

Spot Safety Project Evaluation

Project Log # 200704292

Spot Safety Project # 07-98-223

Spot Safety Project Evaluation of the Traffic Signal Installation At the Intersection of NC 49 (Maple Ave) and SR 1148 (Anthony Rd) Alamance County

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Transportation Mobility and Safety Division
North Carolina Department of Transportation

Principal Investigator

Brad Robinson, EI

10/20/2008
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 07-98-223 – The Intersection of NC 43 (Maple Ave) and SR 1148 (Anthony Rd) in Alamance County.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was to install a fully actuated traffic signal at the intersection. The intersection is a 3-leg intersection, with SR 1148 (Anthony Rd) intersecting NC 49 (Maple Ave) at a skew, making a “Y” type intersection. In the before period the intersection was controlled by a stop sign on SR 1148. A right turn lane is provided on the southbound NC 49 approach. The other two legs have single lane approaches. The speed limit is 35 mph for NC 49 and 45 mph for SR 1148.

The original statement of problem was that vehicles could not safely enter the intersection due to insufficient gaps in traffic. The original investigation revealed that the intersection met MUTCD volume warrants 1, 6, 9, and 11.

The initial crash analysis was conducted from September 1, 1995 to August 1, 1998 with a total of 22 reported crashes, 12 of which were considered correctable by the chosen countermeasure. The final completion date for the improvements at the subject intersection was on March 26, 2002 with a total cost of \$75,000.00.

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 February 1, 2002 to May 31, 2002. The before period consisted of reported crashes from January 1, 1996 through January 31, 2002 (6 years and 1 months) and the after period consisted of reported crashes from June 1, 2002 through June 30, 2008 (6 years and 1 months). The ending date for this analysis was limited by the available crash data at the time the analysis was conducted.

The treatment data consisted of all reported crashes within 150 feet of the subject intersection. The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Frontal Impact crash types were considered the Target Crashes for the applied countermeasure. These crash types are considered as follows: Left Turn, same roadway; Left Turn, different roadway; Right Turn, same roadway; Right Turn, different roadway; Head On and Angle. The target crashes are clearly identified in the before and after period collision diagrams.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	27	6	-77.8
Total Severity Index	4.29	4.7	9.6
Target Crashes	15	3	-80.0
Target Crash Severity Index	4.45	5.93	33.3
Volume	14,500	14,700	1.4
<u>Crash Severity Summary</u>			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	4	0	-100.0
Class C Crashes	8	3	-62.5
PDO Crashes	15	3	-80.0

The naive before and after analysis at the treatment location resulted in a 78 percent decrease in Total Crashes, an 80 percent decrease in Target Crashes, and a 1 percent increase in Average Daily Traffic (ADT). The before period ADT year was 1999 and the after period ADT year was 2005.

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 78 percent decrease in Total Crashes and an 80 percent decrease in Target Crashes. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have decreased at the treatment location from the before to the after period.

The calculated benefit to cost ratio for this project is 2.57 considering total crashes. The benefit to cost ratio considering only target crashes is 1.44. The benefits are calculated using the change in annual crash costs from the before to the after period. Operational and other benefits related to the project are not considered in this analysis. The costs of the project include the actual construction costs as well as the increase in annual maintenance and utility costs.

Referencing the Collision Diagrams and the above table, it is apparent that the traffic signal installation was effective at reducing Frontal Impact Crashes at the subject intersection. The most prominent crash pattern in the before period was Left Turn-Different Roadway crashes between a left turning vehicle from SR 1148 and a southbound vehicle on NC 49. This pattern made up 14 of the 15 before period Target Crashes. In the after period there were only two crashes of this type.

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 roadway.

