

Spot Safety Project Evaluation

Project Log # 200501245

Spot Safety Project # 10-96-220

**Spot Safety Project Evaluation, of the Flashing Traffic Signal Installation,
At the Intersection of NC 24/ 27/ 73 and SR 1720-Valley Drive-Stony Gap Road
Near Albemarle, Stanly County**

Documents Prepared By:

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Principal Investigator

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8/29/2005
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 10-96-220 – The Intersection of NC 24/ 27/ 73 and SR 1720-Valley Drive-Stony Gap Road, near Albemarle, Stanly 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. Benton G. Payne, P.E., Division Engineer, originally requested the improvement. NC 24/ 27/ 73 is a two-lane facility with left turn lanes and a posted speed limit of 55 mph at the treatment intersection. SR 1720-Valley Drive-Stony Gap Road is a two-lane facility with a posted speed limit of 45 mph at the treatment intersection. The subject location is controlled by stop signs on SR 1720-Valley Drive-Stony Gap Road.

The initial crash analysis for this location was completed from January 1, 1992 to November 1, 1995 with a total of six reported crashes. According to the initial crash analysis, there were five Angle crashes and one Rear End crash, resulting in two class A injuries, two class B injuries, and eight class C injuries. The Spot Safety Justification Sheet states the crashes were due to a high volume of traffic entering the stop sign controlled intersection. The final completion date for the improvement at the subject intersection was on May 27, 1997.

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 April 1, 1997 through July 31, 1997. The before period consisted of reported crashes from April 1, 1992 through March 31, 1997 (5 Years) and the after period consisted of reported crashes from August 1, 1997 through July 31, 2002 (5 Years). The dates for this analysis were determined by the construction of left-turn lanes on NC 24/ 27/ 73 prior to the before period.

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 a sum of all crashes within 150 feet of nine intersections located near the treatment intersection. The intersections that comprise the comparison data are as follows:

- NC 24/ 27/73 at Bernard,
- NC 24/ 27/73 at Anderson,
- NC 24/ 27/73 at SR 1537-SR 1734-Anderson,
- NC 24/ 27/73 at SR 1731-Sweet Home Church,
- NC 24/ 27/73 at SR 1736-Dunlap,
- NC 24/ 27/73 at SR 1818-Stoney Mountain,
- NC 24/ 27/73 at SR 1740-Indian Mound,
- NC 24/ 27/73 at SR 1738-Strand, and
- NC 24/ 27/73 at SR 1774-SR 1803-Lake Tillery-Tar Heel.

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	9	10	11.1
Total Severity Index	21.13	18.38	- 13.0
Frontal Impact Crashes	8	8	0.0
Frontal Severity Index	22.73	22.73	0.0
Volume	8700	11100	27.6

Comparison Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	31	46	48.4
Total Severity Index	13.65	4.22	- 86.7
Frontal Impact Crashes	8	10	25.0
Frontal Severity Index	12.33	3.22	- 73.9
Volume	8000	10100	26.3

Odds Ratio: Treatment versus Comparison

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Treatment Total Crashes	9	10	---
Comparison Total Crashes	31	46	- 25.1 %
Treatment Frontal Impact Crashes	8	8	---
Comparison Frontal Impact Crashes	8	10	- 20.0 %

The naive before and after analysis at the treatment location resulted in an 11.1 percent increase in Total Crashes, a 13.0 percent decrease in the Total Severity Index, and a 27.6 percent increase in Average Daily Traffic (ADT). The comparison location experienced a 48.4 percent increase in Total Crashes, an 86.7 percent decrease in the Total Severity Index, and a 26.3 percent increase in ADT. The before period ADT year was 1994 and the after period ADT year was 2000.

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 25.1 percent decrease in Total Treatment Intersection crashes and a 20.0 percent decrease 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 an 11.1 percent increase in Total Crashes and no change in the number of Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 25.1 percent decrease in Total Crashes and a 20.0 percent decrease 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 Total Crashes and no change in the number of Frontal Impact Crashes from the before to the after period using the Naïve Before and After analysis method. However, when using the Odds Ratio to measure the treatment effect there appears to be a decrease in crashes from the before to the after period at the treatment location.

