

# Spot Safety Project Evaluation

Project Log # 200811080

Spot Safety Project # 05-02-201

**Spot Safety Project Evaluation of the Flasher Installation  
SR 2233 (Smithfield Road) and SR 2506 (Major Slade Road)  
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

5-12-2009

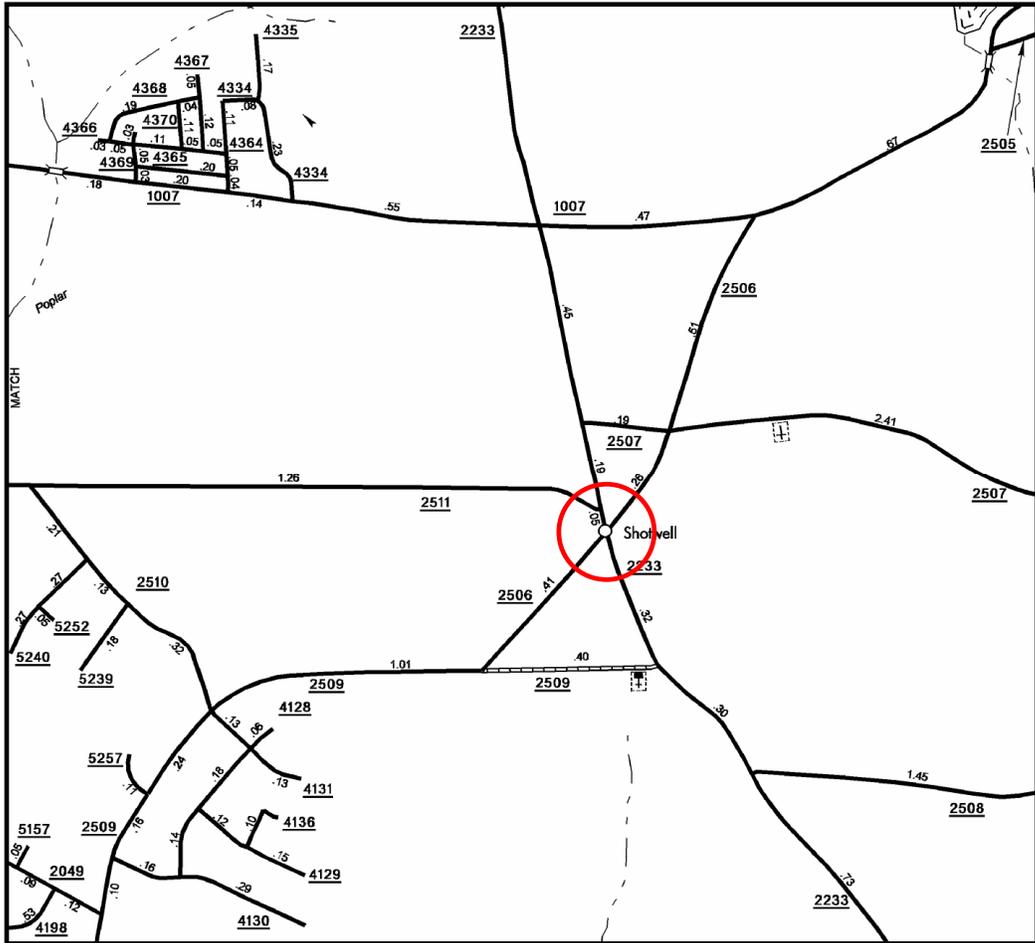
Date

Traffic Safety Project Engineer

# Spot Safety Project Evaluation Documentation

## Subject Location

Evaluation of Spot Safety Project Number 05-02-201 located at the Intersection of SR 2233 (Smithfield Road) and SR 2506 (Major Slade Road) in Wake County, at Shotwell Crossroads.





## **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 continuous flasher. SR 2233 and SR 2506 are both two-lane facilities at the subject intersection with no turn lanes and speed limits of 55 mph on all approaches. The subject location is a four-leg crossroads intersection, which was initially controlled by a stop condition on the SR 2233 (Smithfield Road) approaches.

From reading the background file information and discussing this location with other engineers, it has been discovered that this intersection has evolved through multiple countermeasures. In September 2001, the stop and stop-ahead signs on SR 2233 were upgraded to 36-inch and dual posted. Since the flasher installation, the location has been converted to four-way stop control with the flasher rehabilitated to indicate red on all approaches in April 2007.

The original statement of problem was the occurrence of vehicles on SR 2233 running the stop sign resulting in angle type collisions. The intended purpose of the flasher is to alleviate the accident problem by bringing more awareness to the stop condition ahead.

