

Spot Safety Project Evaluation

Order # 41000011864

Spot Safety Project # 02-05-202

**Spot Safety Project Evaluation of the
“Vehicle Entering” Flasher Installation – Actuated on All Approaches
SR 1753 (Stokestown-St. John Rd) at SR 1725 (County Home Road)
Pitt County**

Documents Prepared By:

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

Principal Investigator



Jason B. Schronce

6-22-2011

Date

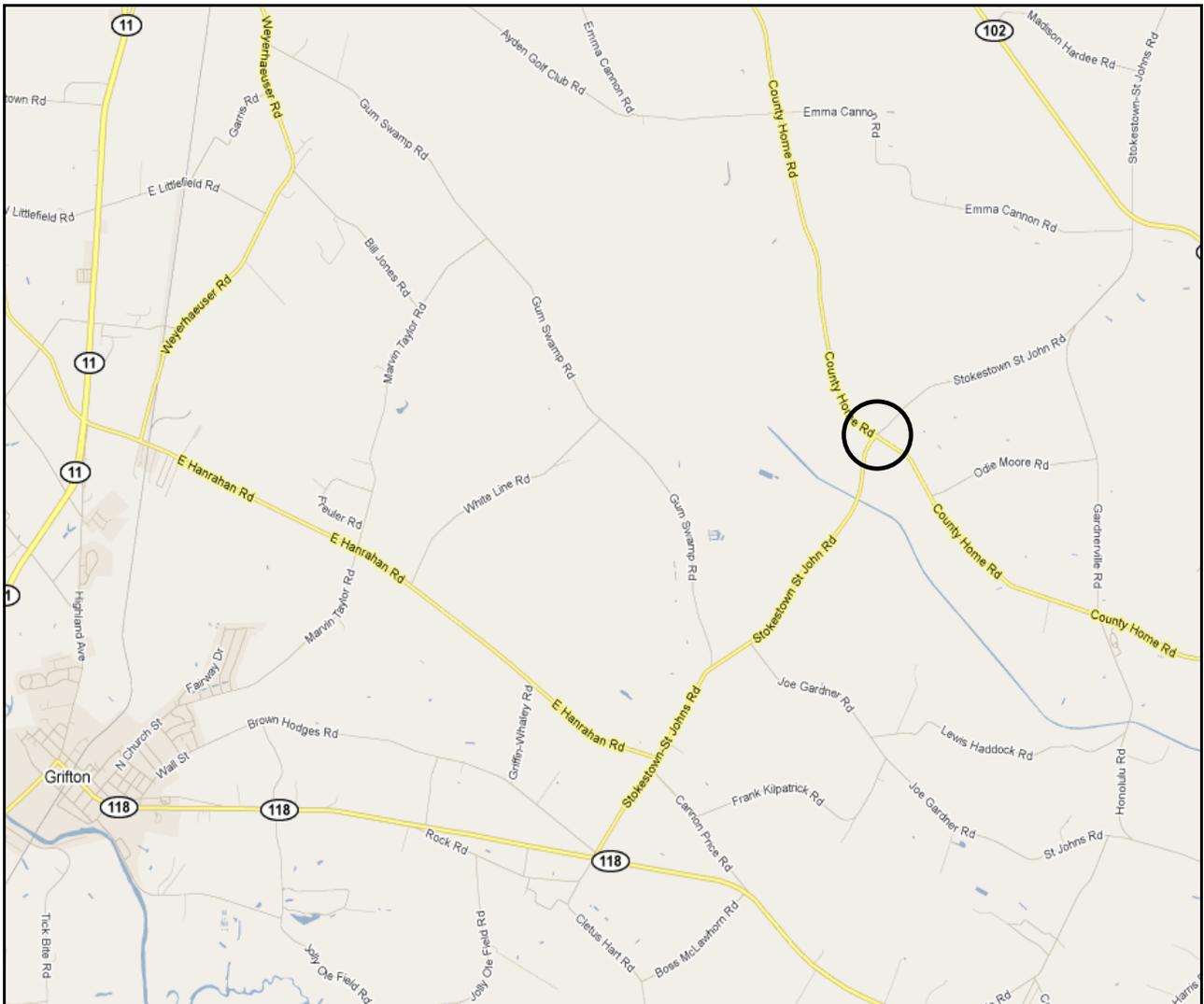
Traffic Safety Project Engineer

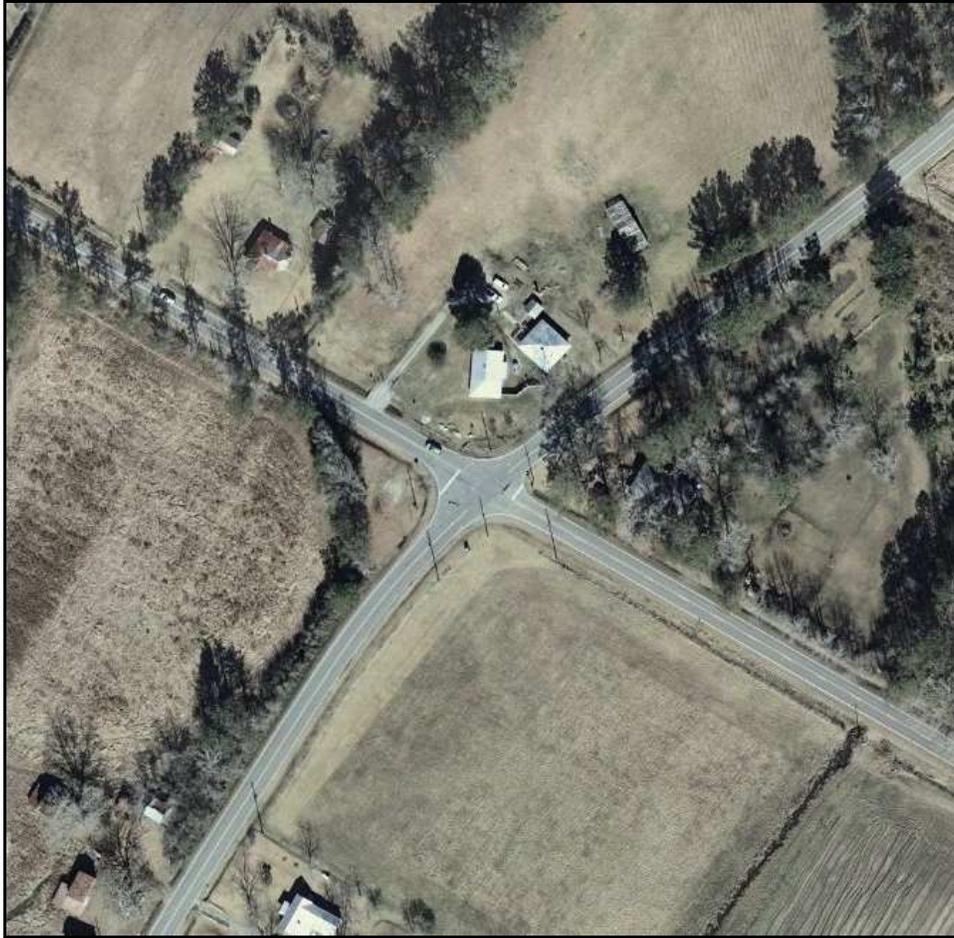
Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 02-05-202 located at the Intersection of SR 1753 (Stokestown-Saint John Road) and SR 1725 (County Home Road) in Pitt County, Community of Coxville.

The Sig ID is 02-0875 for this newly installed actuated flasher.





Aerial Photograph from Pitt County GIS Online (OPIS System) – 2010 Aerial

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 actuated flasher. The design has a posted “Vehicle Entering” on the SR 1753 through movements and “Watch for Approaching Vehicle” on the SR 1725 (County Home Rd) stop approaches. SR 1753 (Stokestown-St. John Rd) and SR 1725 are both two-lane facilities at the subject intersection with speed limits of 55 mph on all approaches. The subject location is a four-leg crossroads intersection, which is controlled by stop signs on the SR 1725 approaches.

The original statement of problem was the existence of numerous angle crashes resulting from motorists failing to yield to the through movement after coming to a stop on SR 1725 (County Home Rd). This countermeasure was enhanced by a fatal angle collision in January 2005.

The initial crash analysis was completed from September 1, 1999 to August 31, 2004 with eight (8) reported angle collisions. The final completion date for the improvement at the subject intersection was on April 2, 2007 with a total cost of \$33,500.

An additional fatal angle crash occurred at this location during our evaluations after period on September 12, 2007. Through research the Safety Evaluation Group discovered that 45-mph Intersection Advisory Signs were added under the existing Crossroads Warning Signs on the SR 1753 (Stokestown-St. John Road) approaches.

