

Spot Safety Project Evaluation

Project Log # 200704287

Spot Safety Project # 07-01-227

Spot Safety Project Evaluation of the Flasher Installation At the Intersection of NC 150 and SR 2321 (Strawberry Rd) Guildford 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

Brad D. Robinson, EI

10/7/2008
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 07-01-227 – The Intersection of NC 150 and SR 2321 (Strawberry Rd) in Guilford County.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of an overhead warning flasher. NC 150 and SR 2321 are both two-lane, two-way facilities at the subject intersection with no turn lanes and speed limits of 55 mph. The subject location is a crossroads type intersection, which is controlled by a stop condition on SR 2321 (Strawberry Rd). There are stop ahead warning signs on both approaches of SR 2321 and the northbound approach has an over-sized stop sign.

The original statement of problem was that vehicles on SR 2321 could not enter the intersection due to insufficient gaps in traffic. The investigation was requested by a private citizen.

The initial crash analysis was completed from August 1, 1998 to July 31, 2001 with nine reported crashes, five of which were deemed correctable by the chosen countermeasure. The final completion date for the improvement at the subject intersection was on August 15, 2002 with a total cost of \$5,000.00.

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 July 1, 2002 to September 30, 2002. The before period consisted of reported crashes from October 1, 1996 through June 30, 2002 (5 years, 9 months) and the after period consisted of reported crashes from October 1, 2002 through June 30, 2008 (5 years, 9 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 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.

Treatment Information			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	14	28	100.0
Total Severity Index	15.53	4.17	-73.1
Target Crashes	10	17	70.0
Target Crash Severity Index	20.6	4.92	-76.1
Volume	6800	7700	13.2
<u>Injury Crash Summary - Total</u>			
Fatal injury Crashes	0	0	
Class A injury Crashes	2	0	-100.0
Class B injury Crashes	3	4	33.3
Class C Injury Crashes	4	8	100.0
Total Injury Crashes	5	16	220.0

The naive before and after analysis at the treatment location resulted in a 100 percent increase in Total Crashes, a 70 percent increase in Target Crashes, and a 73 percent decrease in the Total Severity Index. 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 100 percent increase in Total Crashes, a 70 percent increase in Target Crashes, and a 73 percent decrease in the severity index. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have increased at the treatment location from the before to the after period, although the crashes are less severe.

The calculated benefit to cost ratio for this project is 107.0 considering total crashes. The benefit to cost ratio considering only target crashes is 113.8. 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*, target crash patterns at the intersection have either remained constant or increased from the before to the after period. There is also an increase in rear-end crashes on NC 150 involving vehicles approaching the intersection.

In the before period there were four crashes that appear to have resulted from a vehicle running the stop sign (crash #s 1, 10, 11, and 13). These crashes resulted in two 'A' Injury Crashes and two 'B' Injury Crashes. In the after period there were three crashes that appear to be the result of a vehicle running the stop sign (crash #s 21, 22, and 23). These crashes resulted in two 'C' Injury 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.

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: NC 150 at SR 2321
 COUNTY: Guilford
 FILE NO.: SS 07-01-227

BY: BDR
 DATE: 9/23/2008

DETAILED COST: TYPE IMPROVEMENT - Flasher

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$5,000	10	0.149	\$745
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$5,000	10	0.149	\$745

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$400
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$350
 TOTAL ANNUAL COST= \$1,495
 TOTAL COST OF PROJECT= \$5,000

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	5.75	2	0.35	7	1.22	5	0.87	\$211,043
AFTER	5.75	0	0.00	12	2.09	16	2.78	\$51,061

Annual Benefits from Crash Cost Savings \$159,983

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$158,487
 BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 107.00

TOTAL COST OF PROJECT - \$5,000 COMPREHENSIVE B/C RATIO - 107.00

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: NC 150 at SR 2321
 COUNTY: Guilford
 FILE NO.: SS 07-01-227 Target Crashes

BY: BDR
 DATE: 9/23/2008

DETAILED COST: TYPE IMPROVEMENT - Flasher

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$5,000	10	0.149	\$745
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$5,000	10	0.149	\$745

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$400
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$350
 TOTAL ANNUAL COST= \$1,495
 TOTAL COST OF PROJECT= \$5,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

