

# Spot Safety Project Evaluation

Work Order #41000014697

Spot Safety Project # 08-06-210

## Spot Safety Project Evaluation of the Traffic Signal Installation At the Intersection of NC 211 and SR 1216 (Juniper Lake Rd) Moore 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

10/4/2011

Date

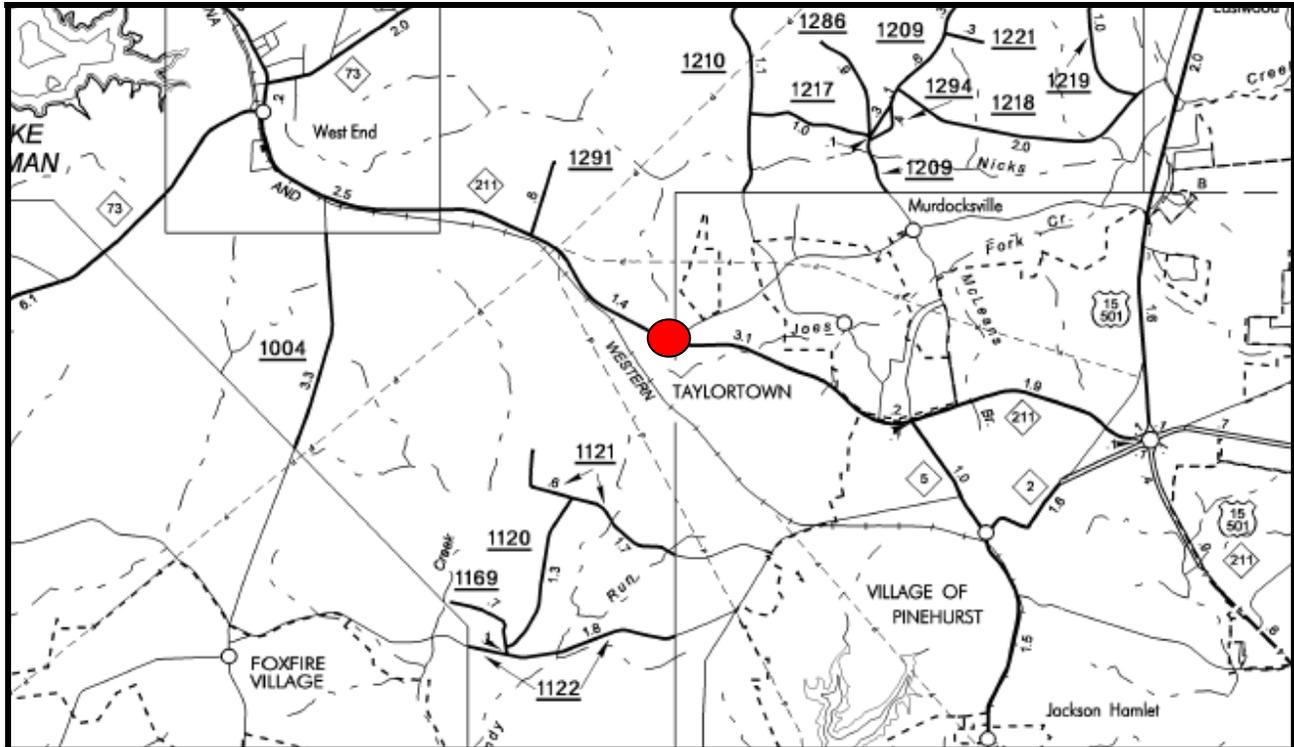
Traffic Safety Project Engineer

# *Spot Safety Project Evaluation Documentation*

## **Subject Location**

Evaluation of Spot Safety Project Number 08-06-210 – The intersection of NC 211 and SR 1216 (Juniper Lake Rd) in Moore County.

The signal number for this location is 08-0983.



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

The spot safety project improvement countermeasure chosen for the subject location was to install a traffic signal.

The subject location is a three-lane intersection which was controlled by a stop sign on SR 1216 in the before period. The approaches of westbound NC 211 and SR 1216 are both single lane. The eastbound approach of NC 211 has one through lane and one left turn lane. The speed limits are 45 mph on SR 1216 and 55 mph on NC 211.

The final completion date for the improvements at the subject intersection was on April 17, 2007 with a total cost of \$47,000.00.

## 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 March 1, 2007 to April 30, 2007. The before period consisted of reported crashes from December 1, 2002 through February 28, 2007 (4 years and 3 months) and the after period consisted of reported crashes from May 1, 2007 through July 31, 2011 (3 years and 3 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 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>Treatment Information</b>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total Crashes	5	3	-40.0
Total Severity Index	8.4	1	-88.1
Target Crashes	4	0	-100.0
Target Severity Index	8.4	0	-100.0
Volume	14,000	12,900	-7.9
<b>Target Crash Severity Summary</b>			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	3	0	-100.0
Class C Crashes	1	0	-100.0
PDO Crashes	0	0	N/A

The naive before and after analysis at the treatment location resulted in a 40 percent decrease in total crashes, a 100 percent decrease in target crashes, and an 8 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

The before period target crashes included three left turn-different roadway crashes and one right turn-different roadway crash. There were no target crashes in the after period.

The calculated benefit to cost ratio for this project is 2.07 considering total crashes. The benefit to cost ratio considering only target crashes is 1.90. 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: NC 211 at SR 1216		BY: bdr						
COUNTY: Moore		DATE: 8/15/2011						
FILE NO.: SS 08-06-210								
DETAILED COST:	TYPE IMPROVEMENT - Signal							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$0	0	0.000	\$0			
		\$47,000	10	0.149	\$7,004			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$47,000	10	0.149	\$7,004			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,000			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900			
	TOTAL ANNUAL COST=				\$9,904			
	TOTAL COST OF PROJECT=				\$47,000			
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	4.25	0	0.00	5	1.18	0	0.00	\$23,529
AFTER	4.25	0	0.00	0	0.00	3	0.71	\$3,035
						Annual Benefits from Crash Cost Savings		\$20,494
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$10,590		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	2.07		
TOTAL COST OF PROJECT		-	\$47,000	COMPREHENSIVE B/C RATIO		-	2.07	

**BENEFIT-COST ANALYSIS WORKSHEET - TARGET**

LOCATION: NC 211 at SR 1216		BY: bdr						
COUNTY: Moore		DATE: 8/15/2011						
FILE NO.: SS 08-06-210								
DETAILED COST:	TYPE IMPROVEMENT - Signal							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$0	0	0.000	\$0			
		\$47,000	10	0.149	\$7,004			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$47,000	10	0.149	\$7,004			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,000			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900			
	TOTAL ANNUAL COST=				\$9,904			
	TOTAL COST OF PROJECT=				\$47,000			
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	4.25	0	0.00	4	0.94	0	0.00	\$18,824
AFTER	4.25	0	0.00	0	0.00	0	0.00	\$0
						Annual Benefits from Crash Cost Savings		\$18,824
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$8,919		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	1.90		
TOTAL COST OF PROJECT		-	\$47,000	COMPREHENSIVE B/C RATIO		-	1.90	

**Treatment Site Photos Taken September 15, 2011**



**Traveling east on NC 211**



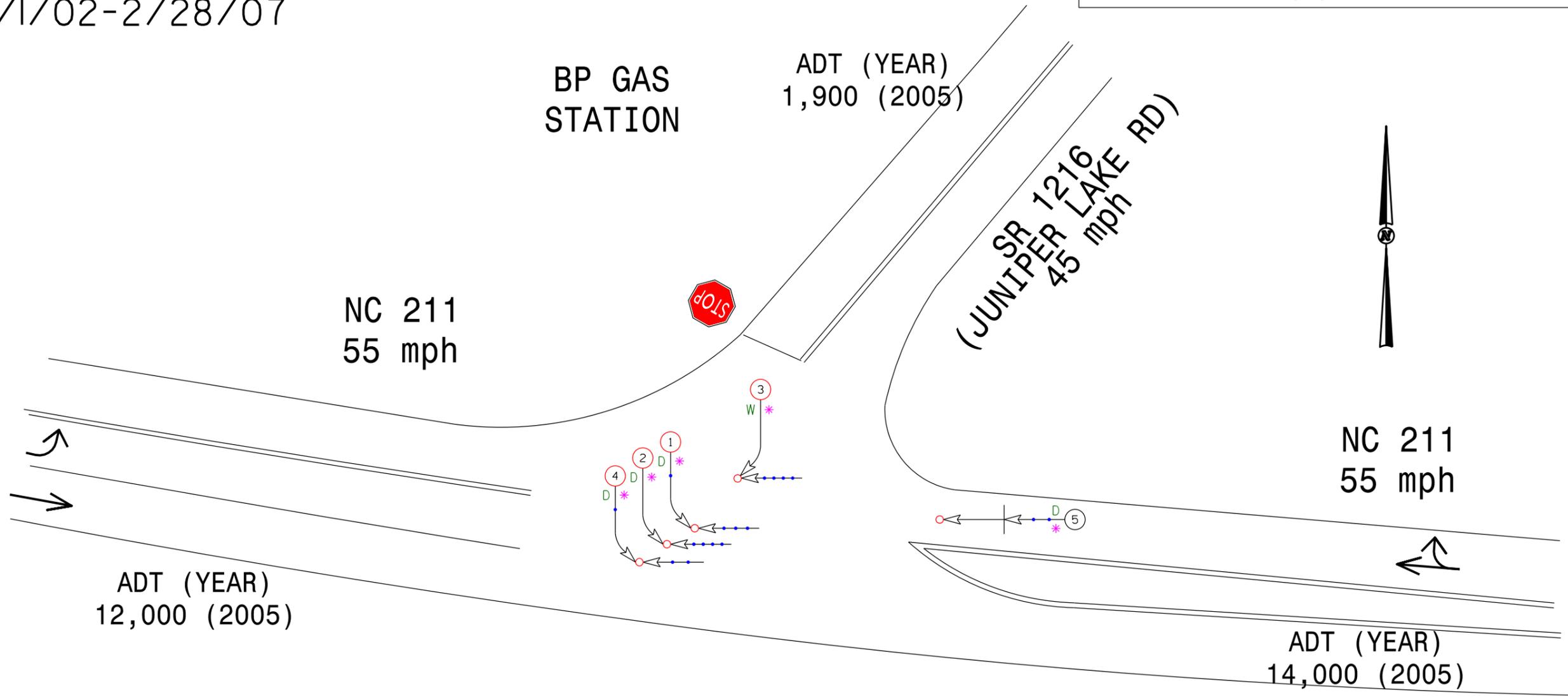
**Traveling west on NC 211**



**Traveling south on SR 1216 (Juniper Lake)**

SS# 08-06-210  
 Order# 4100014697  
 Moore County  
 BEFORE Period  
 12/1/02-2/28/07

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		70 AND UP		SPEED UNKNOWN		



Target Crashes

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

**TRAFFIC SAFETY UNIT**

Date: August 2011 Prepared By: bdr

SS# 08-06-210  
 Order# 4100014697  
 Moore County  
 AFTER Period  
 5/1/07-7/31/11

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

BP GAS STATION

ADT (YEAR)  
1,800 (2009)

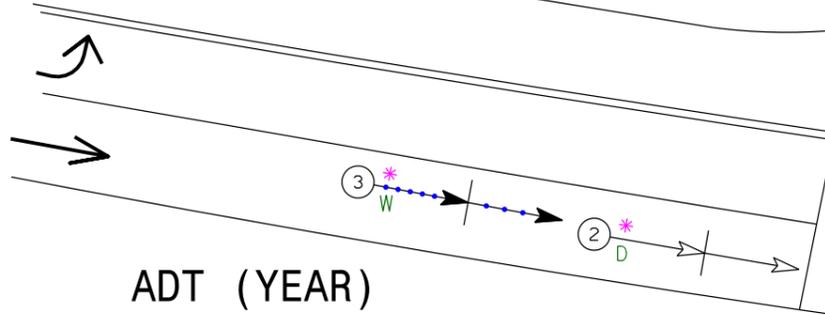
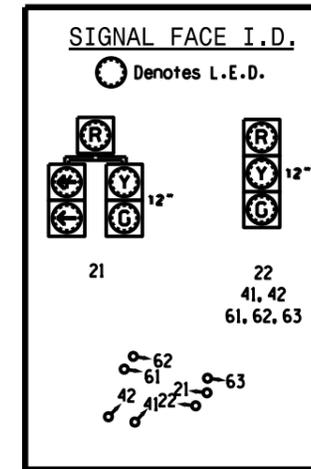
(JUNIPER LAKE RD)  
 SR 1216  
 45 mph

NC 211  
55 mph

NC 211  
55 mph

ADT (YEAR)  
13,000 (2009)

ADT (YEAR)  
11,000 (2009)



Target Crashes

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

**TRAFFIC SAFETY UNIT**

Date: August 2011

Prepared By: bdr