

Spot Safety Project Evaluation

Project Log # 200512164

Spot Safety Project # 04-97-267

**Spot Safety Project Evaluation of the Traffic Signal Installation at SR 1538 (Fenner Road)
and SR 1539 (Instrument Drive) in Nash County**

Documents Prepared By:

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Principal Investigator

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11/21/06
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 04-97-267 – Traffic Signal Installation at SR 1538 (Fenner Road) and SR 1539 (Instrument Drive) in Nash County

Project Information and Background from the Project File Folder

SR 1538 is a two lane facility with a speed limit of 45 mph up to a point of 0.9 mile north of the intersection with SR 1539. From a point of 0.9 mile north of the intersection with SR 1539, the speed limit is 55 mph to US 301. SR 1539 is a two lane facility with a speed limit of 45 mph. The intersection was controlled by a stop condition on SR 1539.

There is a sharp horizontal curve on the north leg of SR 1538 that resulted in 22 crashes at the treatment intersection from August 1, 1991 through July 31, 1997. There were 13 Angle, 4 Ran off Road, 2 Left Turn, 2 Right Turn and 1 random crash. Previously, the intersection did not meet signal warrants; therefore several other attempts were made to reduce crashes. Following the unsuccessful attempts a decision was made to install a traffic signal. The final completion date for the improvement at the subject location was on May 13, 1999 at a cost of \$40,000.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes along the subject road, the crash data omitted from this analysis to consider for an adequate construction period was from April 1999 through June 1999. The before period consisted of reported crashes from April 1, 1992 through March 31, 1999 (7 years) and the after period consisted of reported crashes from July 1, 1999 through June 30, 2006 (7 Years). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The treatment data consisted of all crashes within 150 feet of the subject intersection. The following data table depicts the Naive Before and After Analysis for the above information. Please note that Frontal Impact crash types were the target crashes for the applied countermeasure. These crash types considered are as follows: Left Turn, same roadway; Left Turn, different roadway; Right Turn, same roadway; Right Turn, different roadway; Head On and Angle.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	40	6	-85.0
Total Severity Index	12.1	5.9	-50.9
Frontal Impact Crashes	34	3	-91.2
Frontal Severity Index	13.6	5.9	-56.4
Volume	4450	5400	21.3
<u>Treatment Injury Crashes</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal	0	0	N/A
Class A	4	0	-100.0
Class B	5	2	-60.0
Class C	14	2	-85.7
Property Damage Only	17	2	-88.2
<u>Frontal Injury Crashes</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal	0	0	N/A
Class A	4	0	-100.0
Class B	4	1	-75.0
Class C	13	1	-92.3
Property Damage Only	13	1	-92.3

Table 1.

The naive before and after analysis at the treatment location resulted in an 85 percent decrease in Total Crashes, a 91 percent decrease in Frontal Impact Crashes, and a 21 percent increase in Average Daily Traffic (ADT). The before period ADT year was 1995 and the after period ADT year was 2002.

Results and Discussion

The naïve before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in an 85 percent decrease in Total Crashes and a 91 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 Total Crashes and a decrease in the number of Frontal Impact Crashes from the before to the after period.

The treatment location shows a significant decrease in the number of Frontal Impact Crashes and severity from the before to the after period. There were 33 Frontal Impact crashes in the before period directly at the intersection. Eighteen crashes involved vehicles from the north approach and 15 from the south approach. The after period shows a total of three Frontal Impact crashes, all involving vehicles from the north approach. Poor sight distance may still exist at the intersection, but adequate signing and traffic control seems to have assisted in reducing crashes.

Prior to the traffic signal installation, there were other countermeasures implemented. Signing and pavement markings were improved, the speed limit was reduced to 45 mph on a portion of the north leg of SR 1538, and an actuated, shoulder mounted “Vehicle Entering When Flashing” sign was installed on the north approach of SR 1538. Upon installation of the signal all of the previous countermeasures remained unchanged except for the shoulder mounted flasher. The shoulder mounted flasher is now actuated by the yellow interval on SR 1538 alerting vehicles to stop ahead (Figures 1 and 2).

