

Spot Safety Project Evaluation

Project Log # 200812257

Spot Safety Project # 07-99-220

Spot Safety Project Evaluation of the Left Turn Lanes and Traffic Signal Installation at the Intersection of NC 150 and SR 1001 (Church Street) Guilford 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

2-5-2009

Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 07-99-220 located at the Intersection of NC 150 and SR 1001 (Church Street) north of Greensboro in Guilford County.

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 actuated traffic signal (Sig ID 07-0202) and left turn lanes on both approaches of NC 150. In the before period, NC 150 and SR 1001 were both two-lane facilities at the subject intersection with no turn lanes and speed limits of 55 mph and 50 mph, respectively. The subject location is a four-leg crossroads intersection, which was controlled by stop conditions on SR 1001 (Church Street) and a standard overhead flasher. Along with the improvements, traffic islands and rumble strips on the SR 1001 approaches were removed.

The original statement of problem was that vehicles traveling on SR 1001 could not enter the intersection safely due to insufficient gaps in traffic. The goal was to alleviate the angle accident occurrence. The intersection met signal warrants 9 and 11.

The initial crash analysis was completed from July 1, 1996 to June 30, 1999 with sixteen (16) reported crashes, nine (9) of which were deemed correctable. The final completion date for the improvement at the subject intersection was on July 29, 2003 with a total cost of \$145,000.00.

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 May 1, 1998 to July 31, 1998. The before period consisted of reported crashes from February 1, 1998 through April 30, 2003 (5 years and 3 months); and the after period consisted of reported crashes from August 1, 1998 through October 31, 2008 (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	21	6	- 71.4 %
Total Severity Index	14.30	3.47	- 75.7 %
Target Crashes	14	3	- 78.6 %
Target Crash Severity Index	14.47	5.93	- 59.0 %
Volume	8,000	8,500	6.25 %
<u>Injury Crash Summary - Total</u>			
Fatal injury Crashes	1	0	- 100.0 %
Class A injury Crashes	2	0	- 100.0 %
Class B injury Crashes	2	0	- 100.0 %
Class C Injury Crashes	5	2	- 60.0 %
Total Injury Crashes	10	2	- 80.0 %

The naive before and after analysis at the treatment location resulted in a 71 percent decrease in Total Crashes, a 79 percent decrease in Target Crashes, and a 76 percent decrease in the Total Severity Index. The before period ADT year was 2000 and the after period ADT year was 2006.