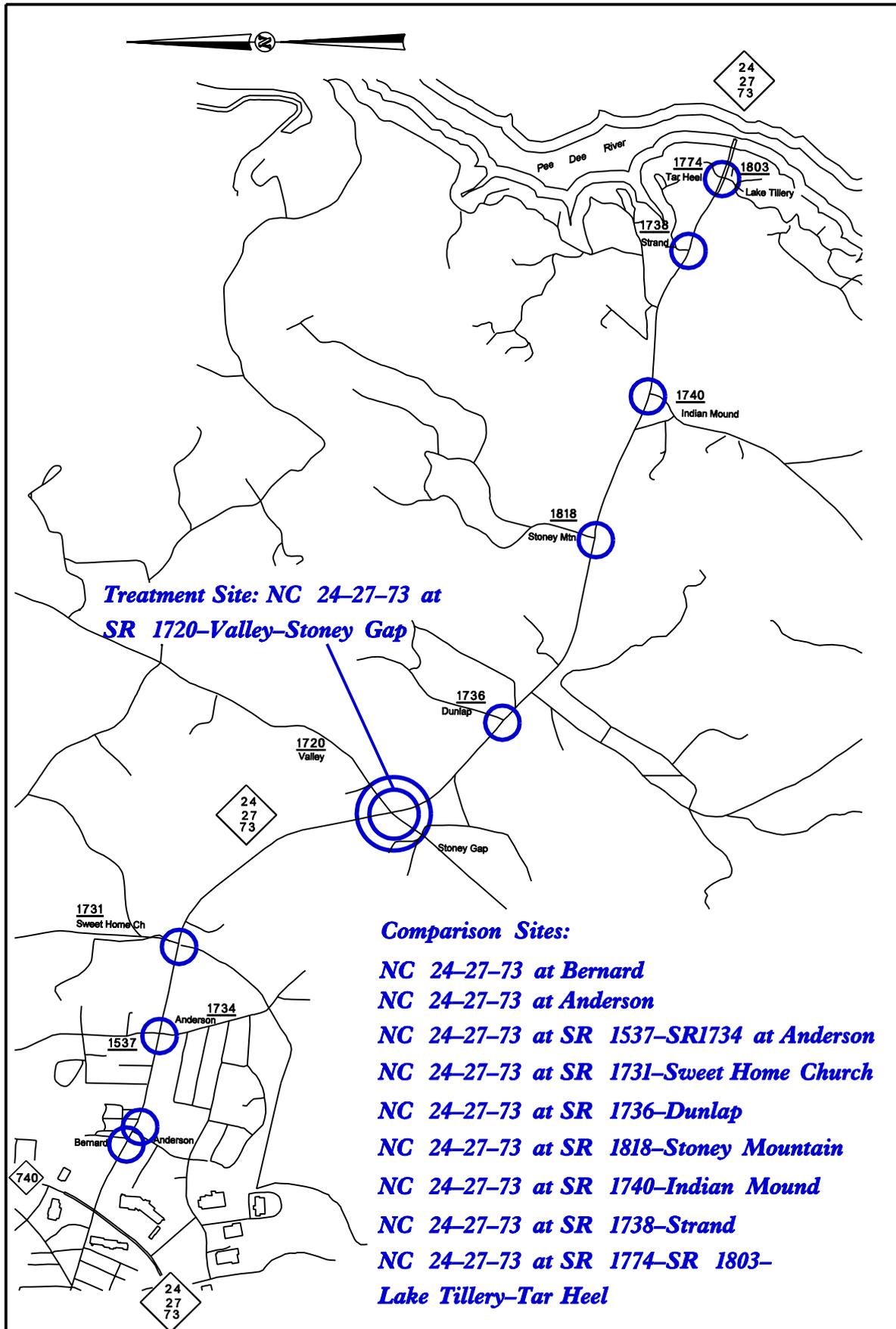
Flashing traffic signals are generally installed to help motorists better identify the existing traffic control. Analysis of the crash data in the before period reveals that at least four out of the nine crashes (44.4 percent) at the treatment intersection were caused by a vehicle running through the stop signs located on SR 1720-Valley Drive-Stony Gap Road. In the after period, none of the crashes at the subject location appeared to be caused by a vehicle running through the stop signs. Therefore the problem of intersection recognition appears to have been corrected by the treatment.