The initial crash analysis was completed from October 1, 1998 to September 30, 2001 with fourteen (14) reported crashes, eleven (11) of which were deemed correctable. The final completion date for the flasher installation at the subject intersection was on May 3, 2003 with a total cost of \$10,000.

## **Naive Before and After Analysis**

After reviewing the spot safety project file folder along with all the crashes at the subject location, the following time periods were established as the basis for analysis:

Construction Periods: August to September 2001, April to May 2003, and April 2007.

Before 1 (2-Way Stop / Nothing): August 1, 1997 to July 31, 2001 (4 Years).

Before 2 (2-Way Stop / Dual Signs): October 1, 2001 to March 31, 2003 (1 Year, 6 Months).

After 1 (2-Way Stop / Flasher): June 1, 2003 to March 31, 2007 (3 Years, 10 Months).

After 2 (4-Way Stop / Flasher): May 1, 2007 to October 31, 2008 (1 Year, 6 Months).

The ending date for this analysis was determined by the last available crash data when the analysis was completed. The treatment data consisted of all crashes within 150 feet of the subject intersection. *Please see attached location map, aerial maps, and photos for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Angle collisions resulting from a vehicle failing to stop for the stop sign were the assigned Target Crashes for these applied countermeasures.

<u>Treatment Information</u>	<b>Before 1 2-Way Stop 4.00 Yrs</b>	<b>Before 2 Dual Signs 1.50 Yrs</b>	<b>After 1 Flasher 3.84 Yrs</b>	<b>After 2 4-Way Stop 1.50 Yrs</b>
Total crashes	19	5	13	3
Total Severity Index	8.49	5.44	10.25	3.47
<b>Total Crashes per Year</b>	<b>4.75</b>	<b>3.33</b>	<b>3.39</b>	<b>2.00</b>
Target Crashes	12	3	3	0
Target Crash Severity Index	11.02	8.40	<b>28.73</b>	0.00
<b>Target Crashes per Year</b>	<b>3.00</b>	<b>2.00</b>	<b>0.78</b>	<b>0.00</b>
Volume	5,100	5,100	12,000	12,000

The naive before and after analysis at the treatment location resulted in a 58 percent decrease in Total Crashes per year through the analysis and complete elimination of Target Crashes per year. 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 58 percent decrease in Total Crashes per year and a 100 percent decrease in Target Crashes per year from the Before 1 period to the After 2 period. The summary results above demonstrate that both Total Crashes per year and Target Crashes per year appear to have decreased at the treatment location through the analysis.

Referencing the *Collision Diagrams*, the Before 1 period did indicate a pattern of vehicles on SR 2233 running the stop sign averaging out to 3.0 crashes per year. After the flasher installation (with dual posted stop signs), the number of vehicles running the stop condition and colliding reduced to less than one crash per year. However, since one of these three crashes during this period resulted in an A-class injury; the Target Crash Severity Index skyrocketed to 28.73.

As discussed above, this location was converted to four-way stop control in April 2007. Since that time and through this analysis, no collisions have occurred from vehicles running the stop sign.

Please see the attached *Treatment Site Photos*. Photos are provided for all four approaches to the treatment intersection showing the four-way stop control measures. This site is also currently being evaluated and monitored as a four-way stop independent study within the Safety Evaluation Group.

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 TAKEN 1/27/2009**



Traveling West (Southwest) on SR 2506 (Major Slade Rd)



Traveling West (Southwest) on SR 2506



Traveling East (Northeast) on SR 2506 (Major Slade Road)



Traveling East (Northeast) on SR 2506



Traveling North on SR 2233 (Smithfield Road)



Traveling North on SR 2233 (Smithfield Road)



Traveling South on SR 2233 (Smithfield Road)