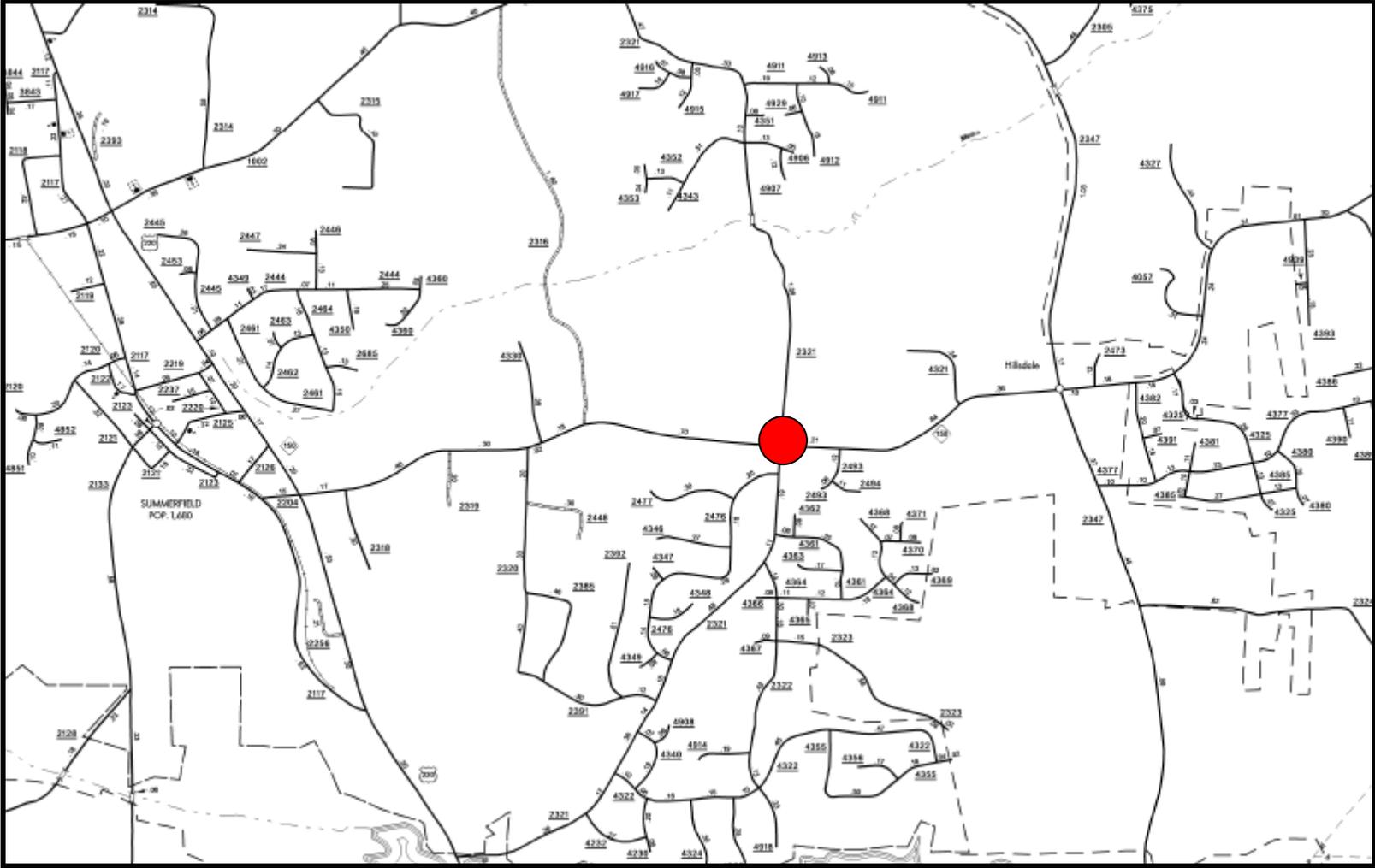
TIME PERIOD	YEARS	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES				PDO		ANNUAL COSTS
		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	CRASHES	CRASHES PER YR	
BEFORE	5.75	2	0.35	6	1.04	2	0.35	\$205,600
AFTER	5.75	0	0.00	9	1.57	8	1.39	\$35,443

Annual Benefits from Crash Cost Savings \$170,157

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$168,661
 BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 113.81

