

Spot Safety Project Evaluation

Order # 41000000824

Spot Safety Project # 13-01-204

**Spot Safety Project Evaluation of the Traffic Signal and Left Turn Lane Installation
SR 3136 (Cane Creek Rd) and SR 3147 (Lower Branch Creek Rd)
Buncombe County**

Documents Prepared By:

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

Principal Investigator



Jason B. Schronce

9-21-2009

Date

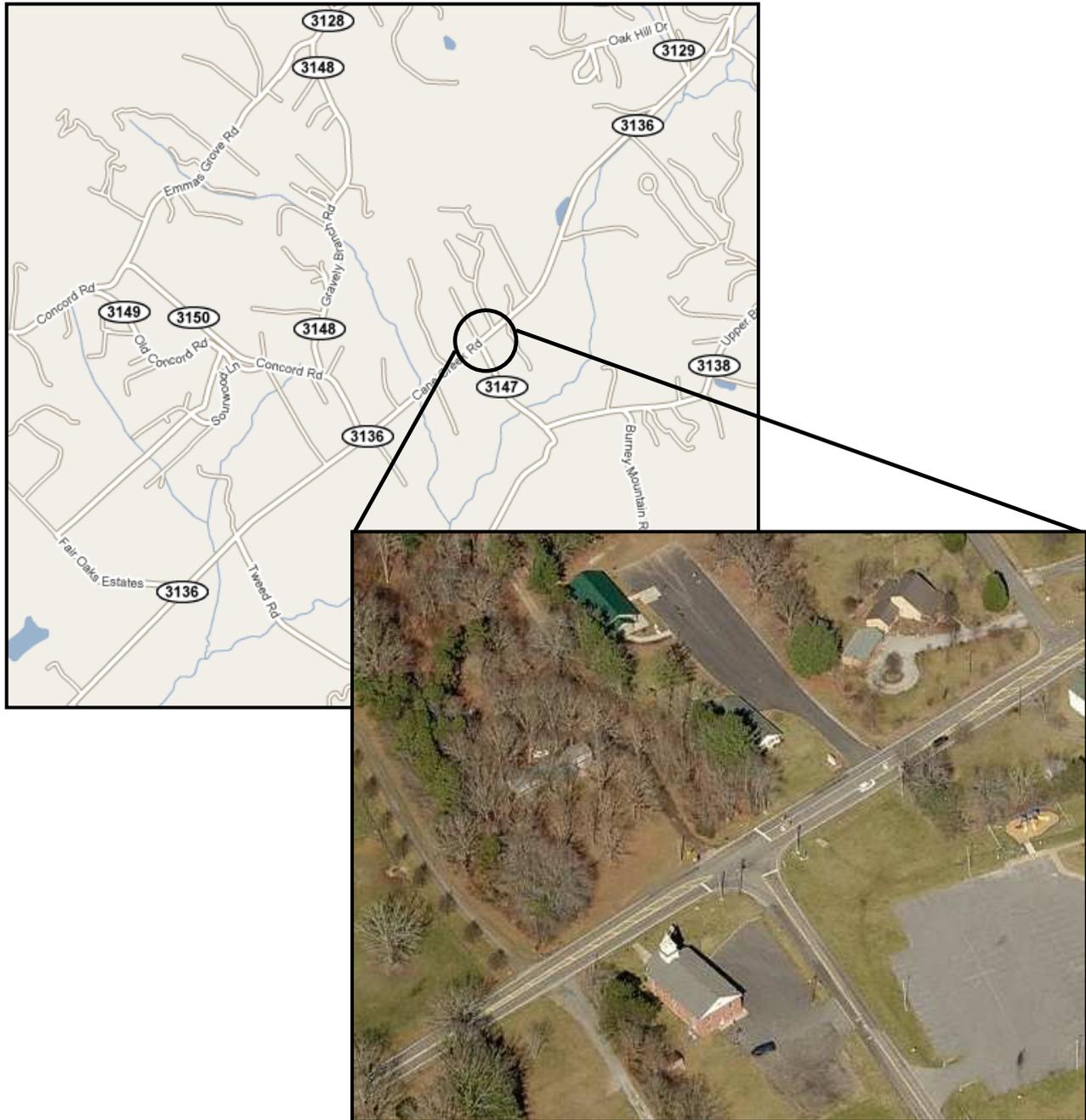
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 13-01-204 located at the Intersection of SR 3136 (Cane Creek Road) and SR 3147 (Lower Branch Creek Road) in Buncombe County, between the Towns of Fairview and Fletcher.

