Spot Safety Project Evaluation

Project Log # 200501231

Spot Safety Project # 10-99-214

Spot Safety Project Evaluation of the Flashing Traffic Signal Installation at the Intersection of NC 200 and SR 1006 (Mt. Pleasant Rd) in Cabarrus County

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

_____ 08/26/2005
Samuel D. Coleman Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 10-99-214 – The intersection of NC 200 and SR 1006 (Mt. Pleasant Rd) in Cabarrus 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 the installation of a flashing traffic signal. NC 200 is a two-lane facility with no left turn lanes at the intersection with SR 1006. SR 1006 is also a two-lane facility with no left turn lanes. NC 200 has a speed limit of 55 mph and SR 1006 has a speed limit of 45 mph. The intersection is controlled by stop signs on SR 1006 in the before period. It was stated that drivers had difficulty recognizing the existing stop condition. The initial crash analysis for this intersection was completed from March 1, 1996 to March 1, 1999 that yielded 5 total crashes, all of them correctable by installing a flasher. These crashes resulted in 2 Fatality, 1 Class B, and 1 Class C injury. The final completion date for the construction of the flashing traffic signal was August 4, 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 July 2000 through September 2000. The before period consisted of reported crashes from August 1, 1996 through June 30, 2000 (3 Years, 11 Months) and the after period consisted of reported crashes from October 1, 2000 through August 30, 2004 (3 Years, 11 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, at the intersection of NC 200 and SR 1100. 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.

Treatment Information

	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	6	5	-16.7
Total Severity Index	30.0	4.0	-86.8
Frontal Impact Crashes	5	4	-20.0
Frontal Severity Index	34.3	2.9	-91.7
Volume	4100	4700	14.6

Comparison Information

	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	1	6	500.0
Total Severity Index	8.4	4.7	-44.0
Frontal Impact Crashes	1	3	200.0
Frontal Severity Index	8.4	3.5	-58.7
Volume	3100	3100	0.0

Odds Ratio: Treatment versus Comparison

	Before	After	Percent Reduction (-) Percent Increase (+)
Treatment Total Crashes	6	5	-86.1
Comparison Total Crashes	1	6	
Treatment F.I. Crashes	5	4	-73.3
Comparison F.I. Crashes	1	3	

The naive before and after analysis at the treatment location resulted in a 16.7 percent decrease in Total Crashes, a 20.0 percent decrease in Frontal Impact Crashes, and a 14.6 percent increase in Average Daily Traffic (ADT). The comparison locations resulted in a 500.0 percent increase in Total Crashes, a 200.0 percent increase in Frontal Impact Crashes, and a 0.0 percent change 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 Intersection 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 an 86.1 percent decrease in Treatment Intersection crashes and a 73.3 percent decrease in Frontal Impact crashes.