Please see the attached Treatment Site Photos. Photos are provided for each leg of the intersection. In addition, photos are included to show the advance warning signs on each intersection approach.

The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of a 25.1 percent decrease to an 11.1 percent increase in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection can be in the range of a 20.0 percent decrease to a 0.0 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 10-96-220

Location Map, near Albemarle, Stanly County



Treatment Site Photos (Taken on March 11, 2005)



Looking north on NC 24/ NC 27/ NC 73.



Looking south on NC 24/ NC 27/ NC 73.

Treatment Site Photos (Taken on March 11, 2005)



Looking east on SR 1720 – Valley Road – Stony Gap Road.



Looking west on SR 1720 – Valley Road – Stony Gap Road.

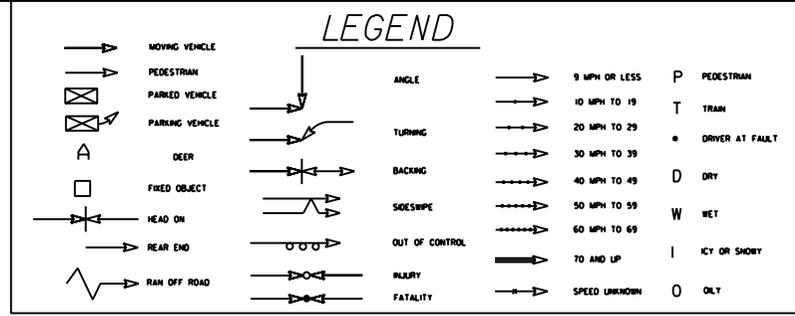
Treatment Site Photos (Taken on March 11, 2005)



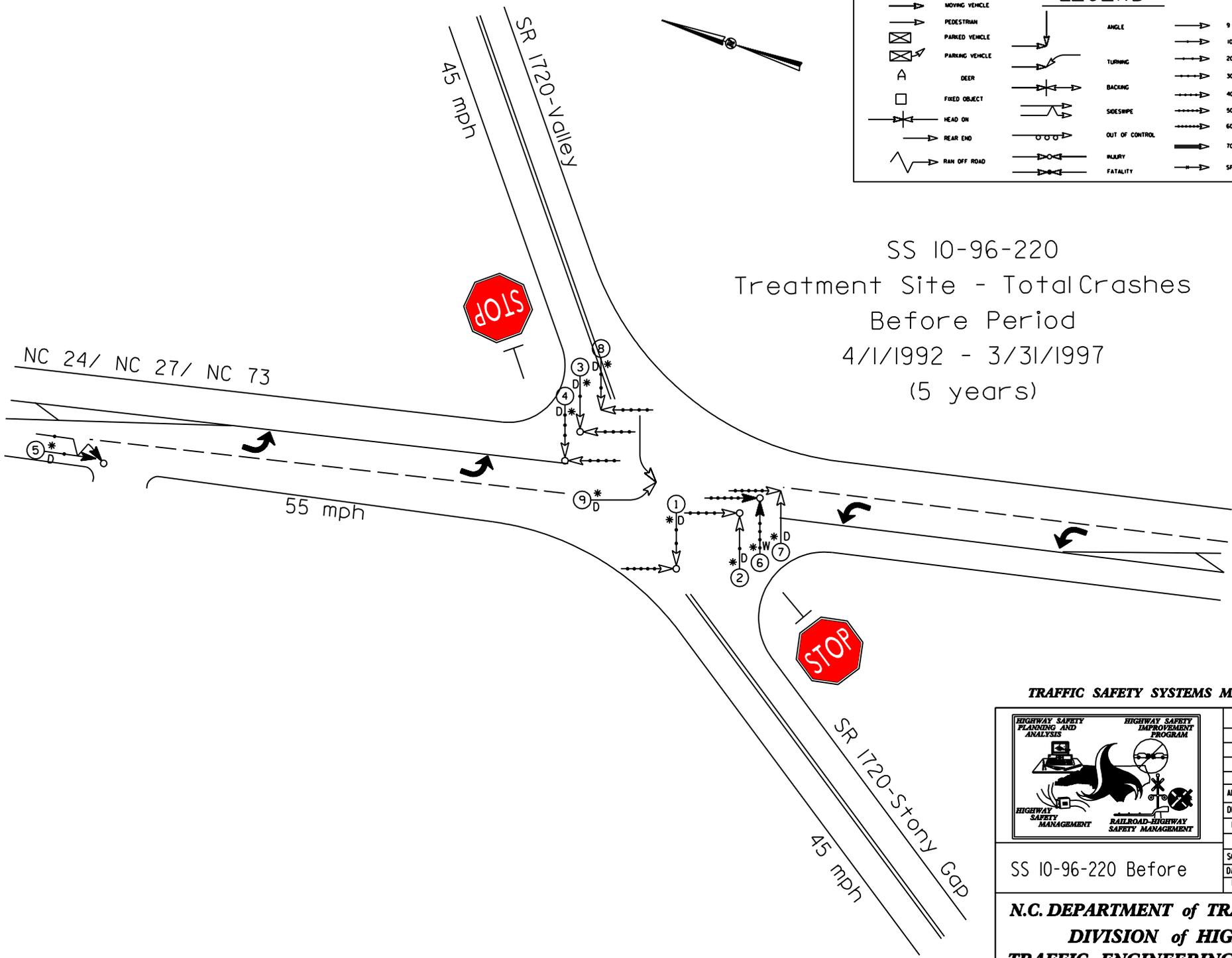
Photos taken while driving east (above, top) and west (above, bottom) towards treatment intersection. Notice the Stop Ahead Warning signs.