The Sig ID is 13-1173 for this newly installed traffic signal.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasures chosen for the subject location were the installation of an intersection traffic signal and a SR 3136 westbound left turn lane. SR 3136 (Cane Creek Road) and SR 3147 are both two-lane facilities near the subject intersection with speed limits of 55 mph and 45 mph, respectfully. The subject location is a three-leg intersection, which was controlled by a stop sign on the SR 3147 (Lower Branch Creek Road) approach. There is also a church and a middle school within close proximity to this location.

The original statement of problem was the concern of traffic congestion during school related peak hours. The intersection also was experiencing a small crash pattern of left turn collisions. The intended purpose of these improvements were to prevent future crashes and regulate traffic volume through this congested area more effectively.

The initial crash analysis was completed from January 1, 1998 to December 31, 2000 with seven (7) reported crashes, four (4) of which were deemed correctable. The final completion date for the improvement at the subject intersection was on March 24, 2004 with a total cost of \$140,000.

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 the months of January through March 2004. The before period consisted of reported crashes from October 1, 1998 through December 31, 2003 (5 years and 3 months); and the after period consisted of reported crashes from April 1, 2004 through June 30, 2009 (5 years and 3 months). The ending date for this analysis was determined by the date of available crash data at the time of analysis.

The treatment data consisted of all crashes within 150 feet of the subject intersection. *Please see attached location map, aerial map, and photos for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. 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.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	9	4	- 55.6 %
Total Severity Index	4.29	4.70	9.6 %
Target Crashes	6	0	- 100.0 %
Target Crash Severity Index	3.47	0.00	- 100.0 %
Volume	6,400	8,400	31.25 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	0	N/A
Class B injury Crashes	0	1	100.0 %
Class C Injury Crashes	4	1	- 75.0 %
Total Injury Crashes	4	2	- 50.0 %

The naive before and after analysis at the treatment location resulted in a 56 percent decrease in Total Crashes, complete elimination of Target Crashes, but a 10 percent increase in the Total Severity Index. The before period ADT year was 2001 and the after period ADT year was 2006.

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 56 percent decrease in Total Crashes and complete elimination of Target Crashes. The summary results above demonstrate that both Total and Target Crashes appear to have decreased at the treatment location from the before to the after period.

Referencing the *Collision Diagrams*, the before period frontal impact crash pattern at the intersection consisted of six (6) collisions, including four (4) left turn different roadway crashes from motorists improperly accessing SR 3136. After the signal and left turn lane installations, the frontal impact crash patterns were completely eliminated. The four (4) after period collisions were random in nature and did not show any pattern formation.

The calculated benefit to cost ratio for this project is **0.38 considering total crashes**. The benefit to cost ratio **considering only target crashes is 0.41**. 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.

Please see the attached *Treatment Site Photos*. Photos are provided from Google Street View for all three approaches to the treatment intersection. 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.

TREATMENT SITE PHOTOS



Looking North on SR 3147 (Lower Branch Creek Road)



Looking West on SR 3136 (Crane Creek Road)



Looking East on SR 3136 (Crane Creek Road)

BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes

LOCATION: SR 3136 at SR 3147		BY: JBS						
COUNTY: Buncombe		DATE: 9/14/2009						
FILE NO.: SS 13-01-204		NOTES: Total Crashes						
DETAILED COST:	TYPE IMPROVEMENT - New Signal & Left Turn Lane							
ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
Construction	\$140,000	10	0.149	\$20,864				
Right-of-Way	\$0	0	0.000	\$0				
TOTALS	\$140,000	10	0.149	\$20,864				
ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,400				
ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900				
TOTAL ANNUAL COST=				\$24,164				
TOTAL COST OF PROJECT=				\$140,000				
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	5.25	0	0.00	4	0.76	5	0.95	\$17,429
AFTER	5.25	0	0.00	2	0.38	2	0.38	\$8,343
Annual Benefits from Crash Cost Savings								\$9,086
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	(\$15,078)		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	0.38		
TOTAL COST OF PROJECT		-	\$140,000	COMPREHENSIVE B/C RATIO		-	0.38	

BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes

LOCATION: SR 3136 at SR 3147		BY: JBS						
COUNTY: Buncombe		DATE: 9/14/2009						
FILE NO.: SS 13-01-204		NOTES: Target Crashes - Frontal Impact						
DETAILED COST:	TYPE IMPROVEMENT - New Signal and Left Turn Lane							
ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
Construction	\$140,000	10	0.149	\$20,864				
Right-of-Way	\$0	0	0.000	\$0				
TOTALS	\$140,000	10	0.149	\$20,864				
ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,400				
ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900				
TOTAL ANNUAL COST=				\$24,164				
TOTAL COST OF PROJECT=				\$140,000				
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	5.25	0	0.00	2	0.38	4	0.76	\$9,829
AFTER	5.25	0	0.00	0	0.00	0	0.00	\$0
Annual Benefits from Crash Cost Savings								\$9,829
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	(\$14,336)		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	0.41		
TOTAL COST OF PROJECT		-	\$140,000	COMPREHENSIVE B/C RATIO		-	0.41	