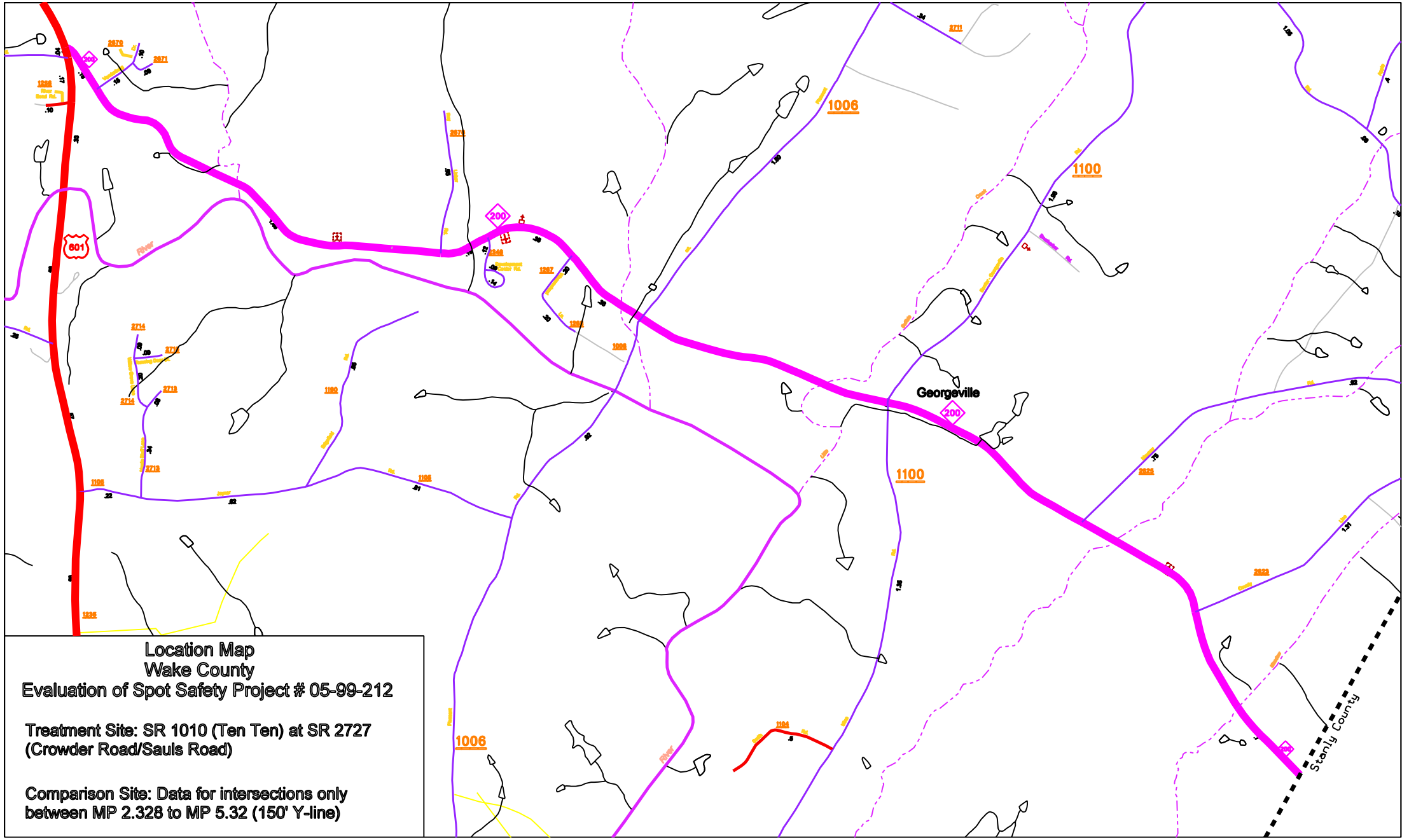
Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 16.7 percent decrease in Total Crashes and a 20.0 percent decrease in Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in an 86.1 percent decrease in Total Crashes at the Treatment Intersection and a 73.3 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 flashing traffic signal was installed as a counter-measure to provide a safer intersection for the traveling public. As stated before, there were reports of drivers not recognizing the stop condition on SR 1006. Analysis of the crash diagrams show significant evidence of consistent stop sign violations in the before period. After the installation of the flasher, the severity of the crashes was reduced, even though the amount of Frontal Impacts only showed a small decrease.

Referring to the crash diagrams, there seems to be no definitive pattern of crashes in the before period. There is a small pattern of angle crashes in the after period, but there seems to be no sight distance issue or traffic problem to support the pattern. All of the angle crashes in the after period were either at 20mph or below. This fact may illustrate that motorists are now proceeding to and through the intersection more cautiously.

The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of a 16.7 to a 86.1 percent decrease in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection can be in the range of a 20.0 to a 73.3 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.



Location Map
Wake County
Evaluation of Spot Safety Project # 05-99-212

Treatment Site: SR 1010 (Ten Ten) at SR 2727
(Crowder Road/Sauls Road)

Comparison Site: Data for intersections only
between MP 2.328 to MP 5.32 (150' Y-line)

