

# Spot Safety Project Evaluation

Work Order #41000015190

Spot Safety Project # 03-06-201

**Spot Safety Project Evaluation of the Installation of an Overhead Flasher at the  
Intersection of SR 1214 (Boykin Bridge Rd) and SR 1222 (Beulah Rd)  
Sampson County**

Documents Prepared By:

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

**Principal Investigator**



Brad Robinson, PE

10/6/2011

Date

Traffic Safety Project Engineer

# *Spot Safety Project Evaluation Documentation*

## **Subject Location**

Evaluation of Spot Safety Project Number 03-06-201 – The intersection of SR 1214 (Boykin Bridge Rd) and SR 1222 (Beulah Rd) in Sampson County.

The signal number for this location is 03-0993.



## **Project Information and Background from the Project File Folder**

The spot safety project countermeasure chosen for the subject location was to install an overhead flasher.

The subject location is a four leg intersection with single lane approaches in all its legs. The intersection is controlled by stop signs on SR 1222. The speed limit is 55 mph for all approaches.

The final completion date for the improvements at the subject intersection was on November 8, 2007 with a total cost of \$32,000.00.

### 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 October 1, 2007 to November 30, 2007. The before period consisted of reported crashes from February 1, 2004 through September 30, 2007 (3 years and 8 months) and the after period consisted of reported crashes from December 1, 2007 through July 31, 2011 (3 years and 8 months). The ending date for this analysis was limited by the available crash data at the time the analysis was conducted.

The treatment data consisted of all reported crashes within 150 feet of the subject intersection. The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Frontal Impact Crashes involving vehicles entering the intersection from the side road (SR 1222) were the Target Crashes for the applied countermeasure. These crash types are considered as follows: Left Turn, same roadway; Left Turn, different roadway; Right Turn, different roadway; Head On and Angle. The target crashes are clearly identified in the before and after period collision diagrams.

<b><u>Treatment Information</u></b>			
	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total Crashes	25	12	-52.0
Total Severity Index	6.03	4.7	-22.1
Target Crashes	21	8	-61.9
Target Severity Index	6.29	4.70	-25.3
Volume	2,800	2,400	-14.3
<b><u>Target Crash Severity Summary</u></b>			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	6	1	-83.3
Class C Crashes	9	3	-66.7
PDO Crashes	6	4	-33.3

The naive before and after analysis at the treatment location resulted in a 52 percent decrease in total crashes, a 62 percent decrease in target crashes, and a 14 percent decrease in average daily traffic (ADT). The before period ADT year was 2005 and the after period ADT year was 2009.

### Results and Discussion

It appears that the spot safety countermeasure has been effective at reducing target crashes at the intersection. The majority of before period target crashes (15) were angle crashes between

northbound vehicles on SR 1222 and westbound vehicles on SR 1214. In all but one of these crashes the northbound vehicle appears to have first stopped at the stop sign before pulling out into the intersection. In the after period this pattern was reduced to only five crashes, none of which involved a vehicle failing to stop at the stop sign.

The calculated benefit to cost ratio for this project is 11.53 considering total crashes. The benefit to cost ratio considering only target crashes is also 11.53. 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*. 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 - TOTAL**

LOCATION: SR 1214 at SR 1222		BY: bdr						
COUNTY: Sampson		DATE: 10/7/2011						
FILE NO.: SS 03-06-201								
DETAILED COST:	TYPE IMPROVEMENT - overhead flasher							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$0	0	0.000	\$0			
		\$32,000	10	0.149	\$4,769			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$32,000	10	0.149	\$4,769			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$300			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$350			
	TOTAL ANNUAL COST=				\$5,419			
	TOTAL COST OF PROJECT=				\$32,000			
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	3.66	0	0.00	17	4.64	8	2.19	\$102,295
AFTER	3.66	0	0.00	6	1.64	6	1.64	\$39,836
						Annual Benefits from Crash Cost Savings		\$62,459
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$57,040		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	11.53		
TOTAL COST OF PROJECT		-	\$32,000	COMPREHENSIVE B/C RATIO		-	11.53	

**BENEFIT-COST ANALYSIS WORKSHEET - TARGET**

LOCATION: SR 1214 at SR 1222		BY: bdr						
COUNTY: Sampson		DATE: 10/7/2011						
FILE NO.: SS 03-06-201								
DETAILED COST:	TYPE IMPROVEMENT - overhead flasher							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$0	0	0.000	\$0			
		\$32,000	10	0.149	\$4,769			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$32,000	10	0.149	\$4,769			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$300			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$350			
	TOTAL ANNUAL COST=				\$5,419			
	TOTAL COST OF PROJECT=				\$32,000			
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	3.66	0	0.00	15	4.10	6	1.64	\$89,016
AFTER	3.66	0	0.00	4	1.09	4	1.09	\$26,557
						Annual Benefits from Crash Cost Savings		\$62,459
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$57,040		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	11.53		
TOTAL COST OF PROJECT		-	\$32,000	COMPREHENSIVE B/C RATIO		-	11.53	