Results and Discussion

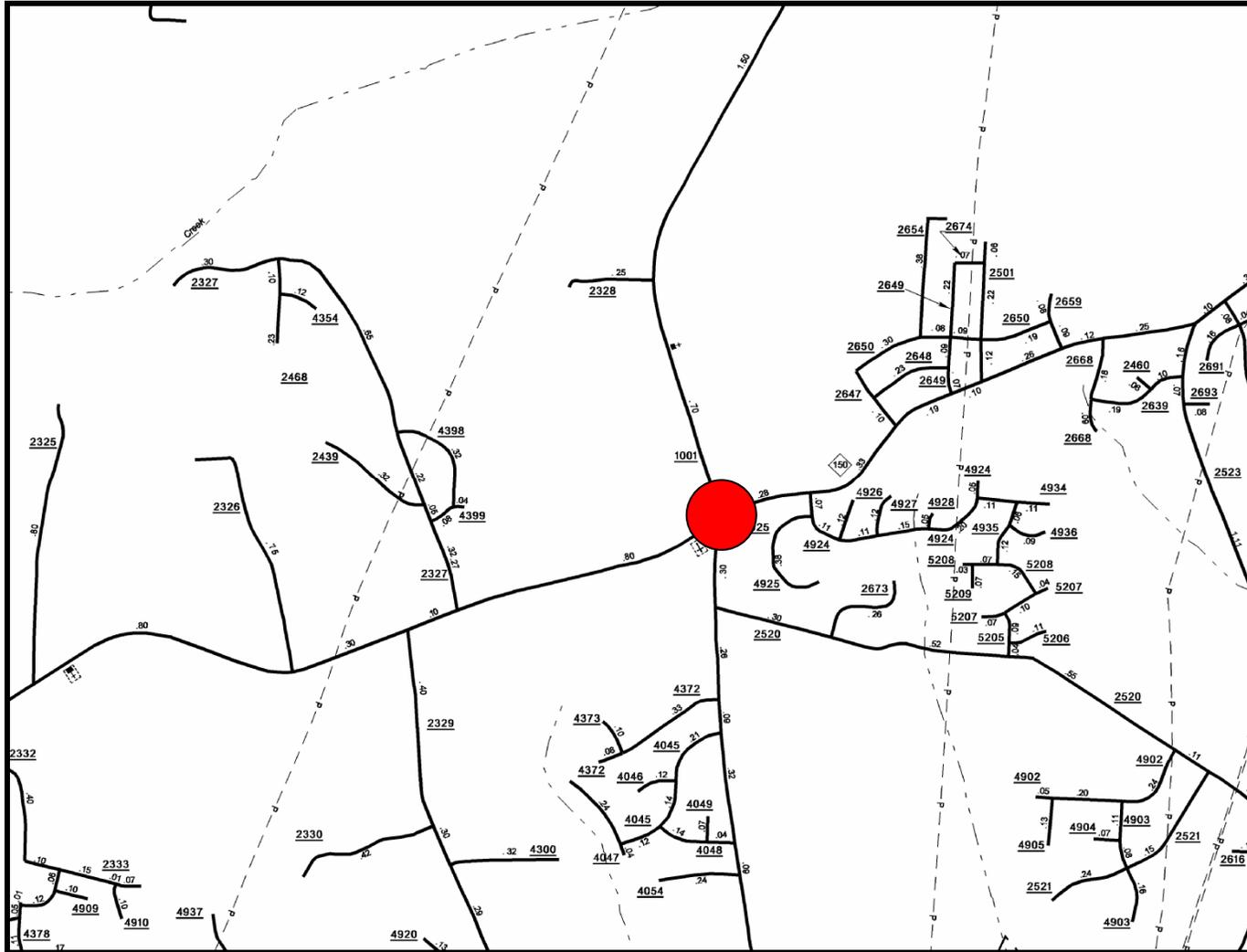
The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 71 percent decrease in Total Crashes and a 79 percent decrease in Target Crashes. The summary results above demonstrate that both Total Crashes and Target Crashes 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 (11 of 21) were the result of a vehicle improperly entering and attempting to cross NC 150 from northbound SR 1001. After the signal installation, this pattern was completely eliminated. The three after period frontal impact crashes were one red light run on NC 150 and two permissive green left turn crashes. The combination of countermeasures has greatly increased the safety of this location. SR 1001 rear-end crashes also reduced from five (5) to two (2) in the after period.

The calculated benefit to cost ratio for this project is **12.08 considering total crashes**. The benefit to cost ratio **considering only target crashes is 8.04**. 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
Guilford County, near City of Greensboro
Evaluation of Spot Safety Project # 07-99-220



Treatment Location: NC 150 at SR 1001 (Church Street)

**SS# 07-99-220 Aerial Map
Guilford County**



TREATMENT SITE PHOTOS TAKEN 1-26-2009



Traveling East on NC 150



Traveling East on NC 150



Traveling North on SR 1001 (Church Street)



Traveling North on SR 1001 (Church Street)



Traveling South on SR 1001 (Church Street)