TOTAL COST OF PROJECT - \$5,000 COMPREHENSIVE B/C RATIO - 113.81

Location Map
Guilford County
Evaluation of Spot Safety Project #07-01-227



Treatment Location: NC 150 at SR 2321 (Strawberry Rd)

Treatment Site Photos Taken February 18, 2008



Traveling Eastbound on NC 150



Traveling Westbound on NC 150



Traveling Northbound on SR 2321 (Strawberry Rd)



Traveling Northbound on SR 2321 (Strawberry Rd)

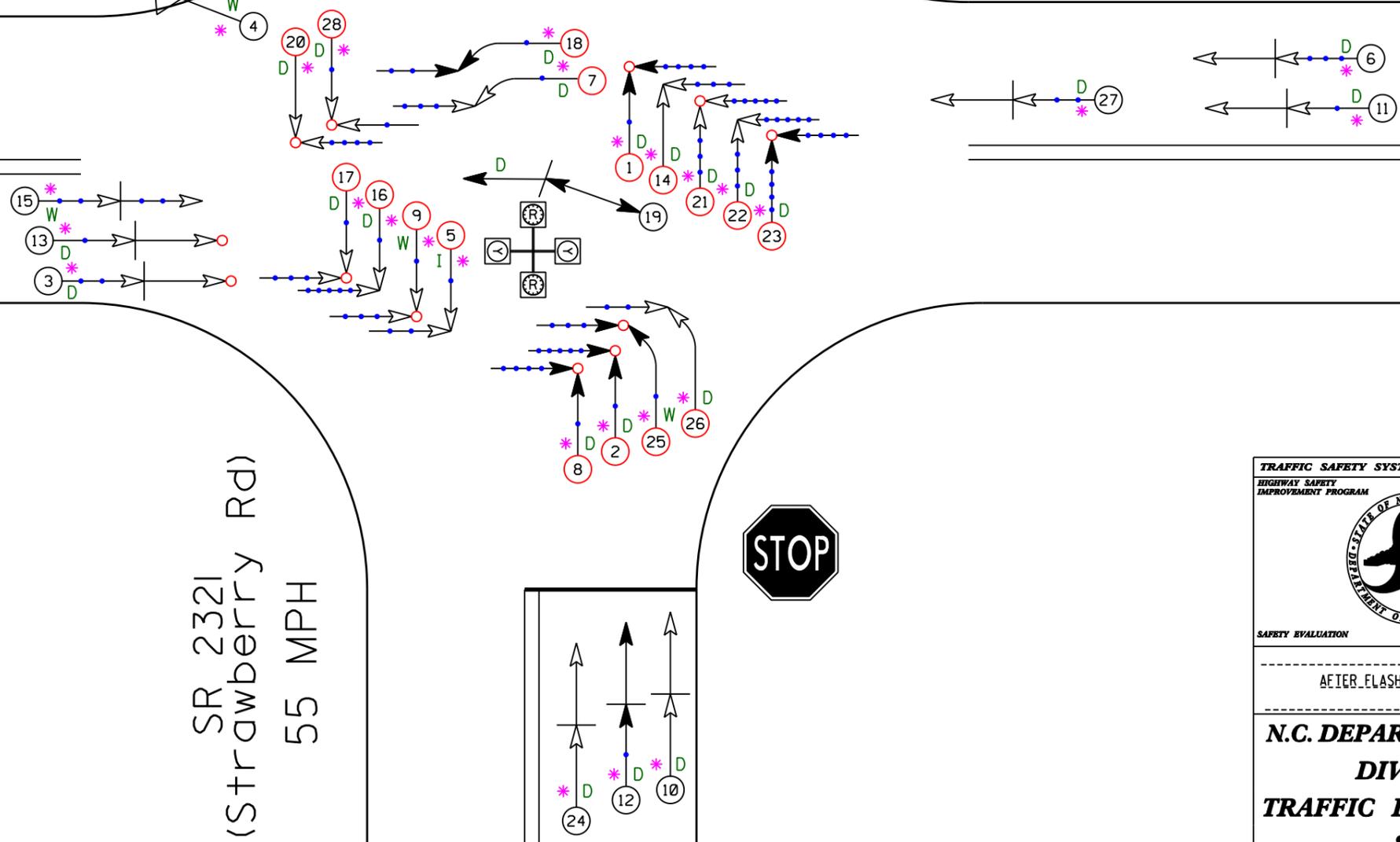
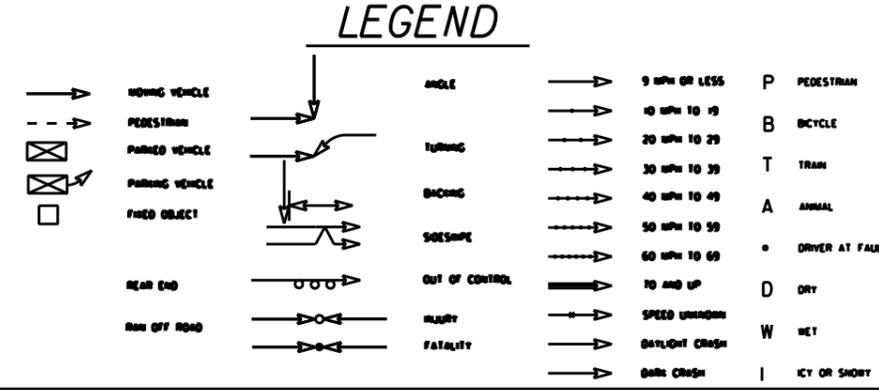
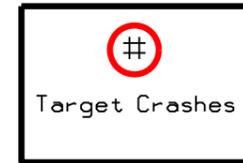
Guilford County
 NC 150 at
 SR 2321(Strawberry Rd)
 In the After Period
 From 10/1/2002-6/30/2008