Treatment Site Photos Taken on September 29, 2011



Traveling southwest on SR 1214 (Boykin Bridge)



Traveling northeast on SR 1214 (Boykin Bridge)



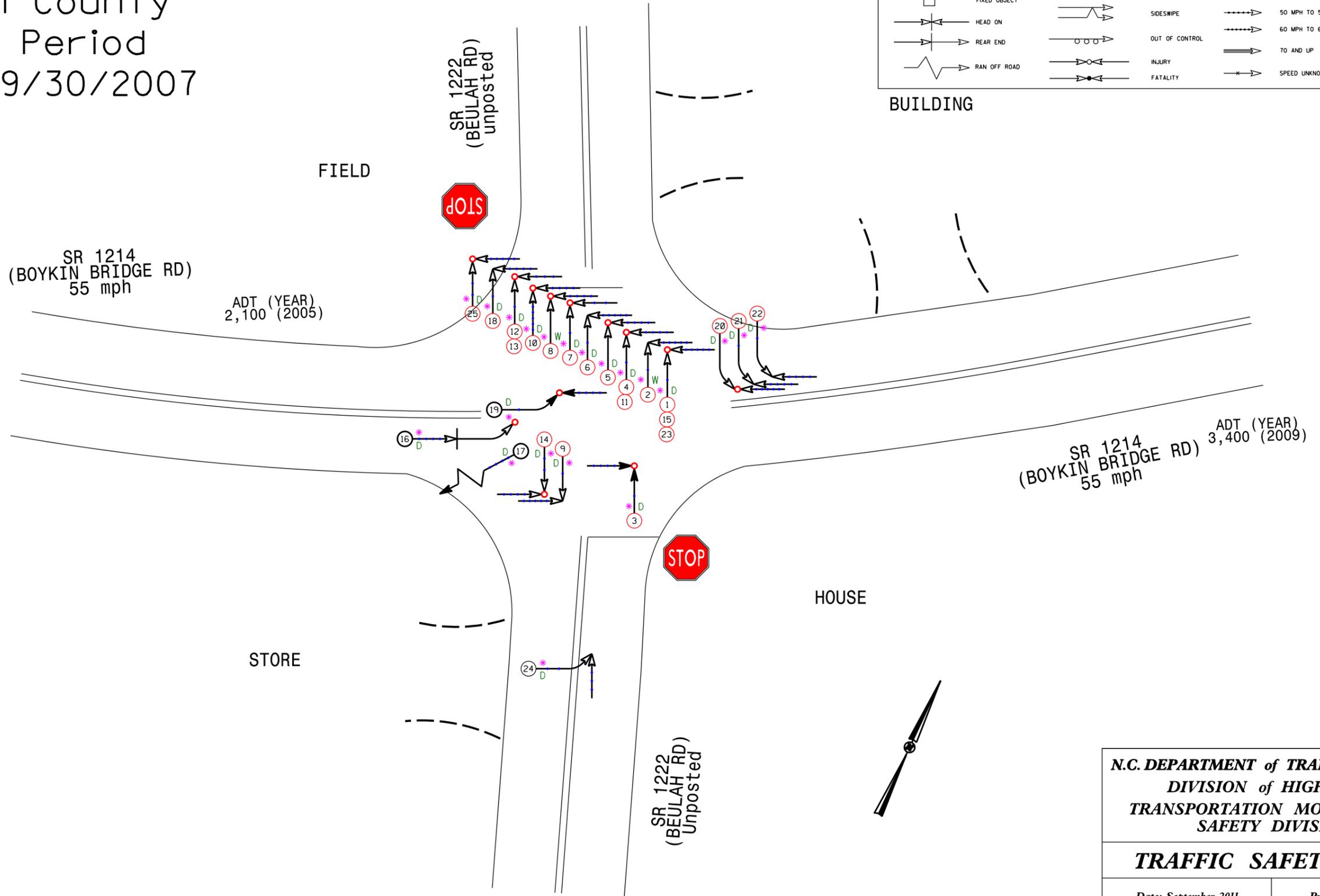
Traveling northwest on SR 1222 (Beulah Rd)



Traveling southeast on SR 1222 (Beulah Rd)

SS# 03-06-201  
 Order# 41000015190  
 Sampson County  
 BEFORE Period  
 2/1/2004-9/30/2007

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
			P PEDESTRIAN
			T TRAIN
			* DRIVER AT FAULT
			D DRY
			W WET
			I ICY OR SNOWY
			O ONLY



