Spot Safety Project Evaluation

Project Log # 200712087

Spot Safety Project # 14-01-205

Spot Safety Project Evaluation of the Traffic Signal Installation
At the Intersection of US 129 and NC 143 Business
Graham County, City of Robbinsville

Documents Prepared By:

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

Principal Investigator

_____ 9-29-2008
Jason B. Schronce Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 14-01-205 located at the intersection of US 129 (Rodney Orr Bypass) and NC 143 Business / SR 1106 (N. Main Street) in Graham County, within the city limits of Robbinsville.

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 2-phase, actuated traffic signal. US 129 and NC 143 Business are both two-lane facilities at the subject intersection with no turn lanes and speed limits of 35 mph. The subject location is a three-leg intersection, which was controlled by a stop sign on NC 143 Business (N. Main Street). The intersection is located on the edge of a horizontal curve and is surrounded by driveway entrances for a gas station, video store, and a car wash.

The original statement of problem was that increased use of the intersection is leading to congestion and delay. The local elementary school is also located close to this location. The intersection met signal warrant 3B.

The initial crash analysis was completed from April 1, 1997 to March 31, 2000 with two (2) reported crashes, both of which were deemed correctable. The final completion date for the improvement at the subject intersection was on September 5, 2002 with a total cost of $45,000.00.

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 August 1 to September 30, 2002. The before period consisted of reported crashes from April 1, 1997 through July 31, 2002 (5 years and 4 months); and the after period consisted of reported crashes from October 1, 2002 through January 31, 2008 (5 years and 4 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	4	2	- 50.00 %
Total Severity Index	4.70	1.00	- 78.72 %
Target Crashes	1	0	- 100.00 %
Target Crash Severity Index	1.00	0.00	- 100.00 %
Volume	4,900	7,200	46.94 %
Injury Crash Summary			
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	0	N/A
Class B injury Crashes	1	0	- 100.00 %
Class C Injury Crashes	1	0	- 100.00 %
Total Injury Crashes	2	0	- 100.00 %

The naive before and after analysis at the treatment location resulted in a 50 percent decrease in Total Crashes, an elimination of Target Crashes, and a 79 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

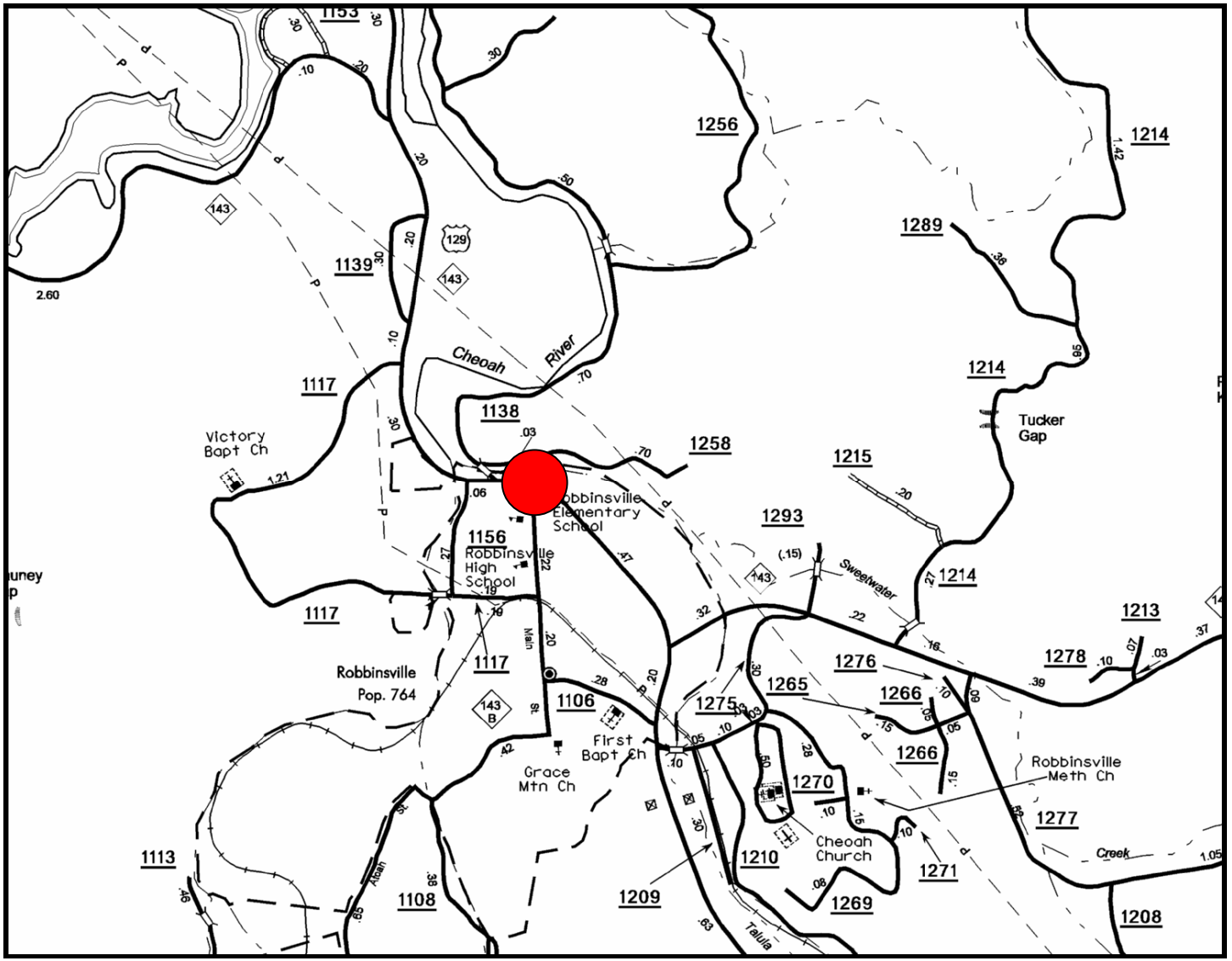
The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 50 percent decrease in Total Crashes and complete elimination Target Crashes. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have decreased at the treatment location from the before to the after period.

Referencing the *Collision Diagrams* and the table above, no crash pattern appeared to exist at this intersection prior to the signal installation. The single target crash was eliminated and rear end crashes approaching the intersection reduced from two (2) in the before period to one (1) in the after. This location has experienced a significant increase in ADT over the study period at 47 percent.

The calculated benefit to cost ratio for this project is **0.70 considering total crashes**. The benefit to cost ratio considering **only target crashes is 0.08**. 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 for all 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.

Location Map
Graham County, Town of Robbinsville
Evaluation of Spot Safety Project # 14-01-205

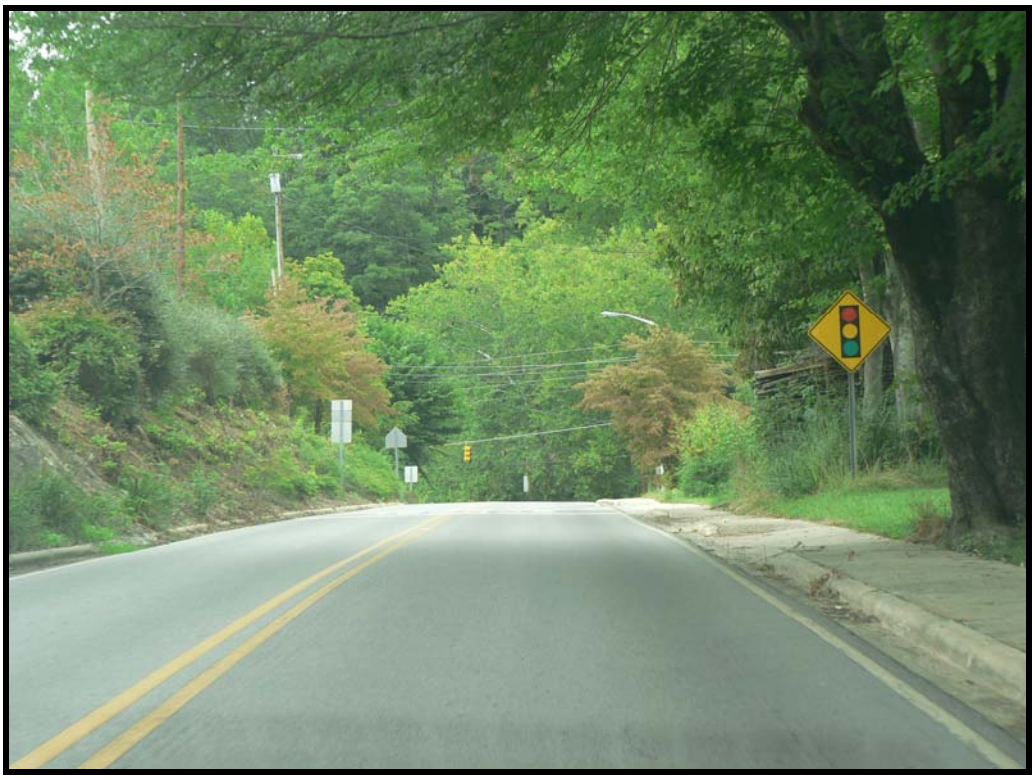


Treatment Location: US 129 (Rodney Orr Bypass) at NC 143 Bus / SR 1106 (N. Main Street)

TREATMENT SITE PHOTOS TAKEN 9/17/2008

Traveling Northwest on US 129 (Rodney Orr Bypass)

Traveling Northwest on US 129



Traveling North on NC 143 Business (N. Main Street)

Traveling North on NC 143 Business

Traveling Southeast on US 129 (Rodney Orr Bypass)

Traveling Southeast on US 129

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: US 129 at NC 143 Bus
COUNTY: Graham
FILE NO.: SS 14-01-205

BY: JBS
DATE: 9/24/2008
NOTES: Total Crashes

DETAILED COST: TYPE IMPROVEMENT - New Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$45,000	10	0.149	$6,706
	$0	0	0.000	$0
Right-of-Way	$0	0	0.000	$0
TOTALS	$45,000	10	0.149	$6,706

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

TOTAL ANNUAL COST= $9,606
TOTAL COST OF PROJECT= $45,000

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	5.34	0	0.00	2	0.37	2	0.37	$8,202
AFTER	5.34	0	0.00	0	0.00	2	0.37	$1,461

Annual Benefits from Crash Cost Savings $6,742

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = ($2,865)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 0.70

TOTAL COST OF PROJECT - $45,000 COMPREHENSIVE B/C RATIO - 0.70

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: US 129 at NC 143 Bus
COUNTY: Graham
FILE NO.: SS 14-01-205

BY: JBS
DATE: 9/24/2008
NOTES: Target Crashes - Frontal Impact

DETAILED COST: TYPE IMPROVEMENT - New Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$45,000	10	0.149	$6,706
	$0	0	0.000	$0
Right-of-Way	$0	0	0.000	$0
TOTALS	$45,000	10	0.149	$6,706

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

TOTAL ANNUAL COST= $9,606
TOTAL COST OF PROJECT= $45,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

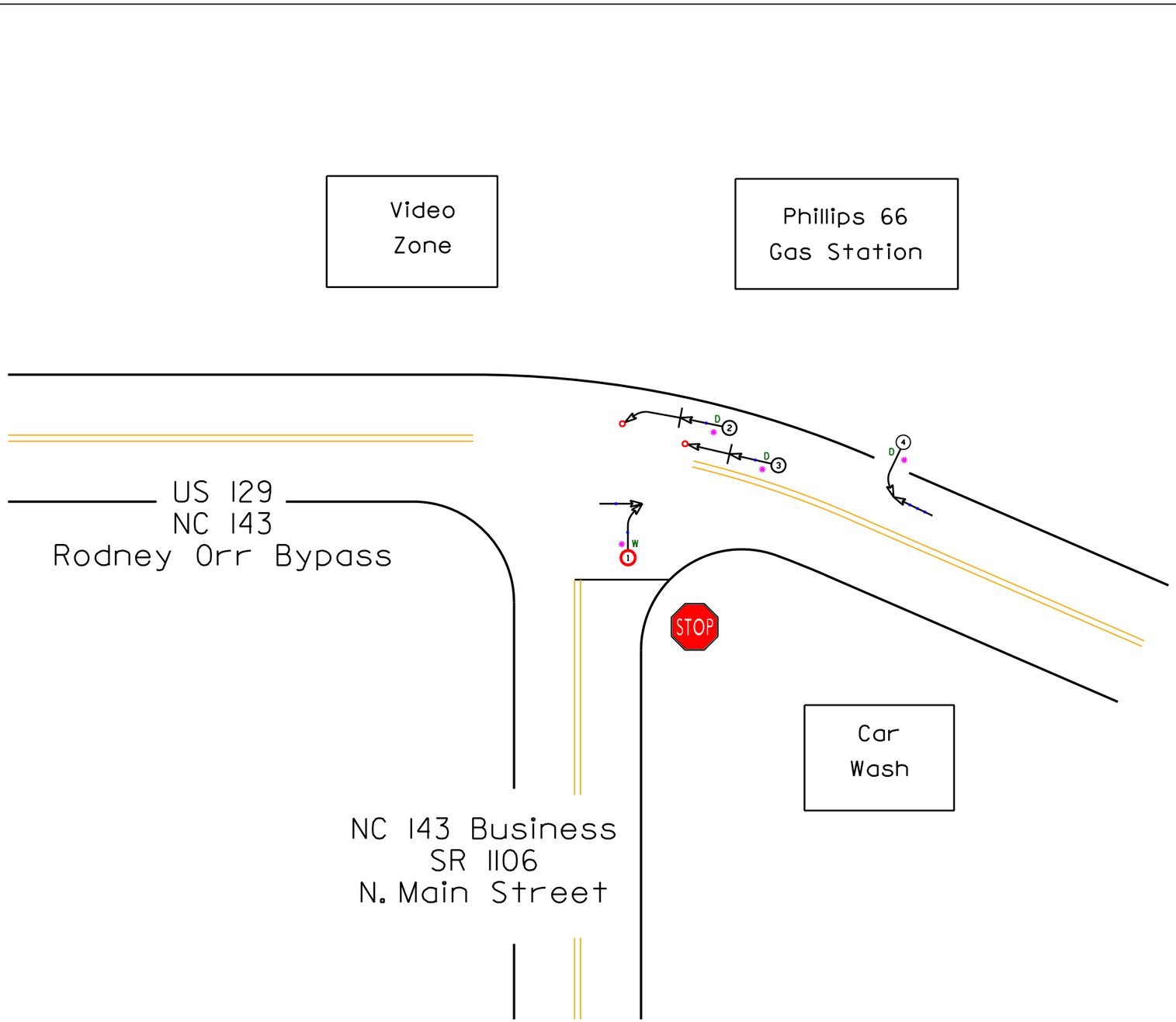
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	5.34	0	0.00	0	0.00	1	0.19	$730
AFTER	5.34	0	0.00	0	0.00	0	0.00	$0