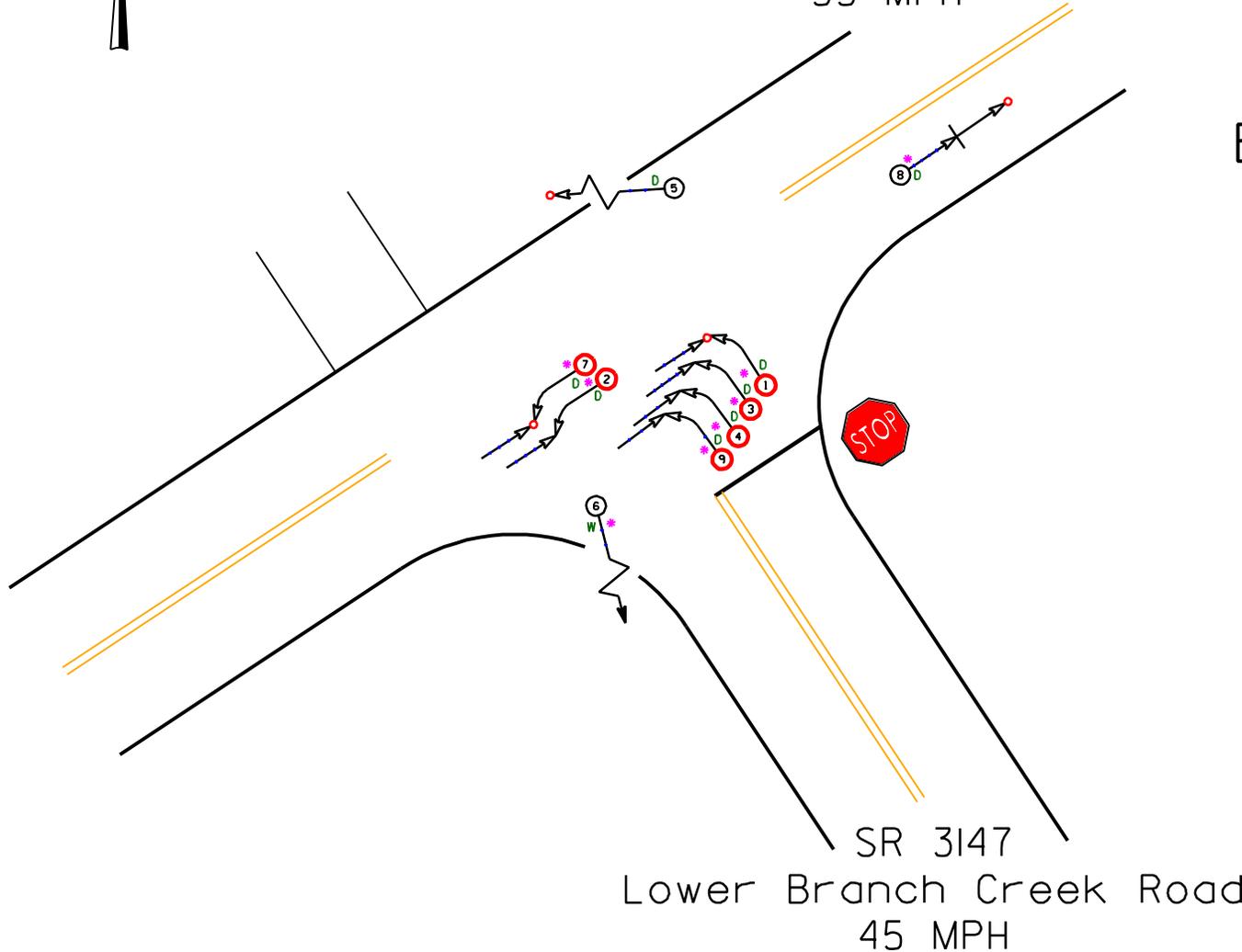


SR 3136
Cane Creek Rd
55 MPH

SS# 13-01-204
Buncombe County
BEFORE Period
10/1/98 - 12/31/08

LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAM
	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		HAZARD		50 MPH TO 59		ICY OR SNOW
	REAR END		FATALITY		TO AND UP		ONLY
	RAN OFF ROAD		SPEED UNKNOWN				



Frontal Impact
Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 13	AREA:
	STUDY PERIOD: 10/1/1998 - 12/31/2003	
	DISTANCE: Y-LINE - 150 FT	
	ANALYSIS PREPARED BY: JBS	
	ANALYSIS CHECKED BY: BR	
	DIAGRAM PREPARED BY: JBS	
	DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE		
DATE: 9-14-2009		
LOG NUMBER: SS* 13-01-204 BEFORE		