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: NC 49 at SR 1148
 COUNTY: Alamance
 FILE NO.: SS 07-98-223

BY: BDR
 DATE: 10/16/2008

DETAILED COST: TYPE IMPROVEMENT - Traffic Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$75,000	10	0.149	\$11,177
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$75,000	10	0.149	\$11,177

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$2,000
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$900
 TOTAL ANNUAL COST= \$14,077
 TOTAL COST OF PROJECT= \$75,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	6.09	0	0.00	12	1.97	15	2.46	\$47,537
AFTER	6.09	0	0.00	3	0.49	3	0.49	\$11,379

Annual Benefits from Crash Cost Savings \$36,158

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$22,080

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 2.57

TOTAL COST OF PROJECT - \$75,000 COMPREHENSIVE B/C RATIO - 2.57

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: NC 49 at SR 1148
 COUNTY: Alamance
 FILE NO.: SS 07-98-223 Target Crashes

BY: BDR
 DATE: 10/16/2008

DETAILED COST: TYPE IMPROVEMENT - Traffic Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$75,000	10	0.149	\$11,177
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$75,000	10	0.149	\$11,177

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$2,000
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$900
 TOTAL ANNUAL COST= \$14,077
 TOTAL COST OF PROJECT= \$75,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES				PDO		ANNUAL COSTS
		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	CRASHES	CRASHES PER YR	
BEFORE	6.09	0	0.00	7	1.15	8	1.31	\$27,225
AFTER	6.09	0	0.00	2	0.33	1	0.16	\$6,913

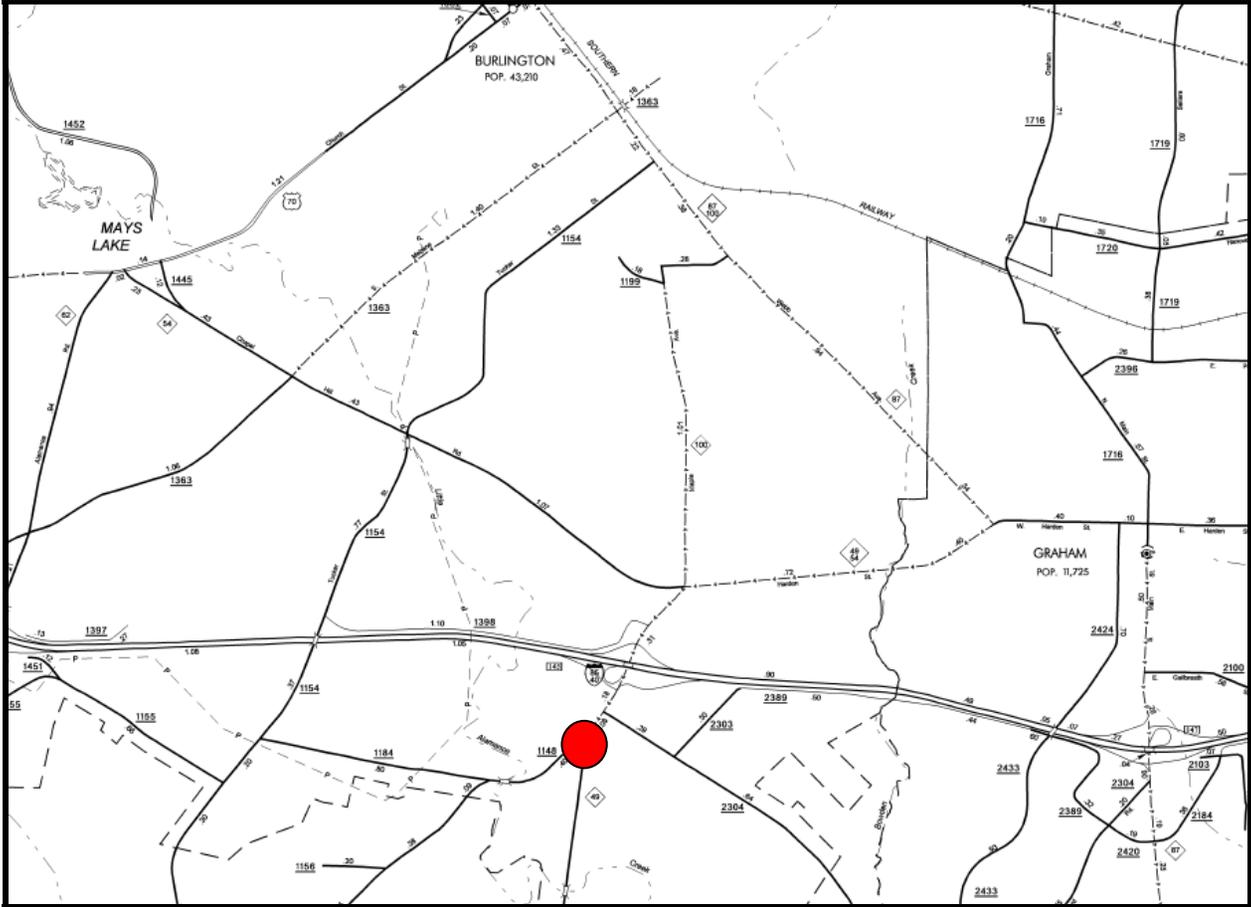
Annual Benefits from Crash Cost Savings \$20,312

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$6,235

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 1.44

TOTAL COST OF PROJECT - \$75,000 COMPREHENSIVE B/C RATIO - 1.44

**Location Map
Alamance County
Evaluation of Spot Safety Project #07-98-223**



Treatment Location: NC 49 (Maple Ave) at SR 1148 (Anthony Rd)

Site Photos Taken February 18, 2008



Traveling Southbound on NC 49 (Maple Ave)



Traveling Southbound on NC 49 (Maple Ave)



Traveling Northbound on NC 49 (Maple Ave)



Traveling Northbound on NC 49 (Maple Ave)



Traveling Eastbound on SR 1148 (Anthony Rd)



Traveling Eastbound on SR 1148 (Anthony Rd)

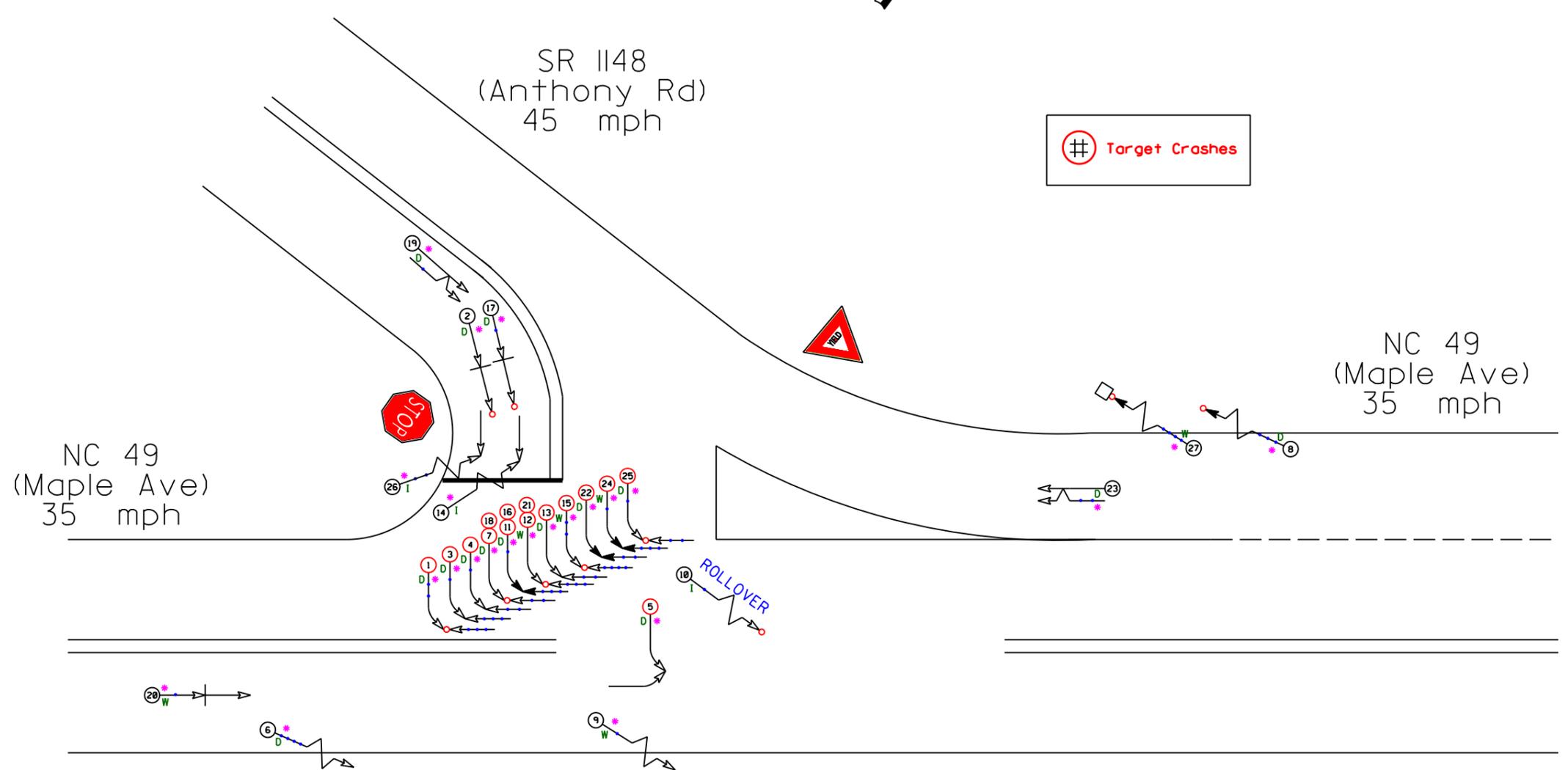
Alamance County
 NC 49 (Maple Ave) at
 SR 1148 (Anthony Rd)
 Before Period
 1/1/1996-1/31/2002

LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PARKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		INJURY		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		ONLY
	RAN OFF ROAD				70 AND UP		
					SPEED UNKNOWN		



Target Crashes

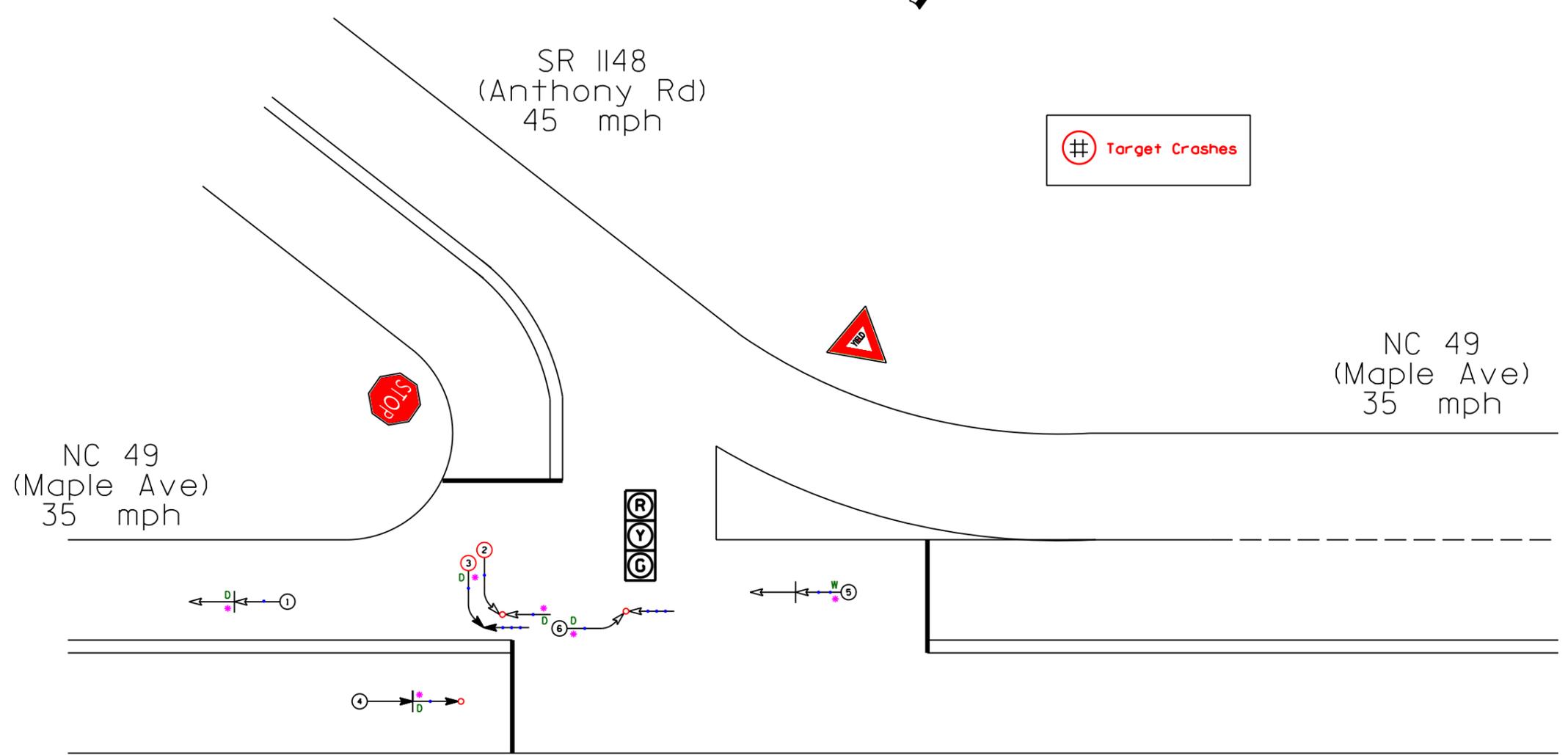
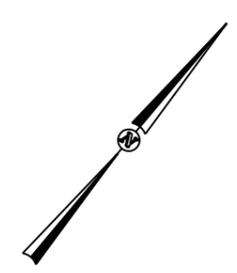
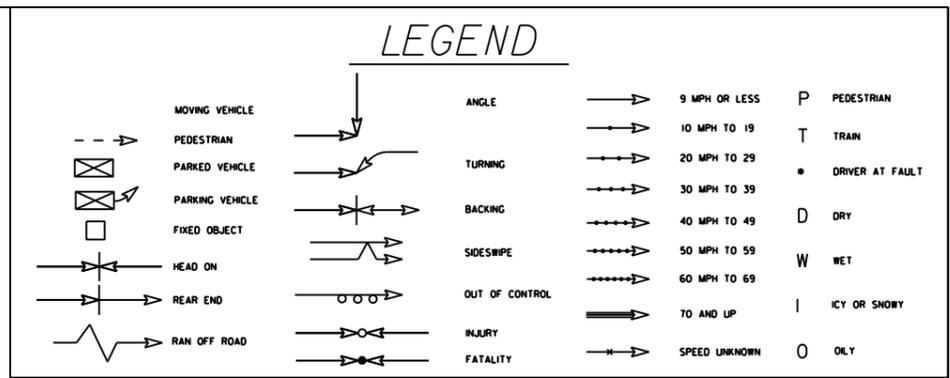


TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM	
DIVISION: 7	AREA:
STUDY PERIOD: 1/1/1996 TO 1/31/2002	
DISTANCE: Y-LINE = 150 FT	
ANALYSIS PREPARED BY: BDR	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: BDR	
DIAGRAM REVIEWED BY:	
SCALE: NOT TO SCALE	
DATE: October 2008	
LOG NUMBER: 200704292	

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRANSPORTATION MOBILITY
AND SAFETY DIVISION

Alamance County
 NC 49 (Maple Ave) at
 SR 1148 (Anthony Rd)
 After Period
 1/1/1996-1/31/2002



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 7	AREA:
STUDY PERIOD: 1/1/1996 TO 1/31/2002		
DISTANCE: Y-LINE = 150 FT		
ANALYSIS PREPARED BY: BDR		
ANALYSIS CHECKED BY:		
DIAGRAM PREPARED BY: BDR		
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 AND SAFETY DIVISION