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As stated before, the project seems to be beneficial for the treatment intersection. However, there were questions raised about the ability to quickly comprehend the signing when approaching the intersection from the north. Figures 1, 2 and 3 point out the areas of concern with supporting sections from the 2003 MUTCD.



Figure 1.

This photo shows a Signal Ahead and a Stop Ahead sign in succession. This may be confusing as to which traffic control device is being used at the intersection.

The following is the standard, from the MUTCD 2003 edition Section 2C.29, for this type of situation:

Standard:

When a BE PREPARED TO STOP (W3-4) sign is used in advance of a traffic control signal, it shall be used in addition to a Signal Ahead sign.

Option:

The BE PREPARED TO STOP sign may be supplemented with a warning beacon (see Section 4K.03).

Guidance:

When the warning beacon is interconnected with a traffic control signal or queue detection system, the BE PREPARED TO STOP sign should be supplemented with a WHEN FLASHING plaque.



Figure 2.

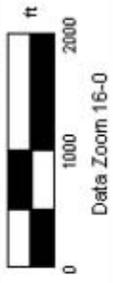
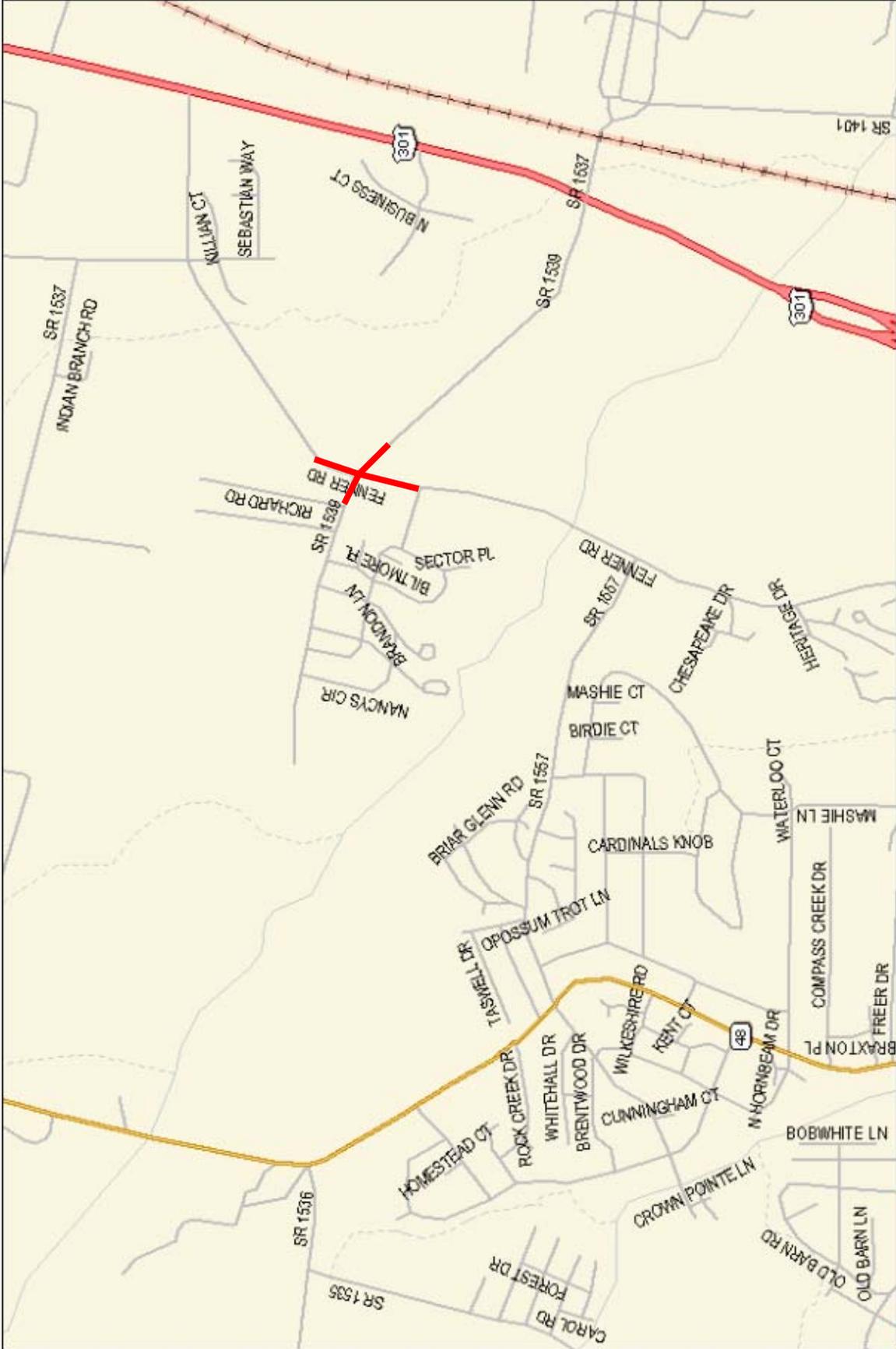
A Stop Ahead (W3-1) sign shall be used where a STOP sign is not visible for a sufficient distance to permit the road user to bring the vehicle to a stop at the STOP sign. (MUTCD 2003, Section 5C.04)