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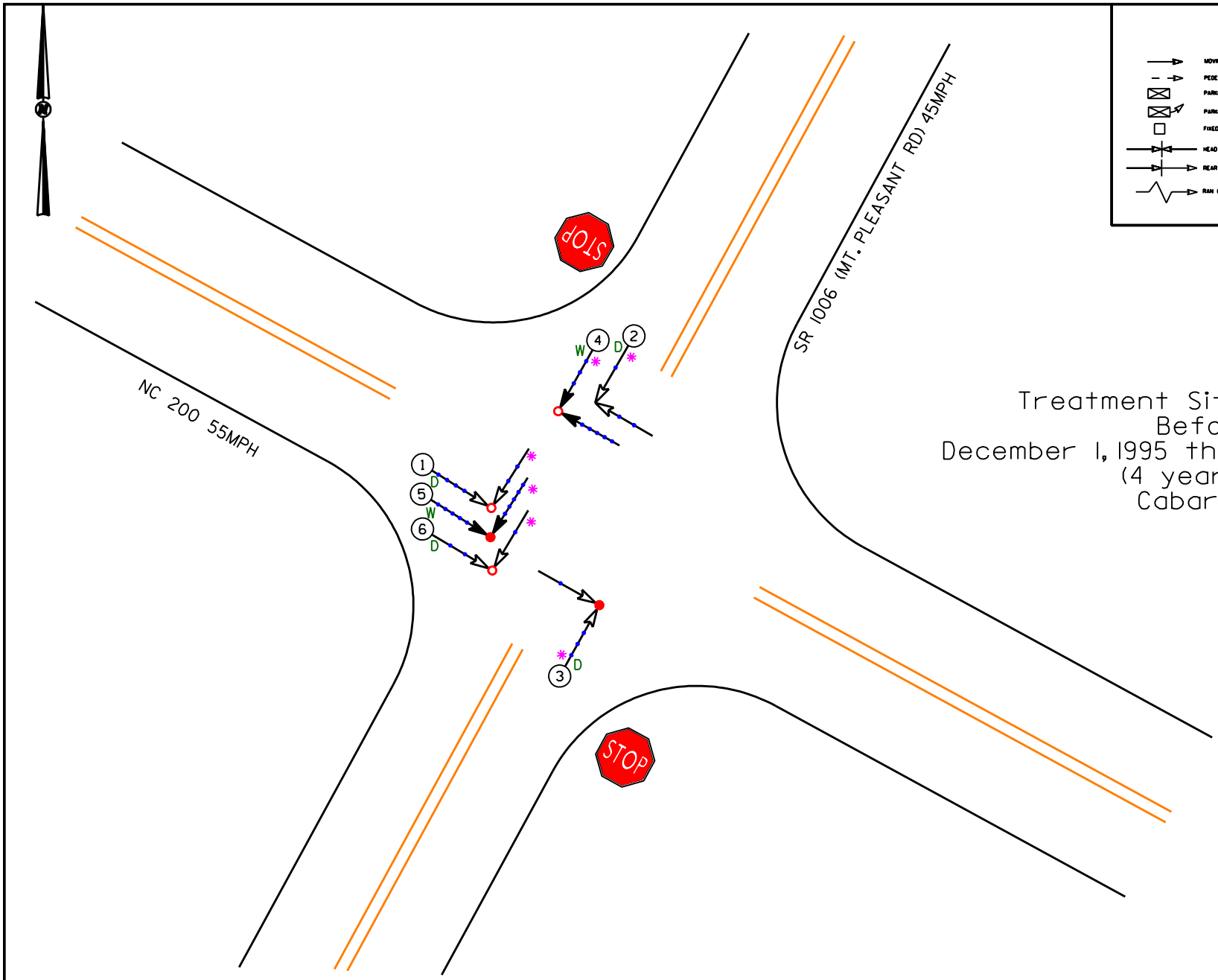
Southbound approach looking west

Southbound approach looking east

Northbound approach looking east

Northbound approach looking west



LEGEND

MOVING VEHICLE
PEDESTRIAN
PARKED VEHICLE
PARKING VEHICLE
FIXED OBJECT
HEAD ON
REAR END
RAN OFF ROAD

ANGLE
TURNING
BACKING
SIDESWIPE
OUT OF CONTROL
INJURY
FATALITY

9 MPH OR LESS
10 MPH TO 19
20 MPH TO 29
30 MPH TO 39
40 MPH TO 49
50 MPH TO 59
60 MPH TO 69
70 AND UP
SPEED UNKNOWN
DAYLIGHT CRASH
DARK CRASH

P PEDESTRIAN
B BICYCLE
T TRAIN
A ANIMAL
VEHICLE FIRE
DRIVER AT FAULT
D DRY
W WET
I ICY OR SNOWY

Treatment Site - Total Crashes
Before Period
December 1, 1995 through February 28, 2000
(4 years 3 months)
Cabarrus County

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT
HIGHWAY SAFETY IMPROVEMENT PROGRAM
SAFETY INFORMATION MANAGEMENT AND SUPPORT
SAFETY EVALUATION
TRAFFIC SAFETY

INTERSECTION OF SR 1006 (MT. PLEASANT RD)
AND NC 200 IN CABARRUS COUNTY

COLLISION DIAGRAM	
DIVISION: 10	REGION: METROLINA
STUDY PERIOD:	12/1/1995 TO 2/28/2000
DISTANCE: X.XX	Y-LINE: 150 FT
ANALYSIS PREPARED BY:	Sam Coleman
DIAGRAM PREPARED BY:	Sam Coleman
DIAGRAM REVIEWED BY:	NAME
SCALE:	NOT TO SCALE
DATE:	4/26/2005
LOG NUMBER:	20050123
PAGE:	1 OF 1

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DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