Traveling South on SR 1001



Traveling West on NC 150



Traveling West on NC 150

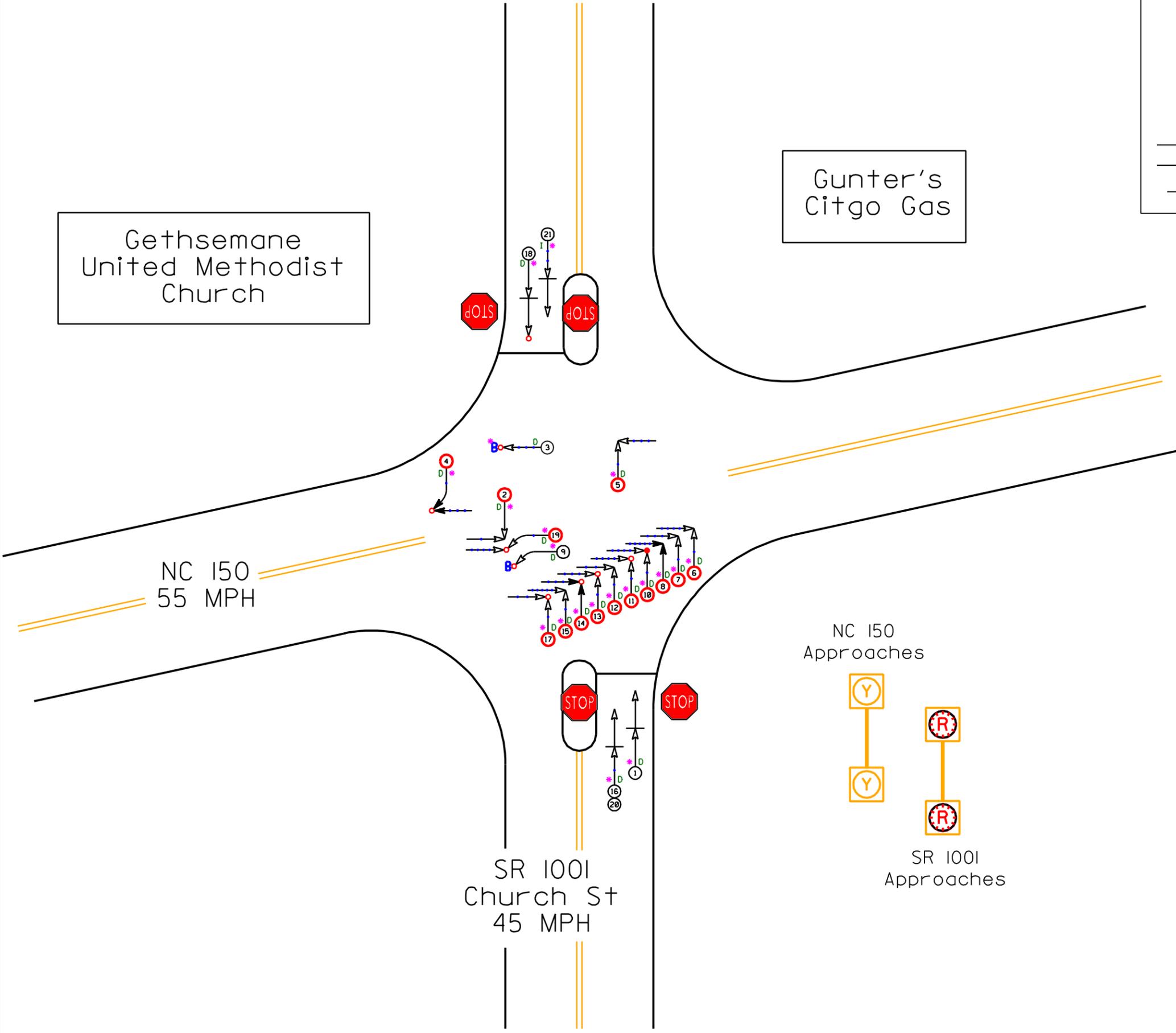
Gethsemane
United Methodist
Church

Gunter's
Citgo Gas

SS# 07-99-220
Guilford County
BEFORE Period
2/1/98 - 4/30/03
NC 150 at SR 1001

LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	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		INJURY		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		SPEED UNKNOWN
	RAN OFF ROAD				70 AND UP		OILY



Frontal Impact
Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 7	AREA:
	STUDY PERIOD: 2/1/1998 - 4/30/2003	
	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: 1-14-2009		
LOG NUMBER: SS* 07-99-220 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		TRAIN
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	RAN OFF ROAD				70 AND UP		OILY

SS# 07-99-220
 Guilford County
 AFTER Period
 8/1/03 - 10/31/08
 NC 150 at SR 1001



Gethsemane
 United Methodist
 Church

Gunter's
 Citgo Gas

Future
 Development
 (Lowes Foods)

NC 150
 55 MPH

SR 1001
 Church St
 50 MPH



New Signalized
 Intersection

Frontal Impact
 Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

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	STUDY PERIOD: 2/1/1998 - 4/30/2003	
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SCALE: NOT TO SCALE		
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N.C. DEPARTMENT of TRANSPORTATION
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SAFETY DIVISION