Figure 3.

Intersection warning signs, other than the Circular Intersection symbol (W2-6) sign and the T-intersection symbol (W2-4) sign, should not be used on approaches controlled by STOP signs, YIELD signs or signals. (MUTCD 2003, Section 2C.37) Also this sign was placed on the left side of the roadway which gives it the potential to be blocked by trucks from the local industrial area.

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 road.




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Location Map: Nash County, SR 1538 (Fenner Rd.) and SR 1539 (Instrument Dr.)

Treatment Site Photos taken October 6, 2006



On SR 1539 facing east



On SR 1539 driving east looking north



Looking north on SR 1538



Looking north on SR 1538



On SR 1539 looking west



On SR 1539 driving west looking north

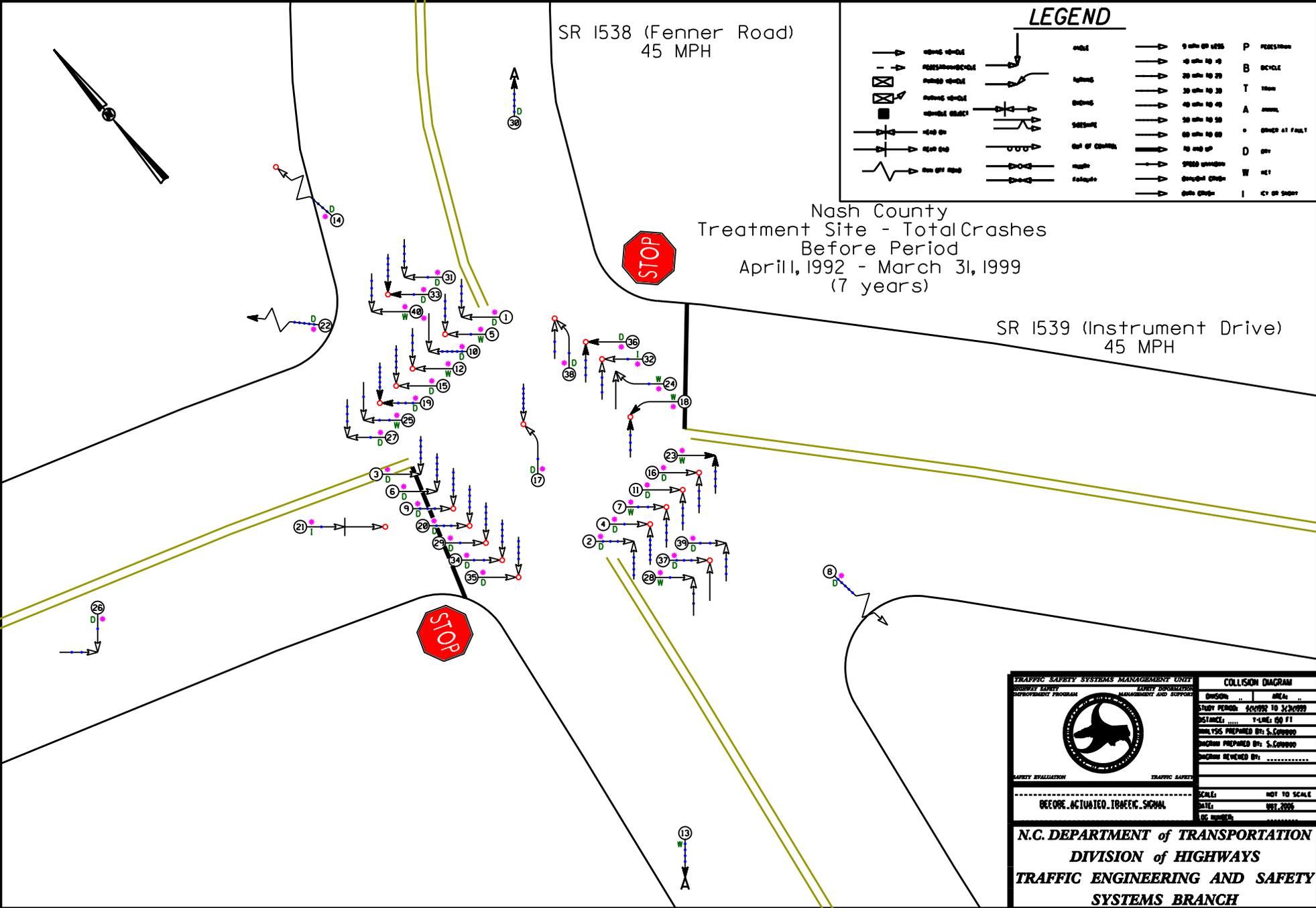
SR 1538 (Fenner Road)
45 MPH

LEGEND

	Vehicle		9 mph or less	P	Person
	Vehicle		10 mph to 19	B	Bicycle
	Vehicle		20 mph to 29	T	Truck
	Vehicle		30 mph to 39	A	Animal
	Vehicle		40 mph to 49	*	Other at Fault
	Vehicle		50 mph to 59	D	Driv
	Vehicle		60 mph to 69	W	Wet
	Vehicle		70 mph or more	I	ICV or Sign
	Vehicle		9 mph or less		
	Vehicle		10 mph to 19		
	Vehicle		20 mph to 29		
	Vehicle		30 mph to 39		
	Vehicle		40 mph to 49		
	Vehicle		50 mph to 59		
	Vehicle		60 mph to 69		
	Vehicle		70 mph or more		
	Vehicle		9 mph or less		
	Vehicle		10 mph to 19		
	Vehicle		20 mph to 29		
	Vehicle		30 mph to 39		
	Vehicle		40 mph to 49		
	Vehicle		50 mph to 59		
	Vehicle		60 mph to 69		
	Vehicle		70 mph or more		

