

Spot Safety Project Evaluation

Order # 41000009061

Spot Safety Project # 07-05-248

**Spot Safety Project Evaluation of the Flasher Installation
US 70 (Burlington Road) at SR 2826 / 3175 (Birch Creek Road)
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



Chad J. Neilson

10-15-2010

Date

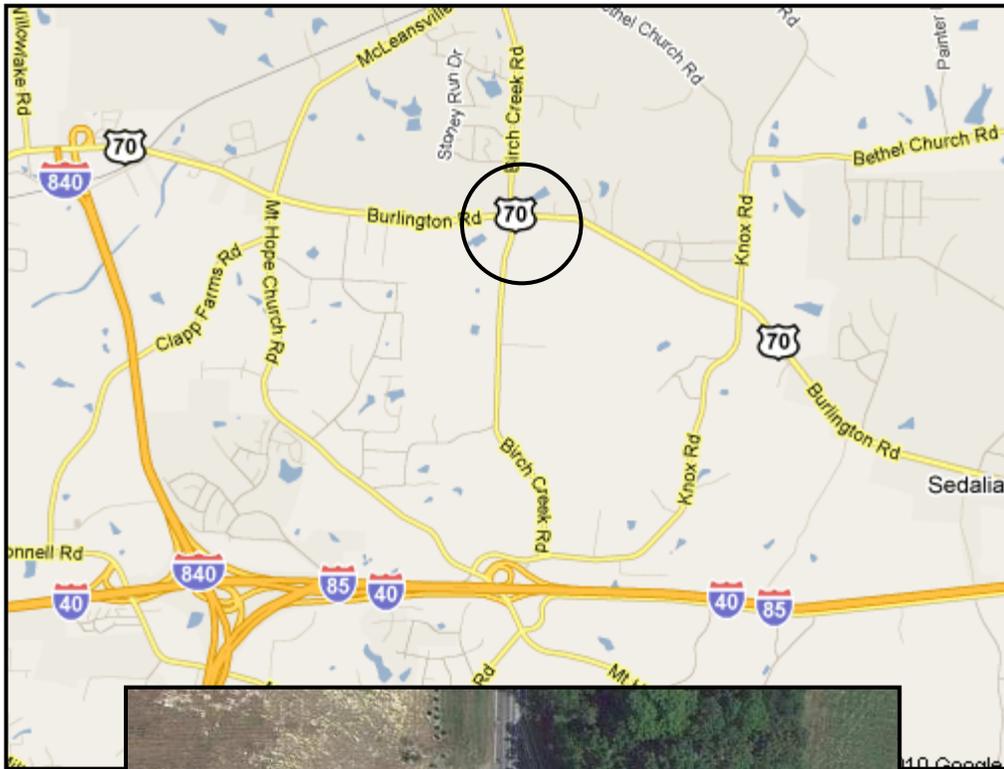
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 07-05-248 located at the Intersection of US 70 (Burlington Road) at SR 2826 / 3175 (Birch Creek Road) in McLeansville, Guilford County.

The Signal ID is 07-1708 for this newly installed overhead flasher system.



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 flasher system. US 70 (Burlington Road) is a three-lane facility with a center left turn lane at the subject rural intersection with a speed limit of 55 mph. SR 2826 / 3175 (Birch Creek Road) is a two lane facility with a speed limit of 55 mph. The subject location is a four-leg crossroads intersection, which is controlled by stop signs on the SR 2826 / 3175 (Birch Creek Road) approaches.

The original statement of problem was that motorists' were running the stop signs posted on SR 2826 / 3175 (Birch Creek Road). The intended purpose of the flasher system is to alleviate collisions by bringing more awareness to the intersection.

The initial crash analysis was completed from October 1, 1999 to September 30, 2004 with six (6) reported angle crashes. The final completion date for the improvement at the subject intersection was on February 24, 2006 with a total cost of \$17,000.00.

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 were the months of January 2006 through March 2006. The before period consisted of reported crashes from August 1, 2001 through December 31, 2005 (4 years and 5 months); and the after period consisted of reported crashes from April 1, 2006 through August 31, 2010 (4 years and 5 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	10	6	- 40.00 %
Total Severity Index	13.02	2.33	- 82.10 %
Target Crashes	5	4	- 20.00 %
Target Crash Severity Index	22.08	2.85	- 87.08 %
<i>Run Stop Sign</i>	5	1	- 80.00 %
Volume (2003, 2008)	10,350	10,600	2.42 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	1	0	- 100.0 %
Class B injury Crashes	4	1	- 75.00 %
Class C Injury Crashes	2	0	- 100.0 %
Total Injury Crashes	7	1	- 85.71 %

The naive before and after analysis at the treatment location resulted in a forty (40) percent decrease in Total Crashes, a twenty (20) percent decrease in Target Crashes, and an eighty-two (82) percent decrease in the Total Severity Index. The before period ADT year was 2003 and the after period ADT year was 2008.