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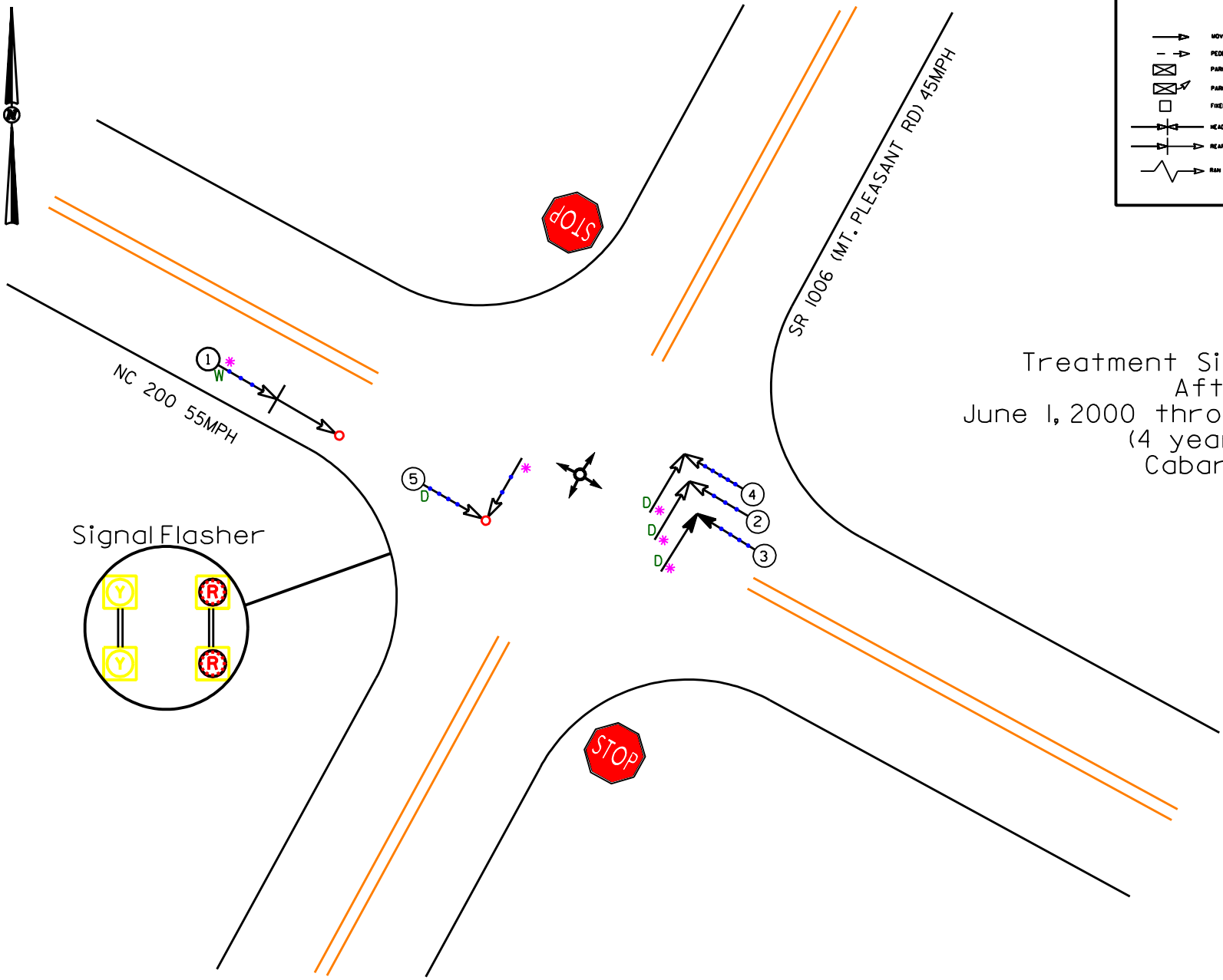

LEGEND

MOVING VEHICLE
PEDESTRIAN
PARKED VEHICLE
PARKING VEHICLE
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P PEDESTRIAN
B BICYCLE
T TRAIN
A ANIMAL
VEHICLE FIRE
DRIVER AT FAULT
D DRY
W WET
I ICY OR SNOWY

Treatment Site - Total Crashes
After Period
June 1, 2000 through September 30, 2004
(4 years 3 months)
Cabarrus County

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INTERSECTION OF SR 1006 (MT. PLEASANT RD)
AND NC 200 IN CABARRUS COUNTY

COLLISION DIAGRAM	
DIVISION: 10	REGION: METROLINA
STUDY PERIOD:	6/1/2000 TO 9/30/2004
DISTANCE: X.XX	Y-LINE: 150 FT
ANALYSIS PREPARED BY:	Sam Coleman
DIAGRAM PREPARED BY:	Sam Coleman
DIAGRAM REVIEWED BY:	NAME
SCALE:	NOT TO SCALE
DATE:	4/26/2005
LOG NUMBER:	20050231
PAGE:	1 OF 1

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