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

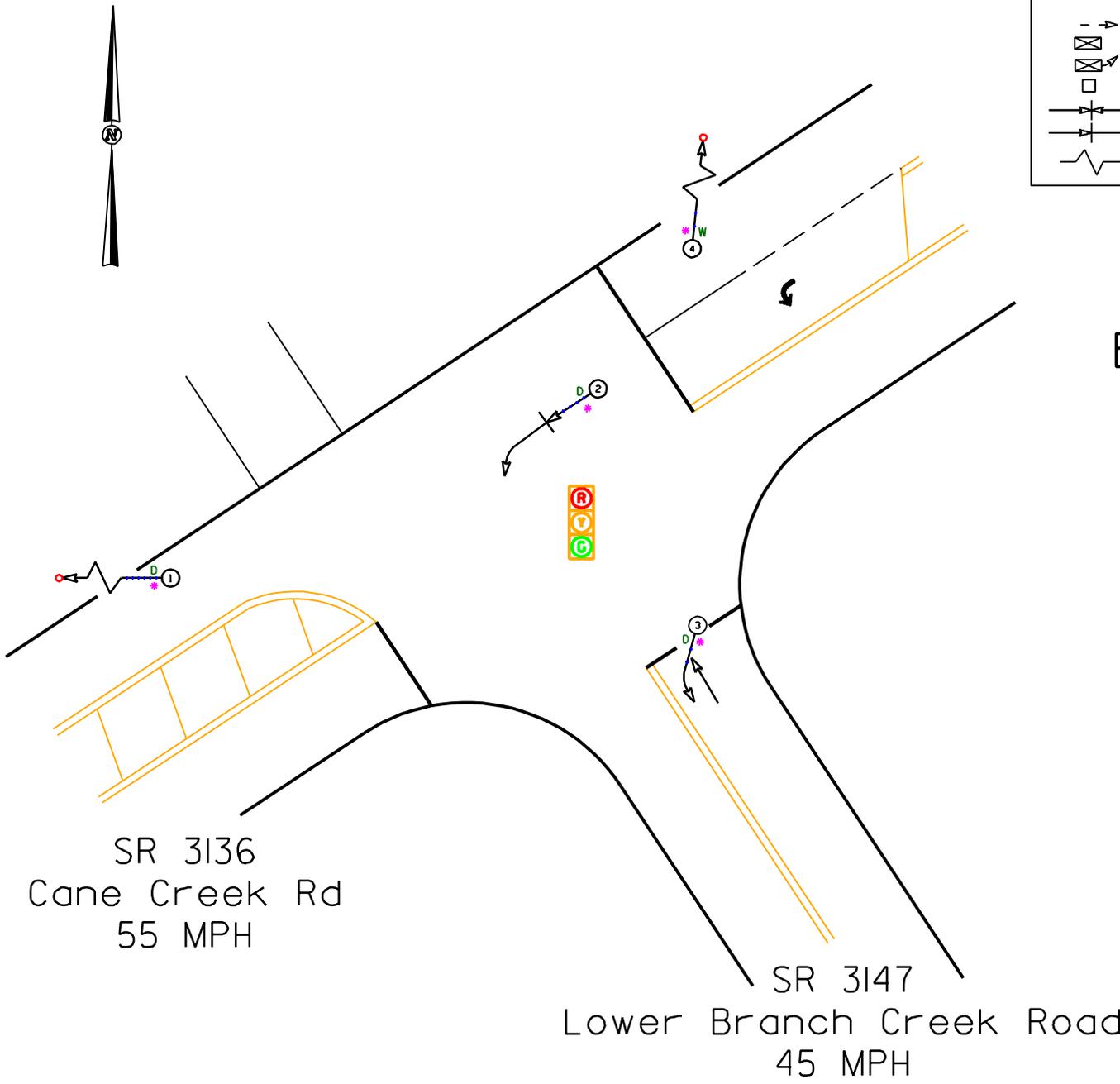
LEGEND

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

SS# 13-01-204
 Buncombe County
 AFTER Period
 4/1/04 - 6/30/09



New Signalized
 Intersection
 Sig ID 13-1173



SR 3136
 Cane Creek Rd
 55 MPH

SR 3147
 Lower Branch Creek Road
 45 MPH

Frontal Impact
 Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 13	AREA:
	STUDY PERIOD: 4/1/2004 - 6/30/2009	
	DISTANCE: Y-LINE + 150 FT	
ANALYSIS PREPARED BY: JBS		
ANALYSIS CHECKED BY: BR		
DIAGRAM PREPARED BY: JBS		
DIAGRAM REVIEWED BY: ST		
SCALE: NOT TO SCALE		
DATE: 9-14-2009		
LOG NUMBER: SS# 13-01-204 AFTER		

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