Results and Discussion

Referencing the *Collision Diagrams*, the before period frontal impact crash pattern consisted of five (5) angle or left turn different roadway target crashes. It appears the stop sign along SR 2826 / 3175 (Birch Creek Road) was ran in all five of these target crashes, based on the speed at of the at fault vehicle. After the overhead flasher installation, the frontal impact crash pattern consisted of four (4) angle or left turn different roadway target crashes. However, the speed of the at-fault vehicle indicates only one (1) of these target crashes occurred from running the stop sign.

The calculated benefit to cost ratio for this project is **49.72 considering total crashes**. The benefit to cost ratio **considering only target crashes is 46.67**. 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 Google Street View 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



Looking North on SR 3175 (Birch Creek Road)



Looking West on US 70 (Burlington Road)



Looking South on SR 2826 (Birch Creek Road)



Looking East on US 70 (Burlington Road)

BENEFIT-COST ANALYSIS WORKSHEET - TOTAL

LOCATION: US 70 (Burlington Rd) @ SR 2826 / 3175 (Birch Creek Rd)		BY: C Neilson						
COUNTY: Guilford		DATE: 10/14/2010						
FILE NO.: SS 07-05-248								
DETAILED COST:	TYPE IMPROVEMENT - Overhead Flasher Installation							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$17,000	10	0.149	\$2,534			
		\$0	0	0.000	\$0			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$17,000	10	0.149	\$2,534			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$400			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$350			
	TOTAL ANNUAL COST=				\$3,284			
	TOTAL COST OF PROJECT=				\$17,000			
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	4.42	1	0.23	6	1.36	3	0.68	\$172,641
AFTER	4.42	0	0.00	1	0.23	5	1.13	\$9,389
							Annual Benefits from Crash Cost Savings	\$163,252
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST				=	\$159,968		
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST				=	49.72		
	TOTAL COST OF PROJECT	-	\$17,000	COMPREHENSIVE B/C RATIO	-			49.72

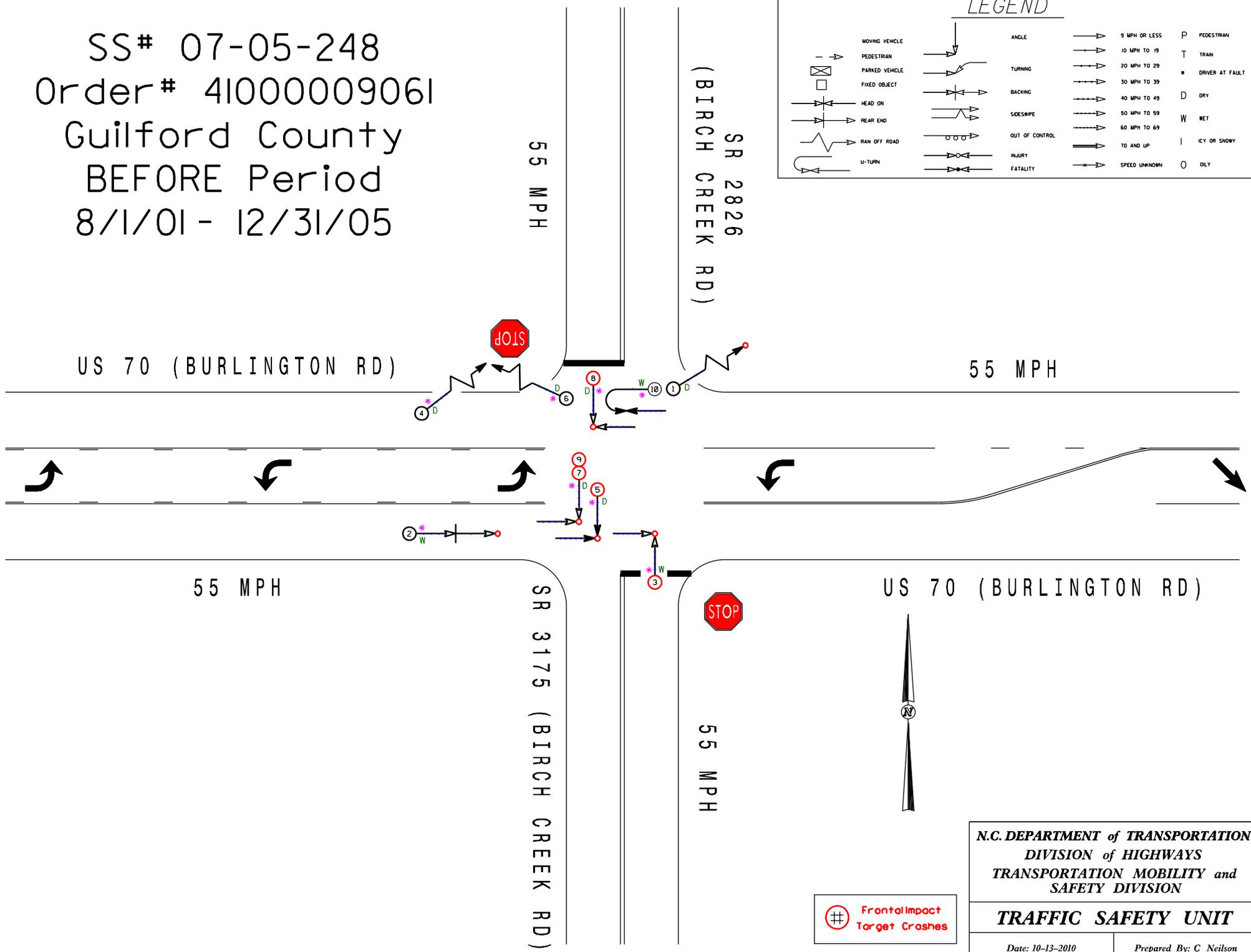
BENEFIT-COST ANALYSIS WORKSHEET - TARGET

LOCATION: US 70 (Burlington Rd) @ SR 2826 / 3175 (Birch Creek Rd)		BY: C Neilson						
COUNTY: Guilford		DATE: 10/14/2010						
FILE NO.: SS 07-05-248								
DETAILED COST:	TYPE IMPROVEMENT - Overhead Flasher Installation							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$17,000	10	0.149	\$2,534			
		\$0	0	0.000	\$0			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$17,000	10	0.149	\$2,534			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$400			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$350			
	TOTAL ANNUAL COST=				\$3,284			
	TOTAL COST OF PROJECT=				\$17,000			
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	4.42	1	0.23	4	0.91	0	0.00	\$160,670
AFTER	4.42	0	0.00	1	0.23	3	0.68	\$7,443
							Annual Benefits from Crash Cost Savings	\$153,226
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST				=	\$149,943		
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST				=	46.67		
	TOTAL COST OF PROJECT	-	\$17,000	COMPREHENSIVE B/C RATIO	-			46.67

SS# 07-05-248
 Order# 41000009061
 Guilford County
 BEFORE Period
 8/1/01 - 12/31/05

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
	FIXED OBJECT		SIDESWIPE		30 MPH TO 39		DRY
	HEAD ON		OUT OF CONTROL		40 MPH TO 49		WET
	REAR END		INJURY		50 MPH TO 59		ICY OR SNOWY
	RAN OFF ROAD		FATALITY		60 MPH TO 69		SPEED UNKNOWN
	U-TURN				70 AND UP		ONLY



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

TRAFFIC SAFETY UNIT

Date: 10-13-2010 Prepared By: C Neilson

SS# 07-05-248
 Order# 41000009061
 Guilford County
 AFTER Period
 4/1/06 - 8/31/10

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
	FIXED OBJECT		SIDESWIPE		30 MPH TO 39		DRY
	HEAD ON		OUT OF CONTROL		40 MPH TO 49		WET
	REAR END		INJURY		50 MPH TO 59		ICY OR SNOWY
	RAN OFF ROAD		FATALITY		60 MPH TO 69		SPEED UNKNOWN
	U-TURN				70 AND UP		ONLY

US 70 (BURLINGTON RD)

(BIRCH CREEK RD)
 SR 2826

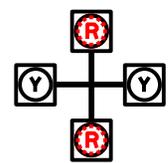
55 MPH

55 MPH

SR 3175 (BIRCH CREEK RD)

55 MPH

US 70 (BURLINGTON RD)



New Overhead
 Flasher Assembly
 Sig ID: 07-1708

ROLLOVER

Frontal Impact
 Target Crashes

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

TRAFFIC SAFETY UNIT

Date: 10-13-2010

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