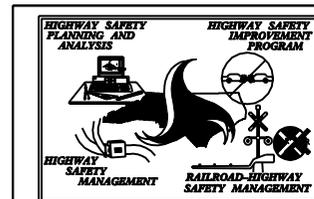
Photos taken while driving north (above, top) and south (above, bottom) towards treatment intersection. Notice the Intersection Warning signs.



SS 10-96-220
 Treatment Site - Total Crashes
 Before Period
 4/1/1992 - 3/31/1997
 (5 years)



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT



COLLISION DIAGRAM	
DIVISION:	AREA:
STUDY PERIOD: 4/1/1992 - 3/31/1997	
DISTANCE: T-LINE = 150 ft	
ANALYSIS PREPARED BY: CLG	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: CLG	
DIAGRAM REVIEWED BY:	

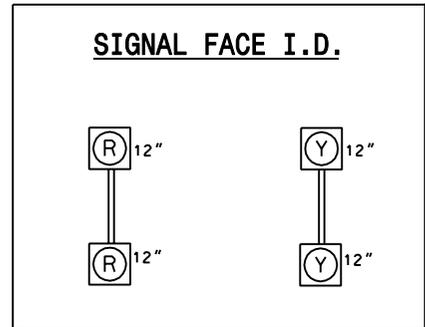
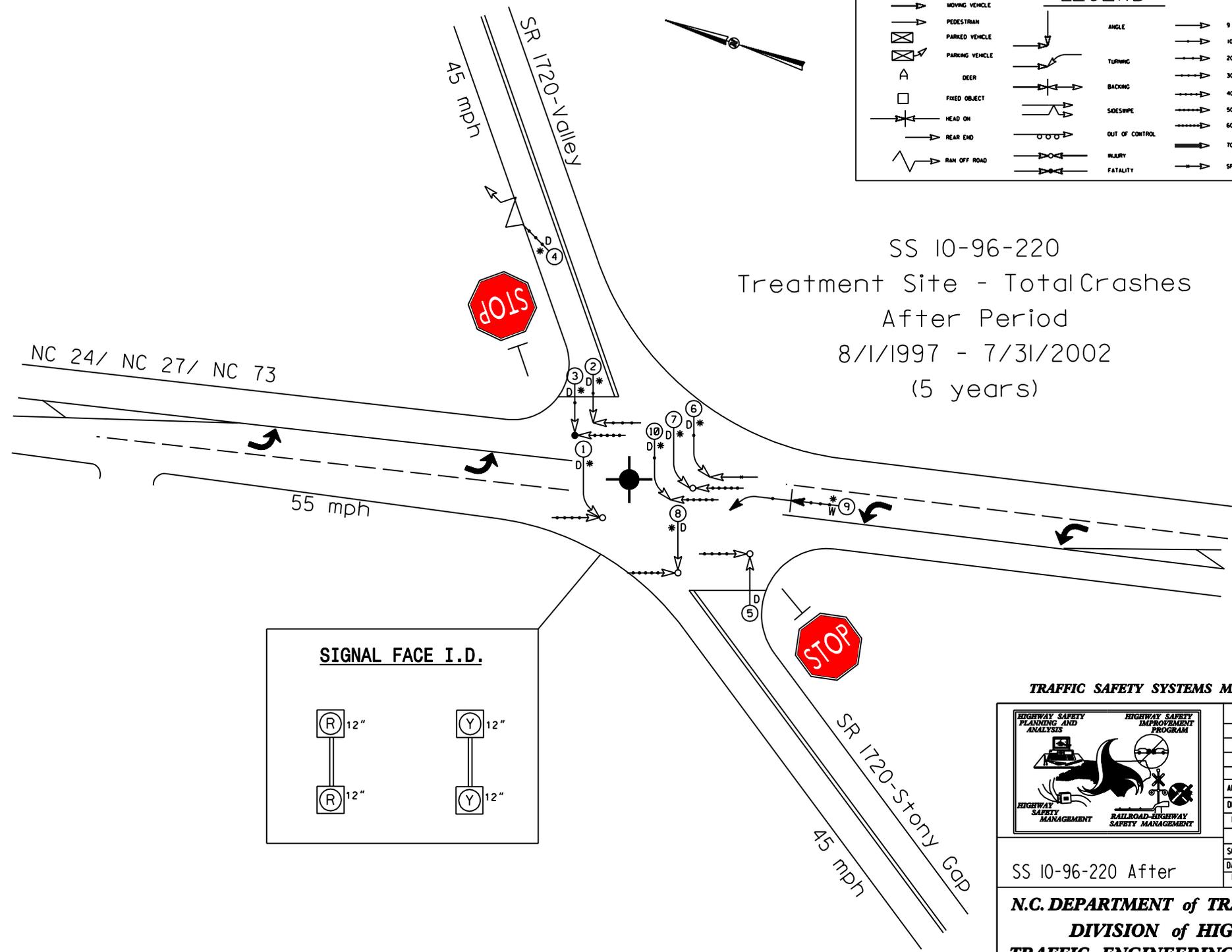
SS 10-96-220 Before

SCALE: NOT TO SCALE
DATE: 3/1/2004
LOG NUMBER: 20050245

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

LEGEND			
	MOVING VEHICLE		ANGLE
	PEDESTRIAN		TURNING
	PARKED VEHICLE		BACKING
	PARKING VEHICLE		SIDESWIPE
	DEER		OUT OF CONTROL
	FIXED OBJECT		INJURY
	HEAD ON		FATALITY
	REAR END		9 MPH OR LESS
	RAN OFF ROAD		10 MPH TO 19
			20 MPH TO 29
			30 MPH TO 39
			40 MPH TO 49
			50 MPH TO 59
			60 MPH TO 69
			TO AND UP
			SPEED UNKNOWN
			P PEDESTRIAN
			T TRAIN
			* DRIVER AT FAULT
			D DRY
			W WET
			I ICY OR SNOWY
			O ONLY

SS 10-96-220
 Treatment Site - Total Crashes
 After Period
 8/1/1997 - 7/31/2002
 (5 years)



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION:	AREA:
	STUDY PERIOD: 8/1/1997 - 7/31/2002	
	DISTANCE: Y-LINE : 150 ft	
	ANALYSIS PREPARED BY: CLG	
ANALYSIS CHECKED BY:		
DIAGRAM PREPARED BY: CLG		
DIAGRAM REVIEWED BY:		
SCALE: NOT TO SCALE		
DATE: 3/1/2004		
LOG NUMBER: 20050245		

SS 10-96-220 After

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