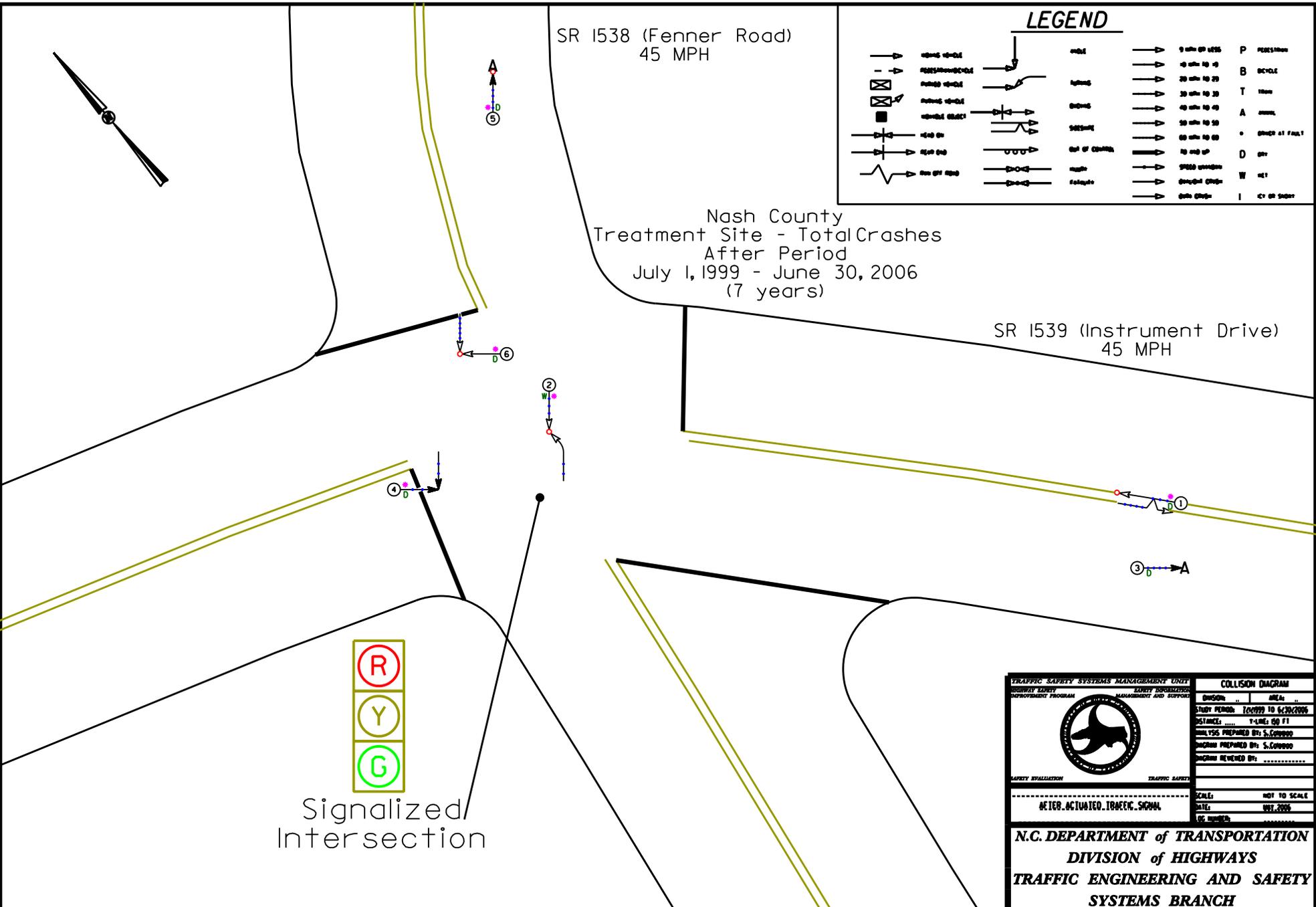
Nash County
Treatment Site - Total Crashes
Before Period
April 1, 1992 - March 31, 1999
(7 years)

SR 1539 (Instrument Drive)
45 MPH



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT HIGHWAY SAFETY SAFETY PROMOTION IMPROVEMENT PROGRAM MANAGEMENT AND SUPPORT		COLLISION DIAGRAM	
		DIVISION: AREA:	
SAFETY INSTALLATION TRAFFIC SAFETY		STUDY PERIOD: 4/1/92 TO 3/31/99	
BECOME ACTIVATED, TRAFFIC SIGNAL		DISTANCE: 1+MILE: 00 01	
ANALYSIS PREPARED BY: S. CONNOR		DATE:	
DIAGRAM PREPARED BY: S. CONNOR		SCALE: NOT TO SCALE	
PROGRAM REVIEWED BY:		DATE:	
(LIC. NUMBER)		(LIC. NUMBER)	

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



	COLLISION DIAGRAM
	DIVISION: .. COUNTY: .. STUDY PERIOD: 7/1/99 TO 6/30/2006 DISTANCE: .. ANALYSIS PREPARED BY: S. CONNOR DIAGRAM PREPARED BY: S. CONNOR PROGRAM REVIEWED BY: ..
	SCALE: NOT TO SCALE DATE: OCT 2006 (SHEET NO.)
	N.C. DEPARTMENT of TRANSPORTATION DIVISION of HIGHWAYS TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH