

# Spot Safety Project Evaluation

Order # 41000013698

Spot Safety Project # 09-04-204

**Spot Safety Project Evaluation of the Traffic Signal Installation  
NC 150 (Peters Creek Parkway) at SR 3010 (Bridgeton Road)  
Forsyth 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

8-10-2011

Date

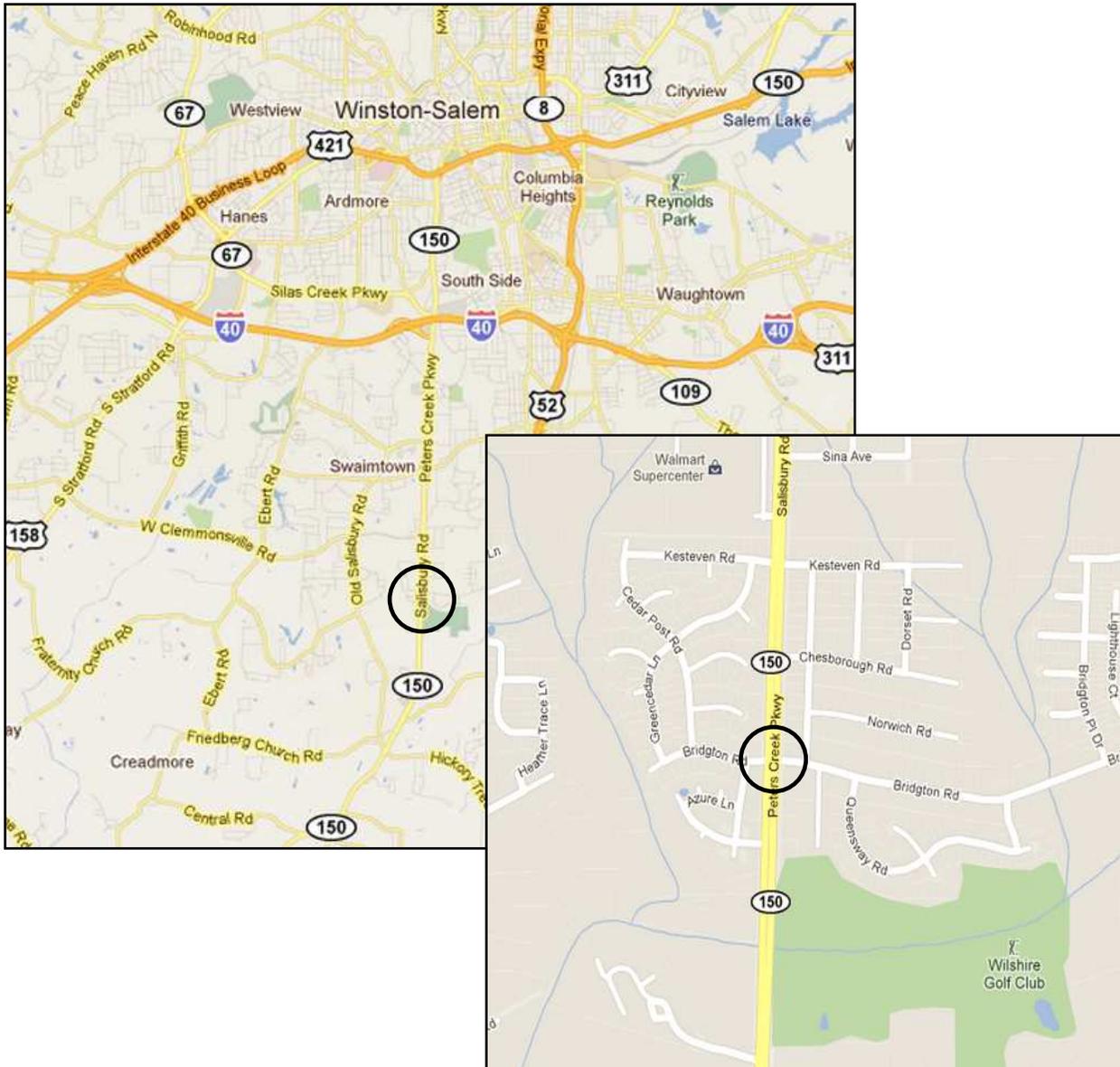
Traffic Safety Project Engineer

# Spot Safety Project Evaluation Documentation

## Subject Location

Evaluation of Spot Safety Project Number 09-04-204 located at the Intersection of NC 150 (Peters Creek Parkway) and SR 3010 (Bridgeton Road) in Forsyth County, south of the City of Winston-Salem.

The Sig ID is 09-0390 for this newly installed traffic signal.





Aerial provided through BING Maps

### **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 intersection traffic signal. NC 150 is a four-lane divided roadway with a 55-mph speed limit. NC 150 (Peters Creek Parkway) also presented left turn lanes on both approaches and a northbound right turn lane in the before period. With the signal installation, a developer paid for and added a southbound right turn lane at the intersection. SR 3010 (Bridgeton Road) is two-lane facility with a speed limit of 35-mph on both approaches. The subject location is a four-leg crossroads intersection, which was controlled by stop signs on SR 3010 in the before period.

The original statement of problem was the presence of angle crashes from vehicles unable to access NC 150 from the side street safely. This intersection met Signal Warrants 2 and 3A.

The initial crash analysis was completed from July 1, 2001 to June 30, 2004 with seventeen (17) reported crashes, eleven (11) of which were deemed correctable including one A-injury crash. The final completion date for the improvement at the subject intersection was on August 23, 2007 with a total cost of \$37,800.

## 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 were the months of June through August 2007. The before period consisted of reported crashes from September 1, 2003 through May 31, 2007 (3 years and 9 months); and the after period consisted of reported crashes from September 1, 2007 through May 31, 2011 (3 years and 9 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>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total Crashes	11	22	100.0 %
Total Severity Index	6.38	12.94	102.8 %
Target Crashes – Frontal Impact	9	15	66.7 %
Target Crash Severity Index	7.58	15.55	105.1 %
Volume (2005, 2009)	18,500	24,200	30.8 %

<u>Injury Crash Summary</u>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Fatal injury Crashes	0	1	100.0 %
Class A injury Crashes	0	1	100.0 %
Class B injury Crashes	2	4	100.0 %
Class C Injury Crashes	6	11	83.3 %
Total Injury Crashes	8	17	112.5 %

The naive before and after analysis at the treatment location resulted in a 100 percent increase in Total Crashes, a 67 percent increase in Target Crashes, and a 103 percent increase in the Total Severity Index. The before period ADT year was 2005 and the after period ADT year was 2009.

## Results and Discussion

Referencing the *Collision Diagrams*, the before period presented a small pattern of frontal impact crashes including five (5) angles and four (4) left turn related collisions. After the new traffic signal

installation, the intersection experienced a spike in frontal impacts including three (3) red light run crashes, one (1) right turn on red, and eleven (11) left turn same roadway collisions.

The left turn same roadway crashes are the strongest pattern in the after period with ten (10) of the eleven occurring in the southbound NC 150 direction. These southbound permissive green collisions included an A-injury and a Fatal crash. Also, seven (7) of the ten (10) collisions occurred at night.

Per a phone call with the Region Traffic Engineering staff, the fatal crash (which occurred on 5/19/2011) is still being investigated and safety improvements are currently being discussed with the City of Winston-Salem. No conclusions have been determined at the time of this report.

The calculated benefit to cost ratio for this project is **(-43.01) considering total crashes**. The benefit to cost ratio **considering only target crashes is (-39.48)**. 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 from our field visit on July 21<sup>st</sup>, 2011 for all four 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.

**Treatment Site Photos – Field Visit 7-21-2011**



**Travelling Southbound on NC 150 (Peters Creek Parkway) approaching intersection**



**Travelling Northbound on NC 150 (Peters Creek Parkway) approaching intersection**



**Travelling Eastbound on Bridgeton Road (sometimes labeled Laurel Hill Drive)**



**Travelling Eastbound on SR 3010 (Bridgeton Road) at NC 150**

**BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes**

LOCATION: NC 150 at SR 3010		BY: JBS							
COUNTY: Forsyth		DATE: 8/5/2011							
FILE NO.: SS 09-04-204									
DETAILED COST:	TYPE IMPROVEMENT - Signal Installation								
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
	Construction	\$37,800	10	0.149	\$5,633				
	Right-of-Way	\$0	0	0.000	\$0				
	TOTALS	\$37,800	10	0.149	\$5,633				
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,200				
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900				
	TOTAL ANNUAL COST=				\$8,733				
	TOTAL COST OF PROJECT=				\$37,800				
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	3.75	0	0.00	8	2.13	3	0.80	\$46,107	
AFTER	3.75	2	0.53	15	4.00	5	1.33	\$421,733	
		Annual Benefits from Crash Cost Savings (\$375,627)							
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST						=	(\$384,360)		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST						=	-43.01		
TOTAL COST OF PROJECT		-	\$37,800	COMPREHENSIVE B/C RATIO		-	-43.01		

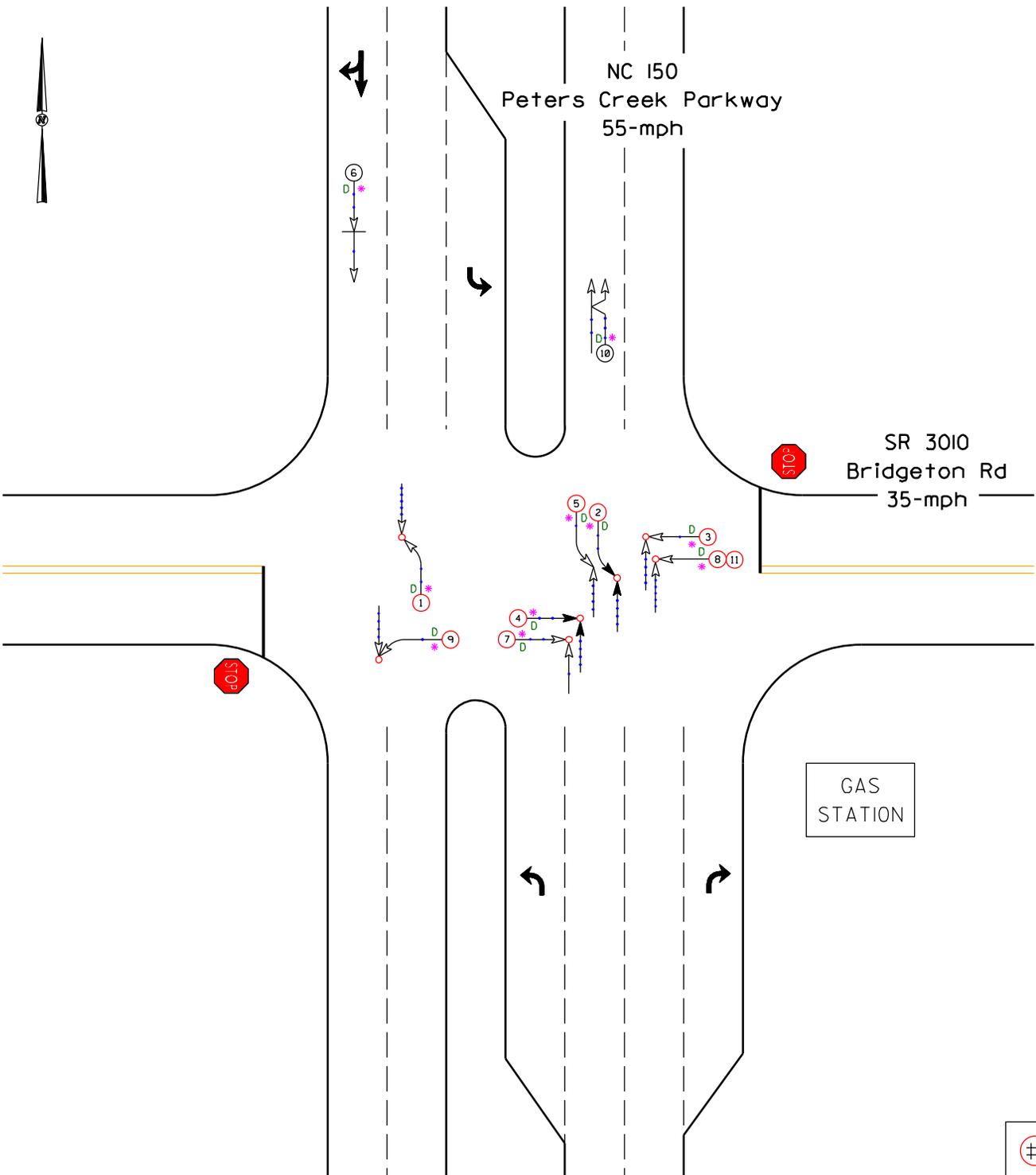
**BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes**

LOCATION: NC 150 at SR 3010		BY: JBS							
COUNTY: Forsyth		DATE: 8/5/2011							
FILE NO.: SS 09-04-204		Frontal Impact Target Crashes							
DETAILED COST:	TYPE IMPROVEMENT - Signal Installation								
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
	Construction	\$37,800	10	0.149	\$5,633				
	Right-of-Way	\$0	0	0.000	\$0				
	TOTALS	\$37,800	10	0.149	\$5,633				
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,200				
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900				
	TOTAL ANNUAL COST=				\$8,733				
	TOTAL COST OF PROJECT=				\$37,800				
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	3.75	0	0.00	8	2.13	1	0.27	\$43,813	
AFTER	3.75	2	0.53	9	2.40	4	1.07	\$388,587	
		Annual Benefits from Crash Cost Savings (\$344,773)							
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST						=	(\$353,507)		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST						=	-39.48		
TOTAL COST OF PROJECT		-	\$37,800	COMPREHENSIVE B/C RATIO		-	-39.48		

**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
	PARKED VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		REAR END		50 MPH TO 59		ICE OR SNOW
	RAN OFF ROAD		REAR END		60 MPH TO 69		TO AND UP
			REAR END		SPEED UNKNOWN		ONLY

SS# 09-04-204  
 Order# 41000013698  
 Forsyth County  
 BEFORE Period  
 9/1/03 - 5/31/07



Frontal Impact  
 Target Crashes

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

Date: 7-20-2011      Prepared By: J. Schronce

**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
	PARKED VEHICLE		SIDESWIPE		40 MPH TO 49		DRY
	FIXED OBJECT		OUT OF CONTROL		50 MPH TO 59		WET
	HEAD ON		REAR END		60 MPH TO 69		ICE OR SNOW
	RAN OFF ROAD		REAR END		TO AND UP		KEY OR SHOVELS
			REAR END		SPEED UNKNOWN		ONLY

SS# 09-04-204  
 Order# 41000013698  
 Forsyth County  
 AFTER Period  
 9/1/07 - 5/31/11

New Signalized  
 Intersection  
 Sig ID 09-0390



GAS  
STATION

Frontal Impact  
Target Crashes

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

**TRAFFIC SAFETY UNIT**

Date: 7-20-2011

Prepared By: J. Schronce