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

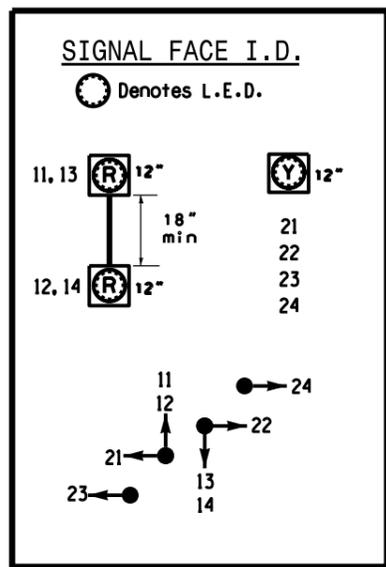
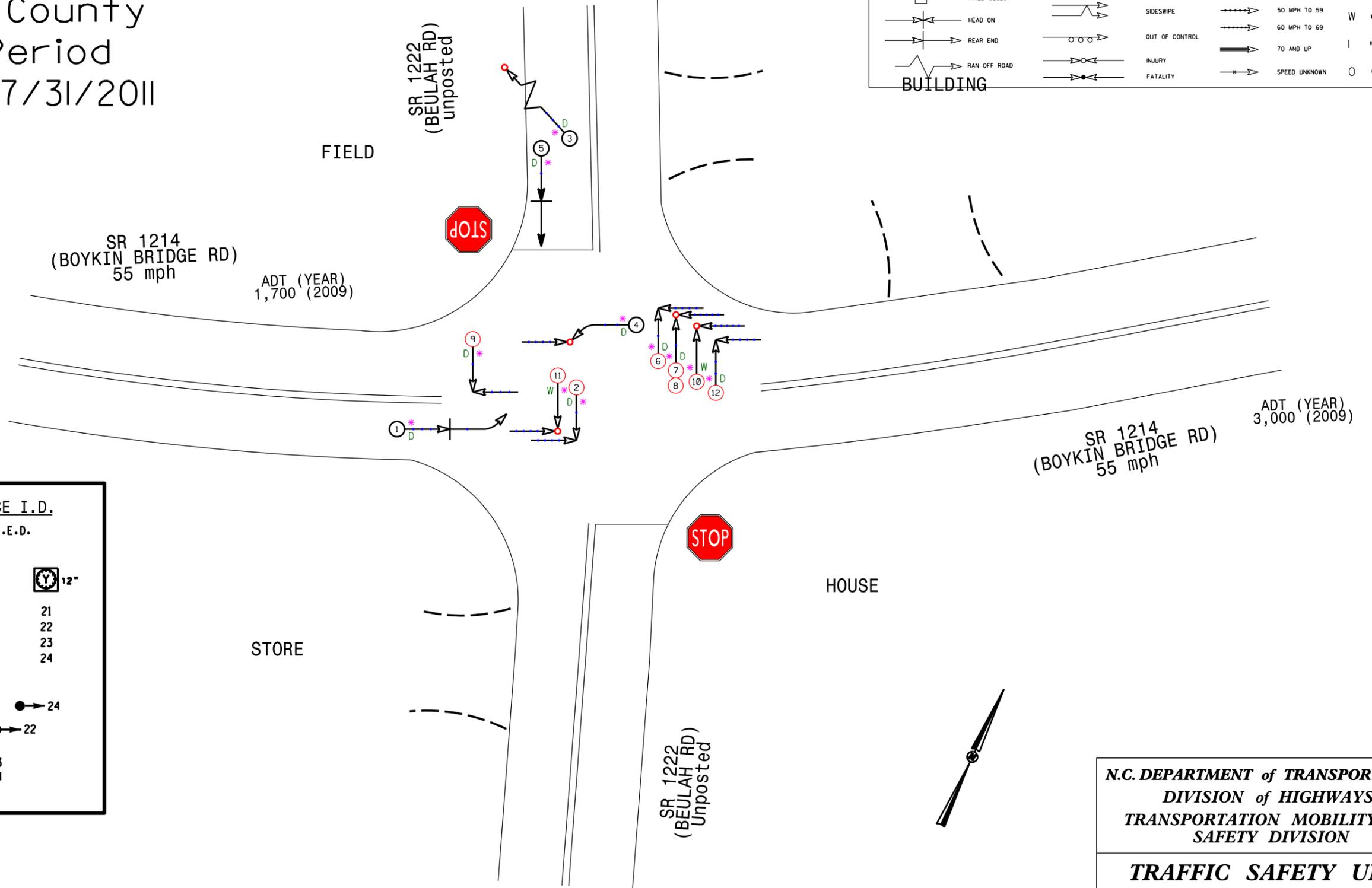
**TRAFFIC SAFETY UNIT**

Date: September 2011

Prepared By: BDR

SS# 03-06-201  
 Order# 41000015190  
 Sampson County  
 AFTER Period  
 12/1/2007-7/31/2011

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		OILY
	RAN OFF ROAD		SPEED UNKNOWN		70 AND UP		



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

**TRAFFIC SAFETY UNIT**

Date: September 2011 Prepared By: BDR