NC 150
 55 MPH

Note: Considered Target Crash.
 Vehicle swerved to avoid north-bound vehicle.

SR 2321
 (Strawberry Rd)
 55 MPH



NC 150
 55 MPH

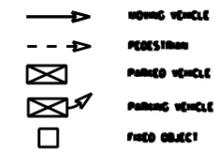
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT <small>HIGHWAY SAFETY IMPROVEMENT PROGRAM</small>		SAFETY INFORMATION <small>MANAGEMENT AND SUPPORT</small>	
		COLLISION DIAGRAM	
		DIVISION: I	AREA: ...
STUDY PERIOD: 10/1/2002 TO 6/30/2008		DISTANCE: Y-LINE: 150 FT	
ANALYSIS PREPARED BY: B. Robison		DIAGRAM PREPARED BY: B. Robison	
DIAGRAM REVIEWED BY:		SCALE: NOT TO SCALE	
AFTER FLASHER INSTALLATION		DATE: September 2008	
SAFETY EVALUATION		TRAFFIC SAFETY	
LOG NUMBER: 200704287		LOG NUMBER: 200704287	
N.C. DEPARTMENT of TRANSPORTATION DIVISION of HIGHWAYS TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH			

Guilford County
 NC 150 at
 SR 2321 (Strawberry Rd)
 In the Before Period
 From 10/1/1996-6/30/2002

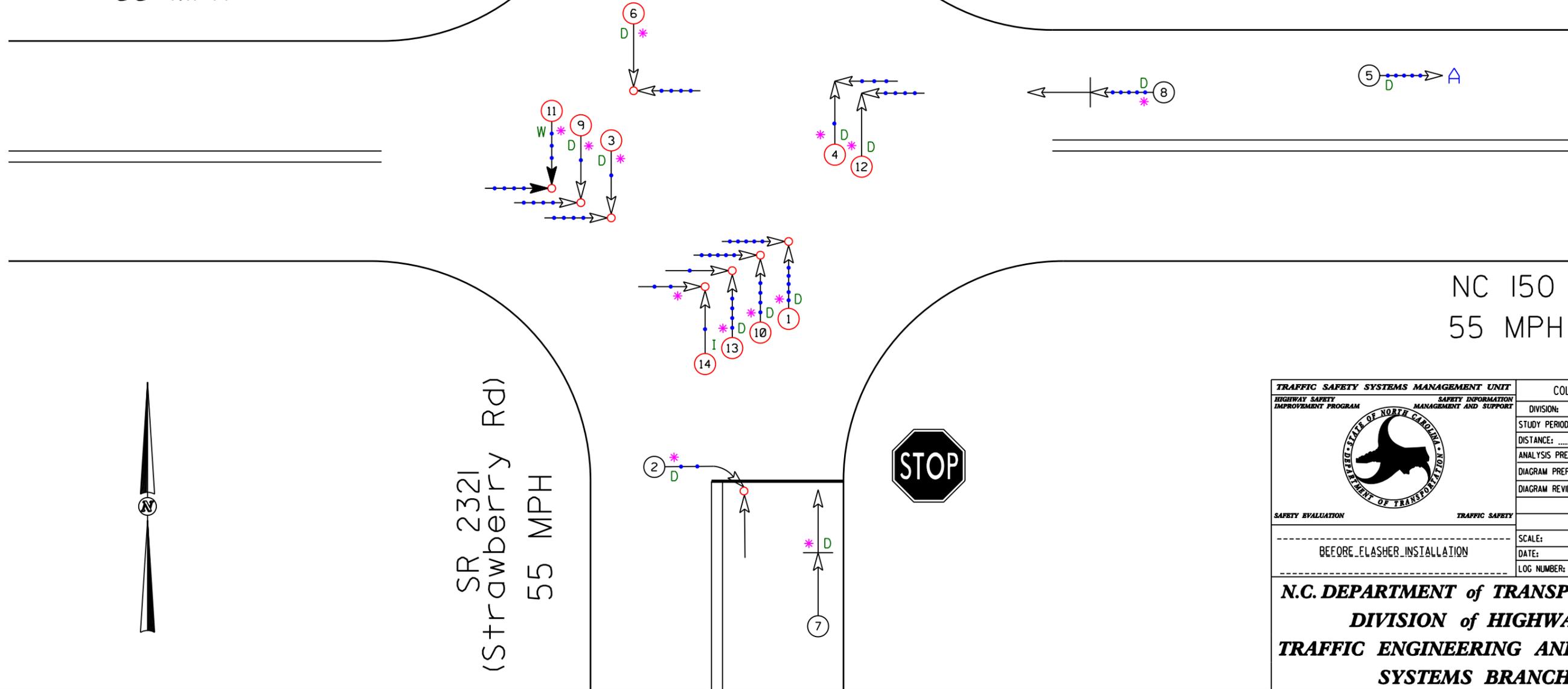
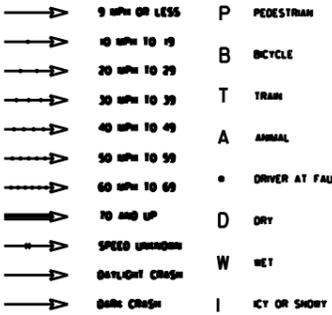
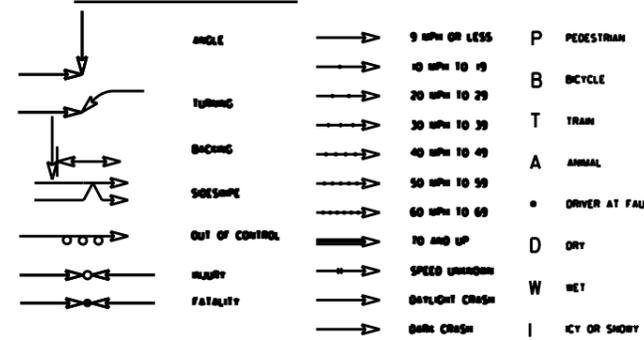


NC 150
 55 MPH

SR 2321
 (Strawberry Rd)
 55 MPH



LEGEND



SR 2321
 (Strawberry Rd)
 55 MPH



NC 150
 55 MPH

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT <small>HIGHWAY SAFETY IMPROVEMENT PROGRAM</small>		COLLISION DIAGRAM <small>SAFETY INFORMATION MANAGEMENT AND SUPPORT</small>	
		DIVISION: I	AREA: ..
		STUDY PERIOD: 10/1/1996 TO 6/30/2002	DISTANCE: Y-LINE: 150 FT
		ANALYSIS PREPARED BY: B. Boblasoo	
		DIAGRAM PREPARED BY: B. Boblasoo	
		DIAGRAM REVIEWED BY:	
SAFETY EVALUATION		TRAFFIC SAFETY	
BEFORE FLASHER INSTALLATION		SCALE: NOT TO SCALE	DATE: September 2008
		LOG NUMBER: 200704287	
N.C. DEPARTMENT of TRANSPORTATION DIVISION of HIGHWAYS TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH			