

# Spot Safety Project Evaluation

Project Log # 200811083

Spot Safety Project # 05-03-202

**Spot Safety Project Evaluation of the Traffic Signal Installation  
At the Intersection of SR 1004 (East Garner Road) and  
SR 2555 (Auburn - Knightdale Road)  
Sig ID 05-0916, Wake County**

Documents Prepared By:

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

**Principal Investigator**



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Jason B. Schronce

2-2-2009

Date

Traffic Safety Project Engineer

# ***Spot Safety Project Evaluation Documentation***

## **Subject Location**

Evaluation of Spot Safety Project Number 05-03-202 located at the Intersection of SR 1004 (East Garner Rd) and SR 2555 (Auburn - Knightdale Rd) in Wake 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 a 2-phase, actuated traffic signal (Sig ID 05-0916). SR 1004 and SR 2555 are both two-lane facilities at the subject intersection with no turn lanes and speed limits of 45 mph on all approaches. The subject location is a four-leg crossroads intersection, which was controlled by a stop signs on SR 2555 (Auburn - Knightdale Rd) during the before period.

The original statement of problem was the development of an angle crash pattern due to insufficient gaps in traffic on SR 1004 (E. Garner Rd). Vehicles traveling on SR 2555 were having issues entering and crossing the intersection safely. The intersection met volume warrants 2 and 3A.

The initial crash analysis was completed from August 1, 1999 to July 31, 2002 with twenty (20) reported crashes, sixteen (16) of which were Angle Crashes. The final completion date for the improvement at the subject intersection was on October 13, 2003 with a total cost of \$35,000.00.

## **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 September 1 to November 30, 2003. The before period consisted of reported crashes from November 1, 1998 through August 31, 2003 (4 years and 10 months); and the after period consisted of reported crashes from December 1, 2003 through September 30, 2008 (4 years and 10 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 field photos for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Intersection 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>			
	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total crashes	40	10	- 75.0 %
Total Severity Index	7.75	3.96	- 48.9 %
Target Crashes	34	5	- 85.3 %
Target Crash Severity Index	8.72	3.96	- 54.6 %
Volume	8,800	9,300	5.68 %
<b><u>Injury Crash Summary - Total</u></b>			
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	2	0	- 100.0 %
Class B injury Crashes	7	0	- 100.0 %
Class C Injury Crashes	9	4	- 55.6 %
Total Injury Crashes	18	4	- 77.8 %

The naive before and after analysis at the treatment location resulted in a 75 percent decrease in Total Crashes, an 85 percent decrease in Target Crashes, and a 49 percent decrease 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 75 percent decrease in Total Crashes and an 85 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.

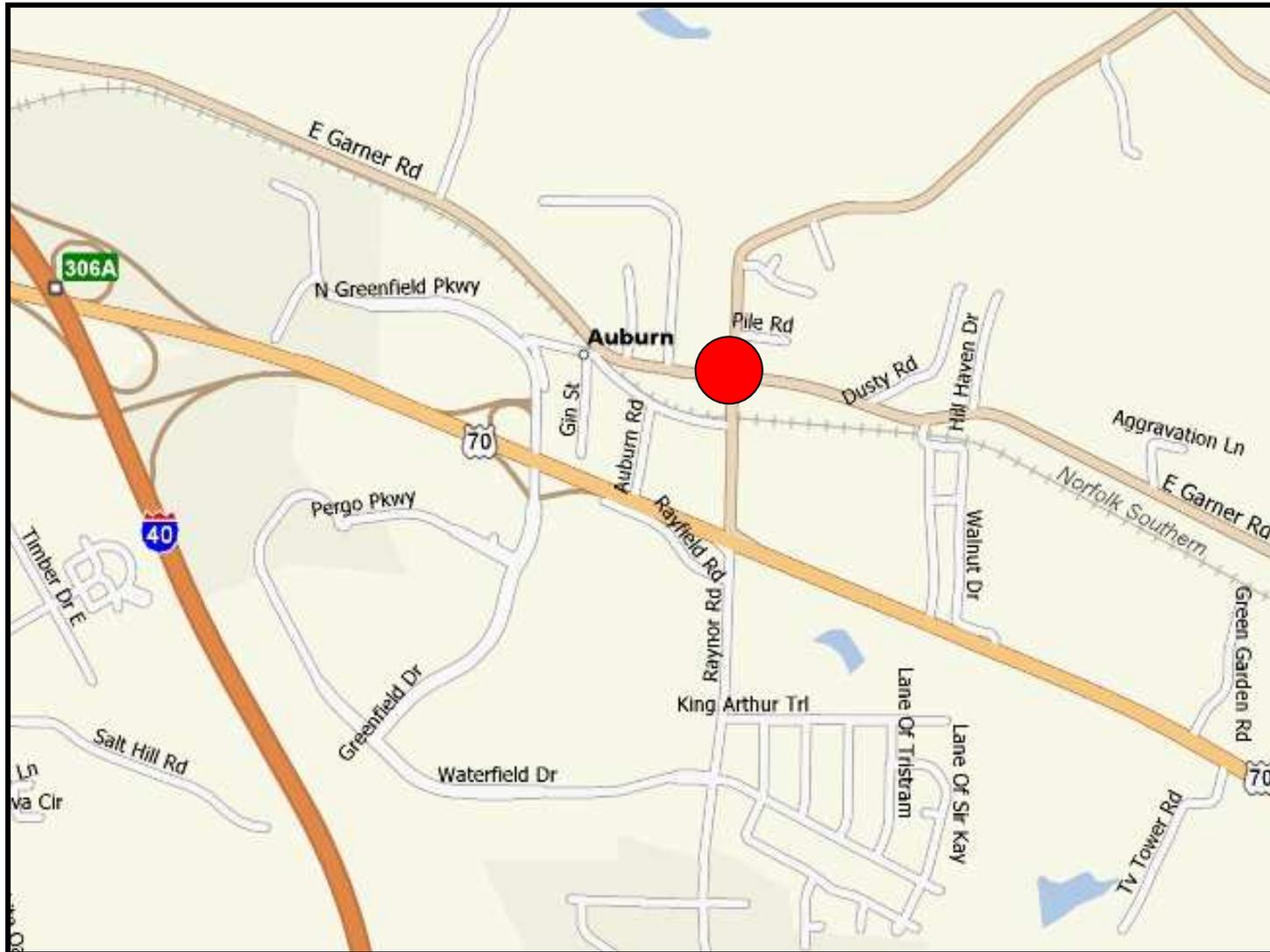
Referencing the *Collision Diagrams*, a large portion of crashes at the intersection in the before period (29 of 40) were the result of a vehicle unsuccessfully attempting to cross SR 1004 from SR 2555. After the signal installation, this angle pattern was significantly reduced to just two (2), which was the result of vehicles running the red light.

During our field investigation, signal ahead warning signs with permanent flags were posted on all approaches to the subject intersection.

The calculated benefit to cost ratio for this project is **32.54 considering total crashes**. The benefit to cost ratio **considering only target crashes is 32.80**. 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  
Wake County  
Evaluation of Spot Safety Project # 05-03-202**



**Treatment Location: SR 1004 (E. Garner Rd) at SR 2555 (Auburn-Knightdale Rd)**

**SS# 05-03-202 Aerial Map**  
**Wake County – near City of Garner**



**TREATMENT SITE PHOTOS TAKEN 1/27/2009**



Traveling East on SR 1004 (E. Garner Rd)



Traveling North on SR 2555 (Auburn - Knightdale Rd)



Traveling West on SR 1004 (E. Garner Rd)



Traveling West on SR 1004



Traveling South on SR 2555 (Auburn - Knightdale Rd)



Traveling South on SR 2555







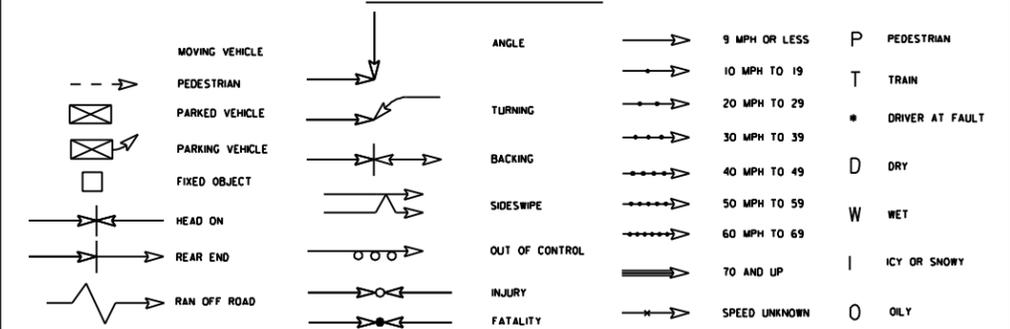
SR 2555  
Auburn-Knightdale Rd  
45 MPH

Abandoned  
Store

SR 1004  
E. Garner Rd  
45 MPH

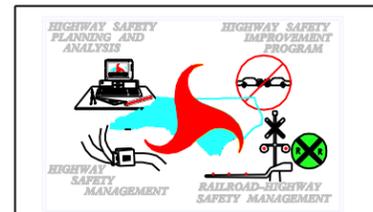
Note Crash 2: Vehicle  
Ran-off Roadway to avoid  
angle collision of a vehicle  
that ran stop sign

LEGEND



SS# 05-03-202  
WAKE County  
BEFORE Period  
11/1/98 - 8/31/03  
SR 1004 at SR 2555

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT



COLLISION DIAGRAM	
DIVISION: 5	AREA:
STUDY PERIOD: 11/1/1998 - 8/31/2003	
DISTANCE: Y-LINE = 150 FT	
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: N/A	
DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE	
DATE: 1-6-2009	
LOG NUMBER: SS* 05-03-202 BEFORE	

⊕ Intersection  
Frontal Impact  
Crashes

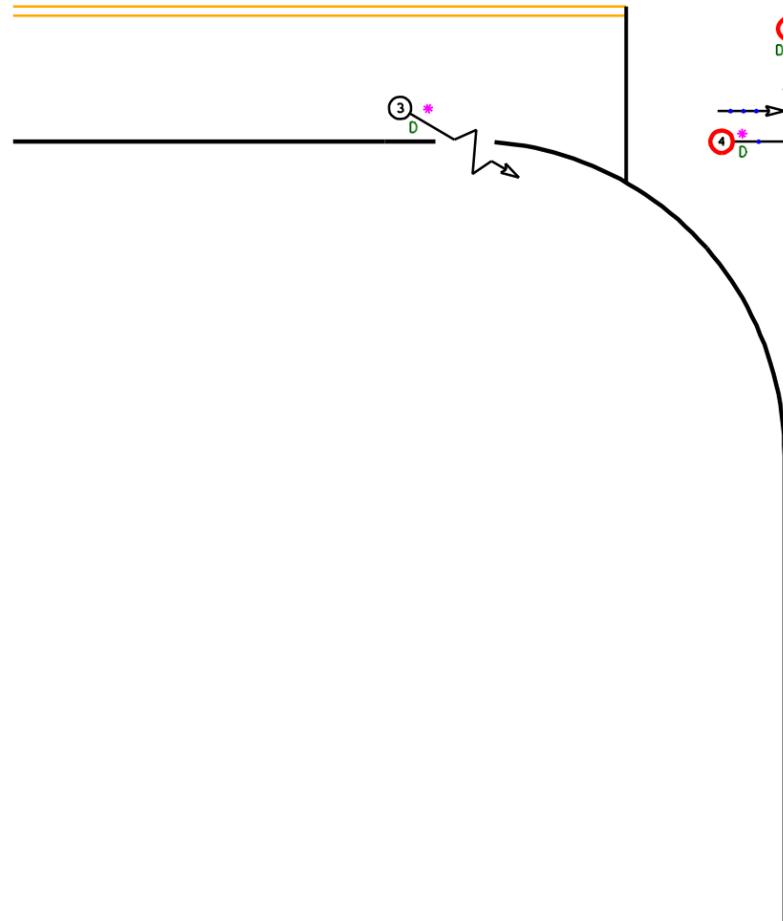
**N.C. DEPARTMENT of TRANSPORTATION**  
**DIVISION of HIGHWAYS**  
**TRANSPORTATION MOBILITY and**  
**SAFETY DIVISION**



SR 2555  
Auburn-Knightdale Rd  
45 MPH

Abandoned  
Store

SR 1004  
E. Garner Rd  
45 MPH



Note Crash 9: Vehicle was stopped at signal when the load from an opposite vehicle fell and impacted the driver side

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

SS# 05-03-202  
WAKE County  
AFTER Period  
12/1/03 - 9/30/08  
SR 1004 at SR 2555



New  
Signalized  
Intersection

Intersection  
Frontal Impact  
Crashes

**TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT**

COLLISION DIAGRAM	
DIVISION: 5	AREA:
STUDY PERIOD: 12/1/2003 - 9/30/2008	
DISTANCE: Y-LINE = 150FT	
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: N/A	
DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE	
DATE: 1-6-2009	
LOG NUMBER: SS* 05-03-202 AFTER	

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