. Spot Safety Project Evaluation

Project Log # 200703076

Spot Safety Project # 13-01-201

Spot Safety Project Evaluation of the Traffic Signal Installation at SR 3116 (Mills Gap Rd) and SR 3136 (Cane Creek Rd) in Buncombe County

Documents Prepared By:

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Principal Investigator

_____ 8/10/2007

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Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 13-01-201 – Traffic Signal Installation at SR 3116 (Mills Gap Rd) and SR 3136 (Cane Creek Rd) in Buncombe County.

Project Information and Background from the Project File Folder

SR 3116 (Mills Gap Rd) is a two lane roadway without turn lanes and a speed limit of 55 mph. SR 3136 (Cane Creek) is a two lane roadway without turn lanes and a speed limit of 55 mph on the east leg, 45 mph on the west leg. The intersection was controlled by a standard flasher with the stop condition on SR 3136 in the before period.

The original problem statement shows that the side roads are offset which creates potential conflicts. Sight distance is also limited when traveling through the intersection. The original crash study from 5/1/1997 to 4/30/1999 yielded eight total crashes, in which were five crashes were considered correctable (three left turn and two angle). The countermeasure chosen to alleviate the conflicts was a traffic signal. The traffic signal installation was completed on 12/20/2002 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 September 2002 through March 2003. The before period consisted of reported crashes from January 1, 1999 through August 31, 2002 (3 years, 8 months) and the after period consisted of reported crashes from April 1, 2003 through November 30, 2006 (3 years, 8 months). 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 influenced by the implemented countermeasure were the target crashes for the treatment location. 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. The target crashes are clearly identified in the before and after collision diagrams.

Treatment Information			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Total Crashes	17	17	0.0
Total Severity Index	4.5	5.4	19.4
Frontal Impact Crashes	11	6	-45.5
Frontal Severity Index	4.4	7.2	64.2
Volume	9300	10200	9.7
Treatment Injury Crashes			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Fatal	0	0	N/A
Class A	0	0	N/A
Class B	5	1	-80.0
Class C	3	9	200.0
Property Damage Only	9	7	-22.2
Frontal Injury Crashes			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Fatal	0	0	N/A
Class A	0	0	N/A
Class B	3	1	0.0
Class C	2	4	100.0
Property Damage Only	6	1	-83.3

Table 1.

The naive before and after analysis at the treatment location resulted in a zero percent change in Total Crashes, a 46 percent decrease in Frontal Impact Crashes, and a 10 percent increase in Average Daily Traffic (ADT). The before period ADT year was 2000 and the after period ADT year was 2004.

Results and Discussion

The naïve before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a zero percent change in Total Crashes and a 46 percent decrease in Frontal Impact Crashes. The summary results above demonstrate that the treatment location appears to have had no change in the number of Total Crashes and a decrease in the number of Frontal Impact Crashes from the before to the after period.

During the field investigation there were sight distance issues noted from the north and west legs of the intersection. In the before period, eight of the eleven target crashes involved an eastbound vehicle. In the after period there is only one target crash involving an eastbound vehicle.

Addressing the north leg, there were five southbound vehicles involved in the eleven target crashes in the before period. In the after period, five out of the six target crashes involve a southbound vehicle. Referencing the photos there is a curve when approaching the intersection from the north. When a driver is making a left turn, if there are vehicles in front there may be very limited sight distance (see photo below). This situation may be a contributing factor to the left turn crashes.

The calculated benefit to cost ratio for this project is –0.87 considering total crashes. The benefit to cost ratio considering only target crashes is 0.60. 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.

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.

TREATMENT BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 3116 at SR 3136 BY: SDC
COUNTY: Buncombe DATE: 7/30/2007
FILE NO.: SS 13-01-201

DETAILED COST: TYPE IMPROVEMENT - Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$40,000	10	0.149	$5,961
	$0	0	0.000	$0
Right-of-Way	$0	0	0.000	$0
TOTALS	$40,000	10	0.149	$5,961

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $2,000
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $900

TOTAL ANNUAL COST= $8,861
TOTAL COST OF PROJECT= $40,000

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	3.67	0	0.00	8	2.18	9	2.45	$48,801
AFTER	3.67	0	0.00	10	2.72	7	1.91	$56,485

Annual Benefits from Crash Cost Savings ($7,684)

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = ($16,545)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = -0.87

TOTAL COST OF PROJECT - $40,000 COMPREHENSIVE B/C RATIO - -0.87

TARGET BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 3116 at SR 3136 BY: SDC
COUNTY: Buncombe DATE: 7/30/2007
FILE NO.: SS 13-01-201

DETAILED COST: TYPE IMPROVEMENT - Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$40,000	10	0.149	$5,961
	$0	0	0.000	$0
Right-of-Way	$0	0	0.000	$0
TOTALS	$40,000	10	0.149	$5,961

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $2,000
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $900

TOTAL ANNUAL COST= $8,861
TOTAL COST OF PROJECT= $40,000

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	3.67	0	0.00	5	1.36	6	1.63	$30,899
AFTER	3.67	0	0.00	5	1.36	1	0.27	$25,586

Annual Benefits from Crash Cost Savings $5,313

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = ($3,548)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 0.60

TOTAL COST OF PROJECT - $40,000 COMPREHENSIVE B/C RATIO - 0.60

Location Map: SR 3116 (Mills Gap Rd) at SR 3136 (Cane Creek Rd)

Treatment Site Photos taken July 18, 2007

Traveling east on SR 3136

Traveling east on SR 3136

Traveling east on SR 3136 looking north

Traveling west on SR 3136

Traveling west on SR 3136

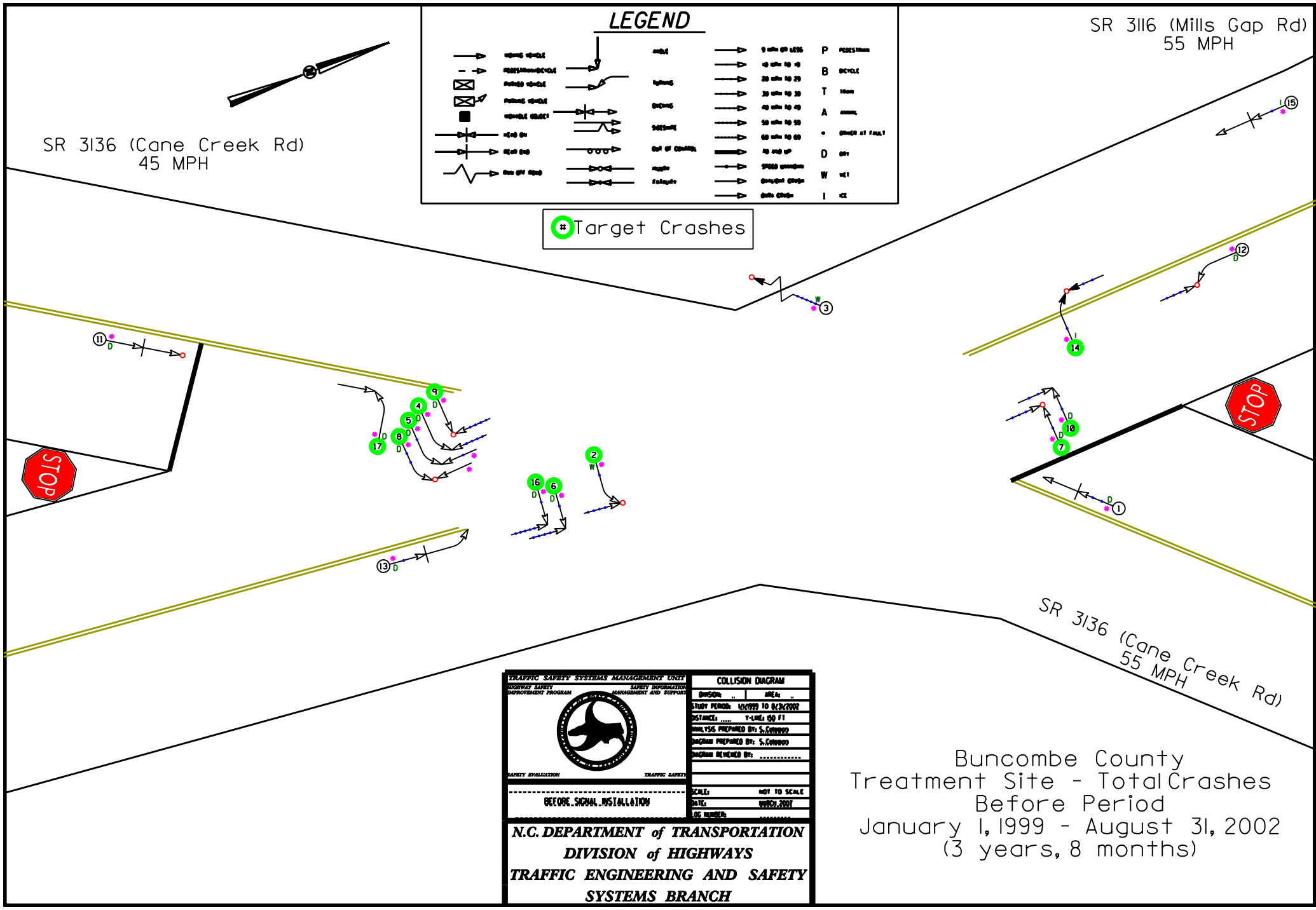
Traveling west on SR 3136 looking south

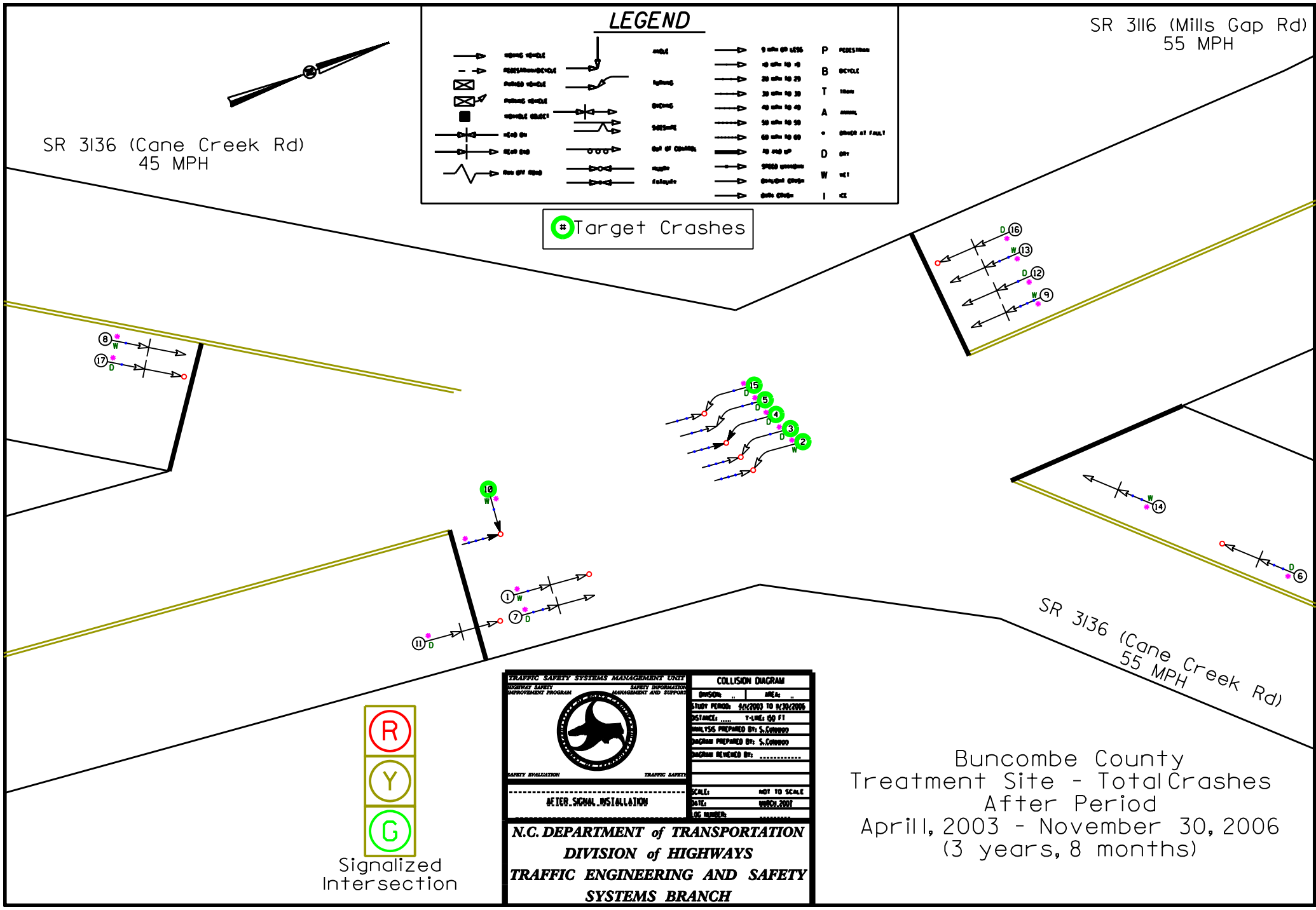
Traveling north on SR 3116

Traveling north on SR 3116

Traveling south on SR 3116

Driving south on SR 3116


LEGEND
Target Crashes
SR 3136 (Cane Creek Rd)
45 MPH
SR 3116 (Mills Gap Rd)
55 MPH
SR 3136 (Cane Creek Rd)
55 MPH
STOP
STOP
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT
HIGHWAY SAFETY IMPROVEMENT PROGRAM
SAFETY INFORMATION MANAGEMENT AND SUPPORT
SAFETY EVALUATION
TRAFFIC SAFETY
BEFORE SIGNAL INSTALLATION
COLLISION DIAGRAM
N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH
Buncombe County
Treatment Site - Total Crashes
Before Period
January 1, 1999 - August 31, 2002
(3 years, 8 months)


LEGEND
Target Crashes
SR 3136 (Cane Creek Rd)
45 MPH
SR 3116 (Mills Gap Rd)
55 MPH
SR 3136 (Cane Creek Rd)
55 MPH
Signalized Intersection
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT
COLLISION DIAGRAM
ACTUATED SIGNAL INSTALLATION
N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH
Buncombe County
Treatment Site - Total Crashes
After Period
April 1, 2003 - November 30, 2006
(3 years, 8 months)