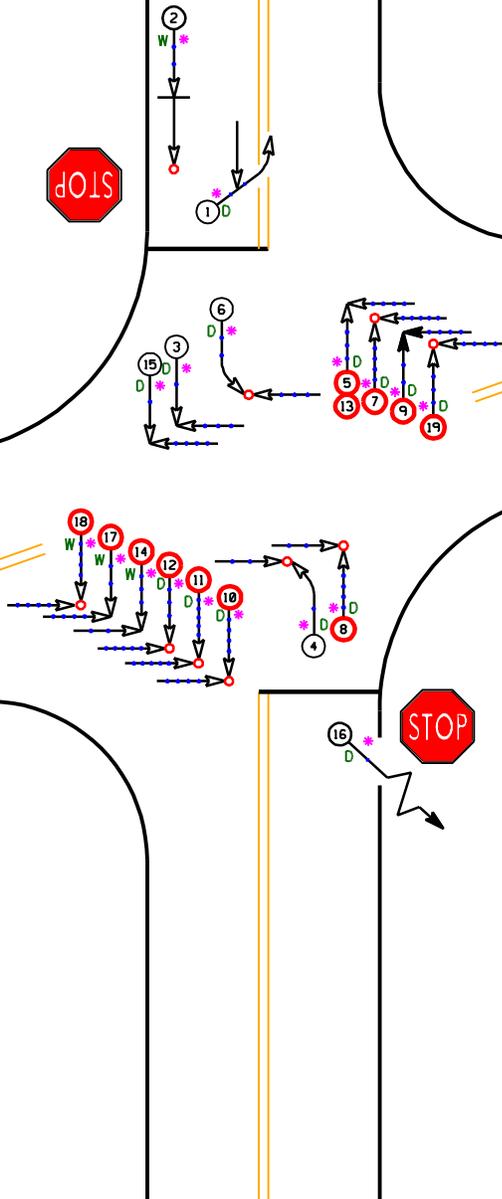
SR 2233  
Smithfield Rd  
55 MPH

SR 2506  
Major Slade Rd  
55 MPH

SS# 05-02-201  
Wake County  
BEFORE Period I  
Stop Control  
8/1/97 - 7/31/01  
4 Years

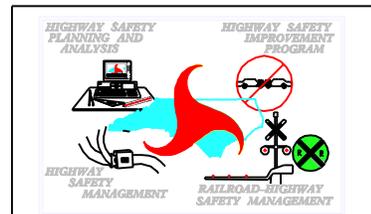
**LEGEND**

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PAKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PAKED VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
	PAKED VEHICLE		OUT OF CONTROL		40 MPH TO 49		WET
	PAKED VEHICLE		HIT AND RUN		50 MPH TO 59		ICY OR SNOWY
	PAKED VEHICLE		FATALITY		60 MPH TO 69		SPEED UNKNOWN
	PAKED VEHICLE				70 AND UP		ONLY
	PAKED VEHICLE						



Stop Sign Run  
Target Crashes

**TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT**



COLLISION DIAGRAM	
DIVISION: 5	AREA:
STUDY PERIOD: 8/1/1997 - 7/31/2001	
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: 5-11-2009	
LOG NUMBER: SS* 05-02-201BEFORE 1	

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

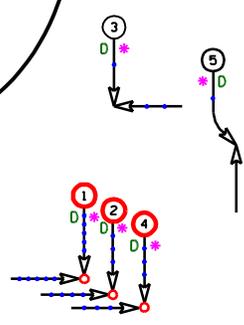
SR 2233  
Smithfield Rd  
55 MPH

**LEGEND**

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PAKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PAKED VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
	PAKED VEHICLE		OUT OF CONTROL		40 MPH TO 49		WET
	PAKED VEHICLE		INJURY		50 MPH TO 59		ICY OR SNOWY
	PAKED VEHICLE		FATALITY		60 MPH TO 69		SPEED UNKNOWN
	PAKED VEHICLE				70 AND UP		ONLY
	PAKED VEHICLE						

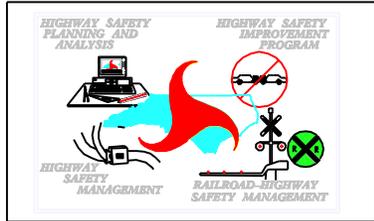


SR 2506  
Major Slade Rd  
55 MPH



SS# 05-02-201  
Wake County  
BEFORE Period 2  
Dual Stop Signs  
10/1/01 - 3/31/03  
1.50 Years

**TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT**



COLLISION DIAGRAM	
DIVISION: 5	AREA:
STUDY PERIOD: 10/1/2001 - 3/31/2003	
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: 5-11-2009	
LOG NUMBER: SS* 05-02-201BEFORE 2	