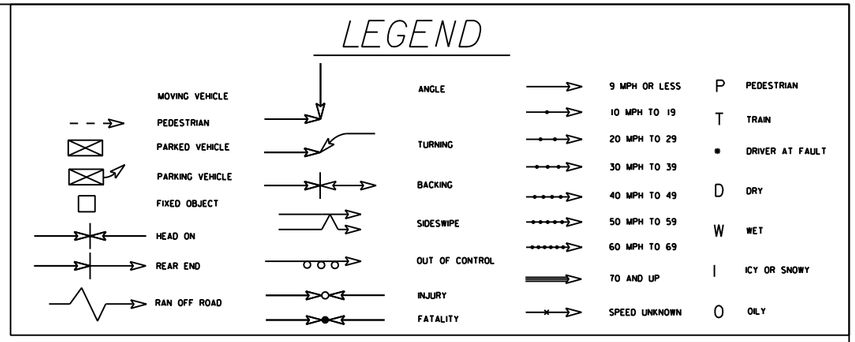
Annual Benefits from Crash Cost Savings $730

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = ($8,876)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 0.08

TOTAL COST OF PROJECT - $45,000 COMPREHENSIVE B/C RATIO - 0.08





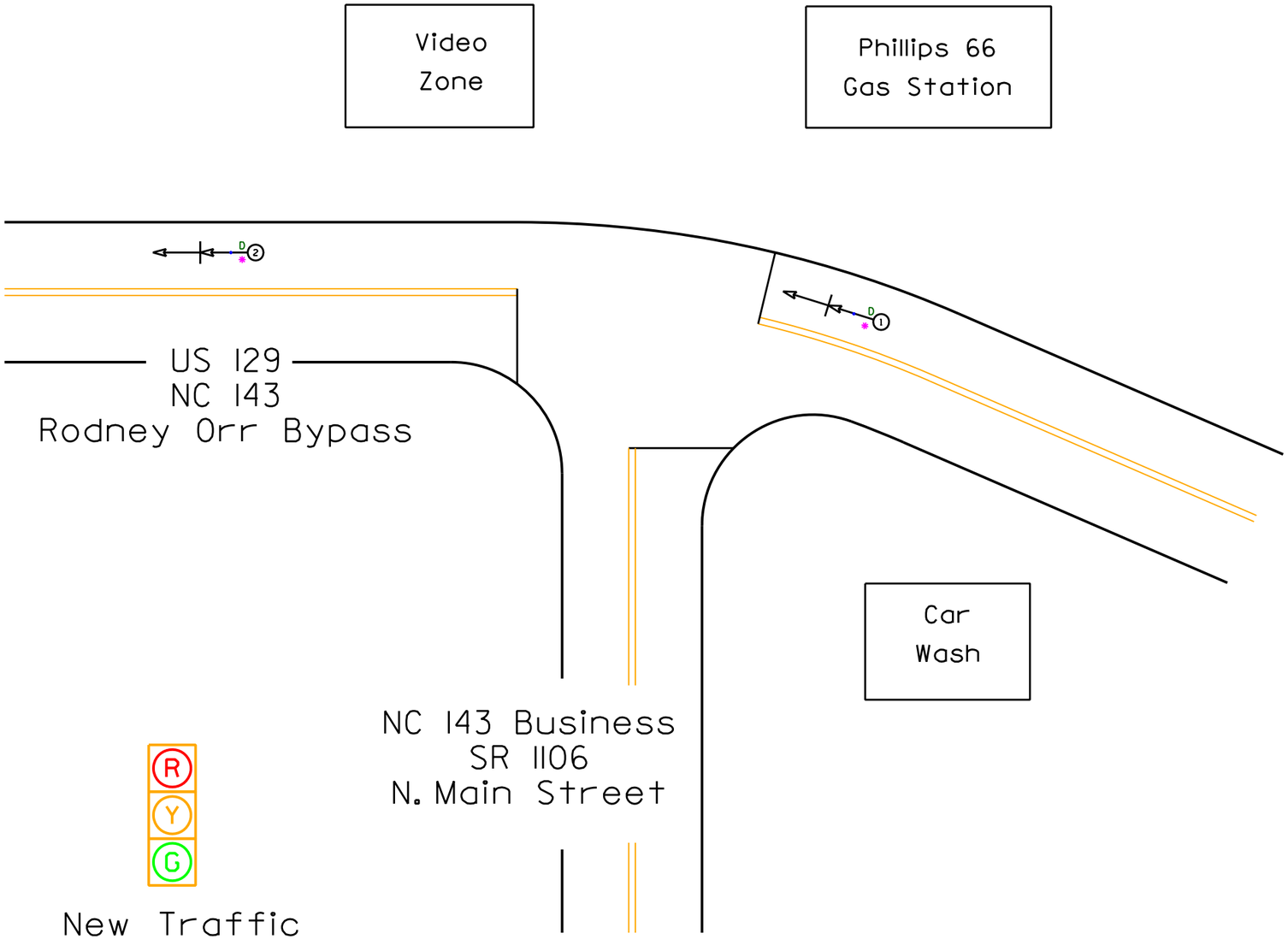
SS# 14-01-205
Graham County
Town of Robbinsville
BEFORE Period
4/1/97 - 7/31/02

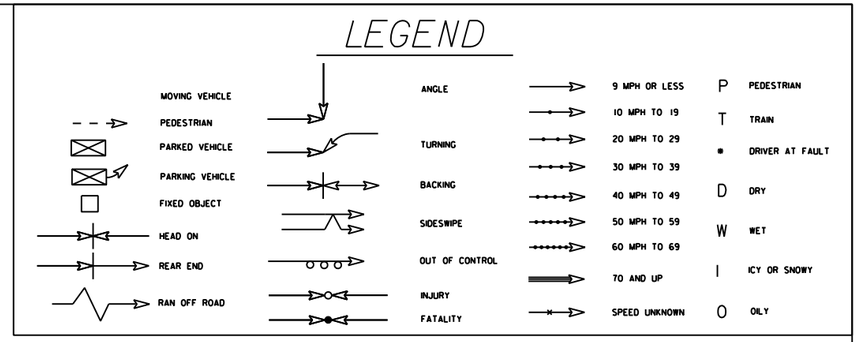
Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM	
DIVISION: 14	AREA:
STUDY PERIOD: 4/1/1997 - 7/31/2002	
DISTANCE: Y-LINE = 150FT	
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: BR	
DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE	
DATE: 8-5-2008	
LOG NUMBER: SS# 14-01-205	

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH





SS# 14-01-205
Graham County
Town of Robbinsville
AFTER Period
10/1/02 - 1/31/08

Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM	
DIVISION: 14	AREA:
STUDY PERIOD: 10/1/2002 - 1/31/2008	
DISTANCE: Y-LINE = 150FT	
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: BR	
DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE	
DATE: 8-5-2008	
LOG NUMBER: SS# 14-01-205	

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH