on March 31, 1998.

Please note that (as stated above) the initial crash analysis from the project file folder claimed a total of thirteen crashes occurred at the treatment intersection between February 1, 1991 through January 31, 1997. However, according to the crash analysis conducted for this evaluation, there were only eleven total crashes at the treatment intersection within the same time period. SR 1543 forms a loop with SR 1534; therefore the two extra crashes belonged to other intersection of SR 1543 and SR 1534.

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 February 1, 1998 through May 31, 1998. The before period consisted of reported crashes from December 1, 1991 through January 31, 1998 (6 Years, 2 Months) and the after period consisted of reported crashes from June 1, 1998 through July 31, 2004 (6 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 a 150 feet Y-line on SR 1534-Big Daddy's Rd, from the Pikeville Municipal Limits to 0.1 miles west of SR 1543-Lancaster Rd *and* from 0.1 miles east of SR 1543-Lancaster Rd to 0.3 miles west of NC 111. 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	13	7	- 46.2
Total Severity Index	16.08	6.29	- 60.9
Frontal Impact Crashes	13	7	- 46.2
Frontal Severity Index	16.08	6.29	- 60.9
Volume	3400	3900	14.7

Comparison Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	31	50	61.3
Total Severity Index	3.63	4.11	13.2
Frontal Impact Crashes	6	5	- 16.7
Frontal Severity Index	4.70	5.44	15.7
Volume	2000	2300	15.0

Odds Ratio: Treatment versus Comparison

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Treatment Total Crashes	13	7	---
Comparison Total Crashes	31	50	- 66.6 %

The naive before and after analysis at the treatment location resulted in a 46.2 percent decrease in Total Crashes, a 60.9 percent decrease in the Total Severity Index, and a 14.7 percent increase in Average Daily Traffic (ADT). The comparison locations experienced a 61.3 percent increase in Total Crashes, a 13.2 percent increase in the Total Severity Index, and a 15.0 percent increase in ADT. The before period ADT year was 1994 and the after period ADT year was 2001.

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 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 66.6 percent decrease in Total Treatment Intersection crashes.

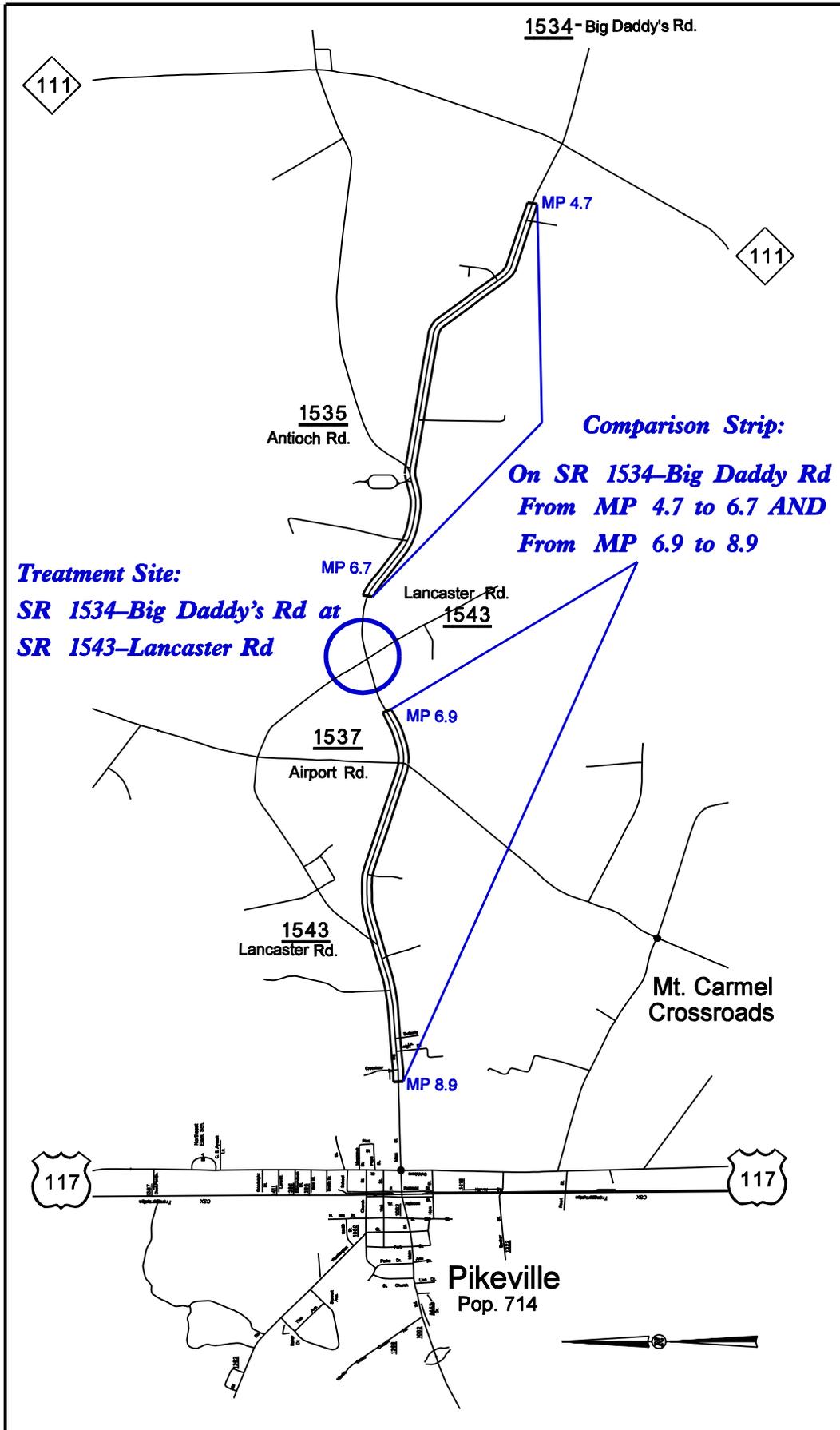
Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 46.2 percent decrease in Total Crashes and Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 66.6 percent decrease in Total Crashes at the Treatment Intersection. The summary results above demonstrate that the treatment location appears to have had a decrease in the number of Total Crashes and Frontal Impact Crashes from the before to the after period using both analysis methods. In addition, the severity index for both Total and Frontal Impact Crash categories decreased by 60.9 percent. 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 46.2 percent decrease to a 66.6 percent decrease in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection is a 46.2 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.

Evaluation of Spot Safety Project Number 04-97-239

Location Map, Wayne County



Treatment Site Photos (Taken on February 19, 2005)



Looking north on SR 1543-Lancaster Rd.



Looking south on SR 1543-Lancaster Rd.

Treatment Site Photos (Taken on February 19, 2005)



Looking east on SR 1534-Big Daddy's Rd.



Looking west on SR 1534-Big Daddy's Rd.

Treatment Site Photos (Taken on February 19, 2005)

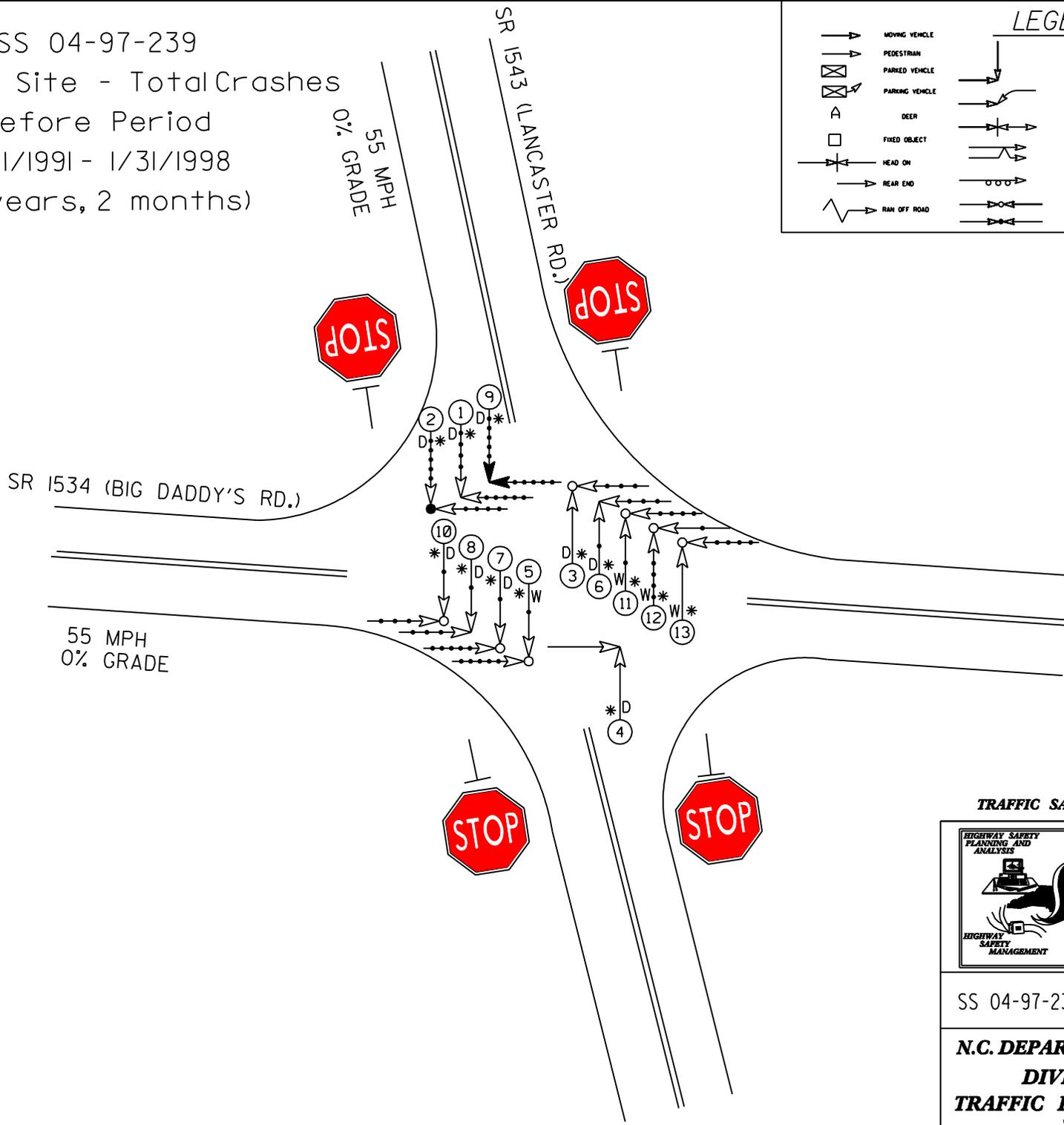
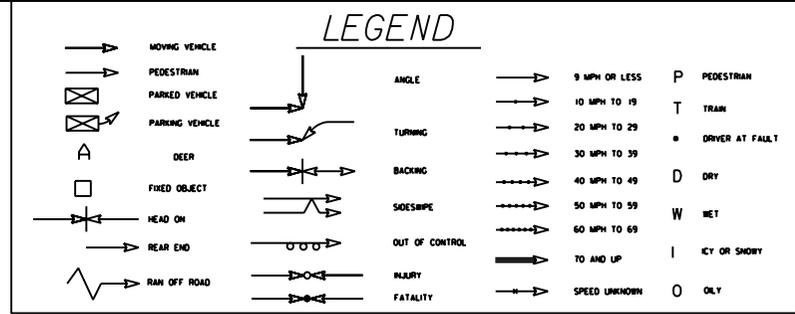


Photo taken while driving north towards treatment intersection.
Notice the Stop Ahead Warning sign.



Photo taken while driving west towards treatment intersection.
Notice the Intersection Warning sign.

SS 04-97-239
 Treatment Site - TotalCrashes
 Before Period
 12/1/1991 - 1/31/1998
 (6 years, 2 months)



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT



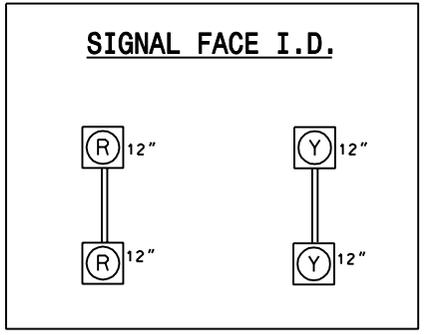
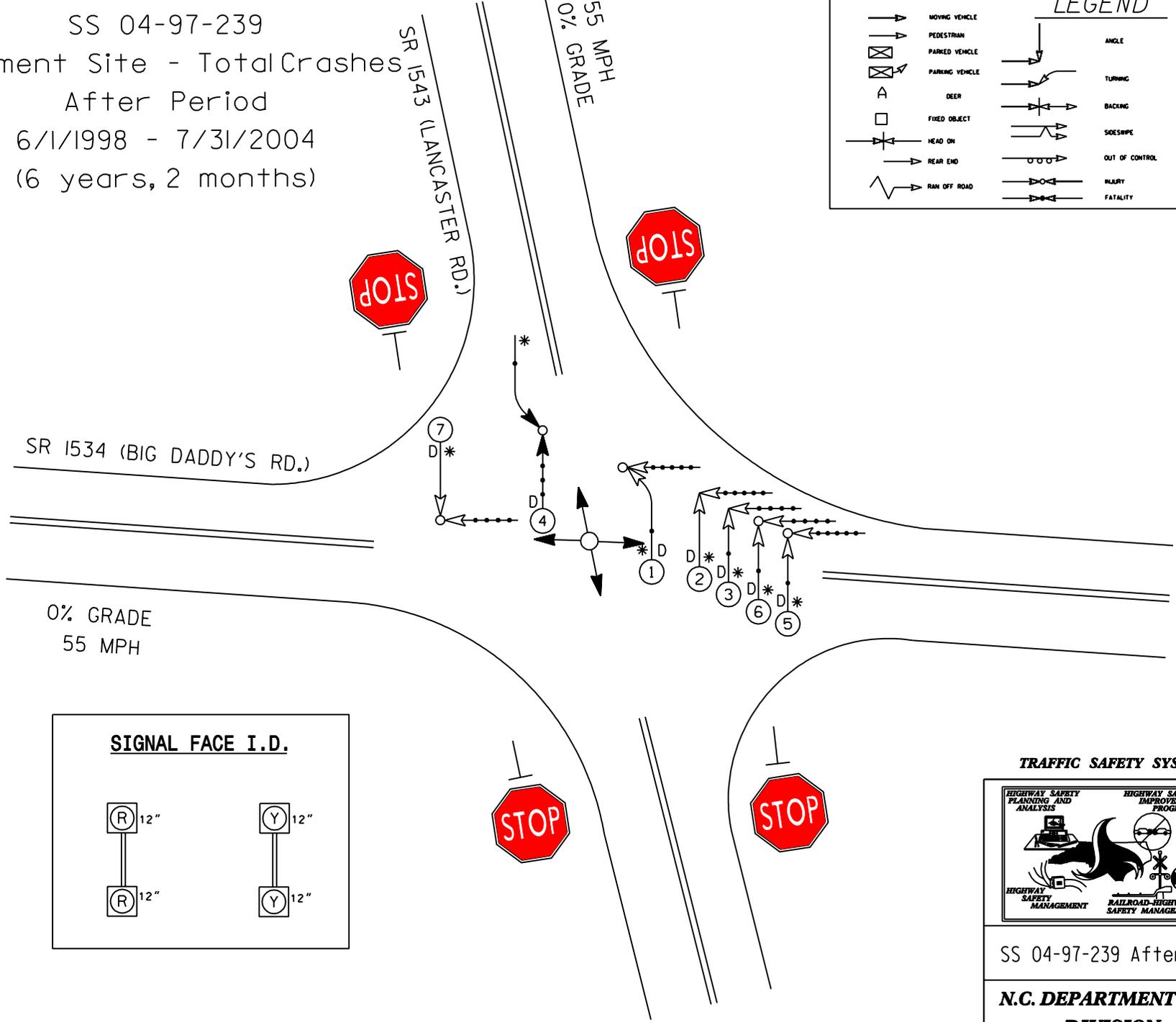
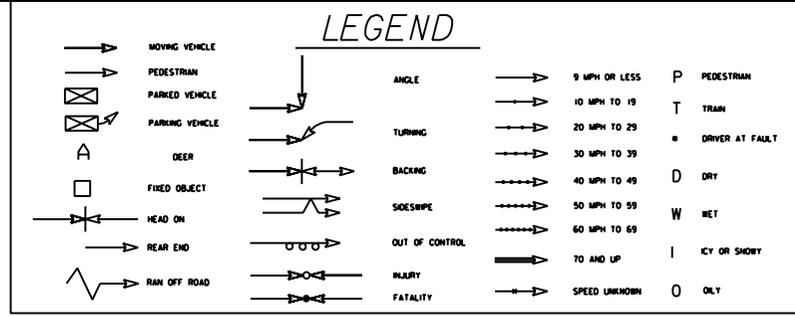
COLLISION DIAGRAM	
DIVISION:	AREA:
STUDY PERIOD: 12/1/91 - 1/31/98	
DISTANCE: Y-LINE = 150 ft	
ANALYSIS PREPARED BY: CLG	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: CLG	
DIAGRAM REVIEWED BY:	

SS 04-97-239 Before

SCALE: NOT TO SCALE
 DATE: 3/3/2004
 LOG NUMBER: 20050242

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

SS 04-97-239
 Treatment Site - TotalCrashes
 After Period
 6/1/1998 - 7/31/2004
 (6 years, 2 months)



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM	
DIVISION:	AREA:
STUDY PERIOD: 6/1/98-7/31/04	
DISTANCE: Y-LINE = 150 ft	
ANALYSIS PREPARED BY: CLG	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: CLG	
DIAGRAM REVIEWED BY:	
SCALE: NOT TO SCALE	
DATE: 3/3/2004	
LOG NUMBER: 20050242	

SS 04-97-239 After

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