Stop Sign Run  
Target Crashes

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



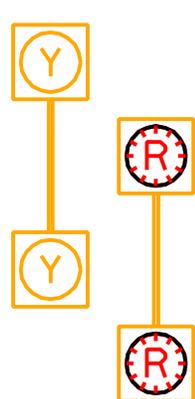
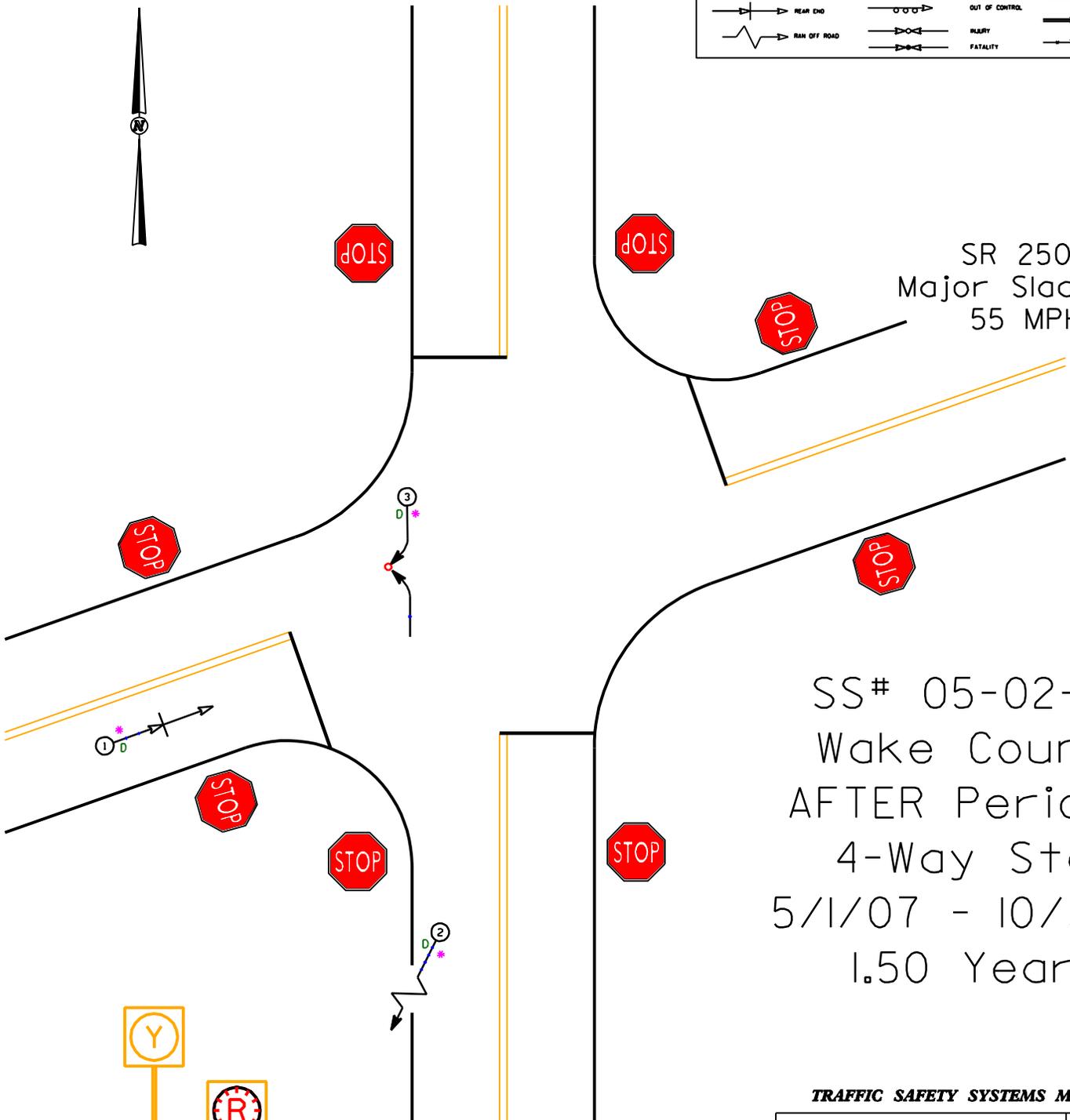
**LEGEND**

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

SR 2233  
Smithfield Rd  
55 MPH

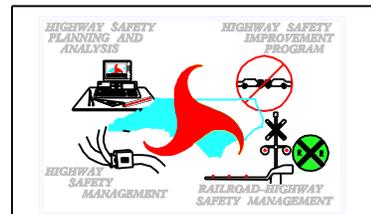
SR 2506  
Major Slade Rd  
55 MPH

SS# 05-02-201  
Wake County  
AFTER Period 2  
4-Way Stop  
5/1/07 - 10/31/08  
1.50 Years



Stop Sign Run  
Target Crashes

**TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT**



COLLISION DIAGRAM	
DIVISION: 5	AREA:
STUDY PERIOD: 5/1/2007 - 10/31/2008	
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: 5-II-2009	
LOG NUMBER: SS* 05-02-201AFTER 2	

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