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 February through April 2007. The before period consisted of reported crashes from May 1, 2003 through January 31, 2007 (3 years and 9 months); and the after period consisted of reported crashes from May 1, 2007 through January 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>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	12	5	- 58.3 %
Total Severity Index	21.80	20.60	- 5.5 %
Target Crashes	9	3	- 66.7 %
Target Crash Severity Index	20.31	31.20	53.6 %
Volume (2005, 2009)	2,600	2,400	- 7.7 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	2	1	- 50.0 %
Class A injury Crashes	1	0	- 100.0 %
Class B injury Crashes	2	1	- 50.0 %
Class C Injury Crashes	1	2	100.0 %
Total Injury Crashes	6	4	- 33.3 %

The naive before and after analysis at the treatment location resulted in a 58 percent decrease in Total Crashes, an 67 percent decrease in Target Crashes, and a 5.5 percent decrease 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 experienced a pattern of nine (9) angle collisions in the intersection. Of these crashes, seven (7) occurred for westbound SR 1725 vehicles and two (2) for eastbound SR 1725 motorists; all nine (9) obeyed the posted stop signs. There was additionally one (1) fatal non-target crash that occurred 142 feet south of the intersection when a vehicle ran-off the roadway at 10-mph above the speed limit and struck a tree. The before period angle crashes resulted in one fatal and one A-injury collision.

After the actuated flasher installation, angle crashes decreased from nine (9) to two (2) and one (1) other left turn different roadway collision. There was one fatal in the after period resulting from an eastbound SR 1725 motorist pulling into oncoming traffic after coming to a stop at the intersection. As previously mentioned, the 45-mph advisory speed limit signs were added to the intersection on SR 1753 following this crash.

The calculated benefit to cost ratio for this project is **55.63 considering total crashes**. The benefit to cost ratio **considering only target crashes is 28.97**. 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 June 15, 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 Photographs



Eastbound on SR 1725 (County Home Road)



Westbound on SR 1725 (County Home Road)



Travelling Southbound on SR 1753 (Stokestown-St. John Rd)



Travelling Southbound on SR 1753 (Stokestown-St. John Rd)



Travelling Northbound on SR 1753 (Stokestown-St. John Rd)

BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes

LOCATION: SR 1725 at SR 1753		BY: JBS						
COUNTY: Pitt		DATE: 6/20/2011						
FILE NO.: SS 02-05-202								
DETAILED COST:	TYPE IMPROVEMENT - Shoulder Guardrail							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$33,500	10	0.149	\$4,992			
		\$0	0	0.000	\$0			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$33,500	10	0.149	\$4,992			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$800			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$350			
	TOTAL ANNUAL COST=				\$6,142			
	TOTAL COST OF PROJECT=				\$33,500			
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	3	0.80	3	0.80	6	1.60	\$526,880
AFTER	3.75	1	0.27	3	0.80	1	0.27	\$185,147
						Annual Benefits from Crash Cost Savings		\$341,733
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$335,591		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	55.63		
TOTAL COST OF PROJECT		-	\$33,500	COMPREHENSIVE B/C RATIO		-	55.63	

BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes

LOCATION: SR 1725 at SR 1753		BY: JBS						
COUNTY: Pitt		DATE: 6/20/2011						
FILE NO.: SS 02-05-202		Target Crashes - Frontal Impact						
DETAILED COST:	TYPE IMPROVEMENT - Shoulder Guardrail							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$33,500	10	0.149	\$4,992			
		\$0	0	0.000	\$0			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$33,500	10	0.149	\$4,992			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$800			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$350			
	TOTAL ANNUAL COST=				\$6,142			
	TOTAL COST OF PROJECT=				\$33,500			
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	2	0.53	3	0.80	4	1.07	\$356,587
AFTER	3.75	1	0.27	2	0.53	0	0.00	\$178,667
						Annual Benefits from Crash Cost Savings		\$177,920
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$171,778		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	28.97		
TOTAL COST OF PROJECT		-	\$33,500	COMPREHENSIVE B/C RATIO		-	28.97	

SR 1753
Stokestown-St. John Rd
55 MPH Roadway

ADT (Year)
1,200 (2005)

SR 1725
County Home Road
55 MPH

ADT (Year)
1,500 (2005)

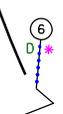
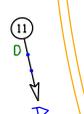
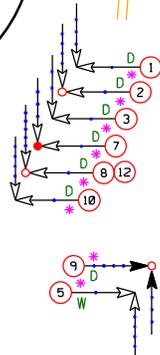
ADT (Year)
728 (2005)

ADT (Year)
1,746 (2005)

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
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		RAN OFF ROAD		50 MPH TO 59		ICY OR SNOWY
	REAR END		HAZY		60 MPH TO 69		TO AND UP
	RAN OFF ROAD		FATALITY		SPEED UNKNOWN		ONLY

SS# 02-05-202
Order# 41000011864
Pitt County
BEFORE Period
5/1/03 - 1/31/07



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

TRAFFIC SAFETY UNIT

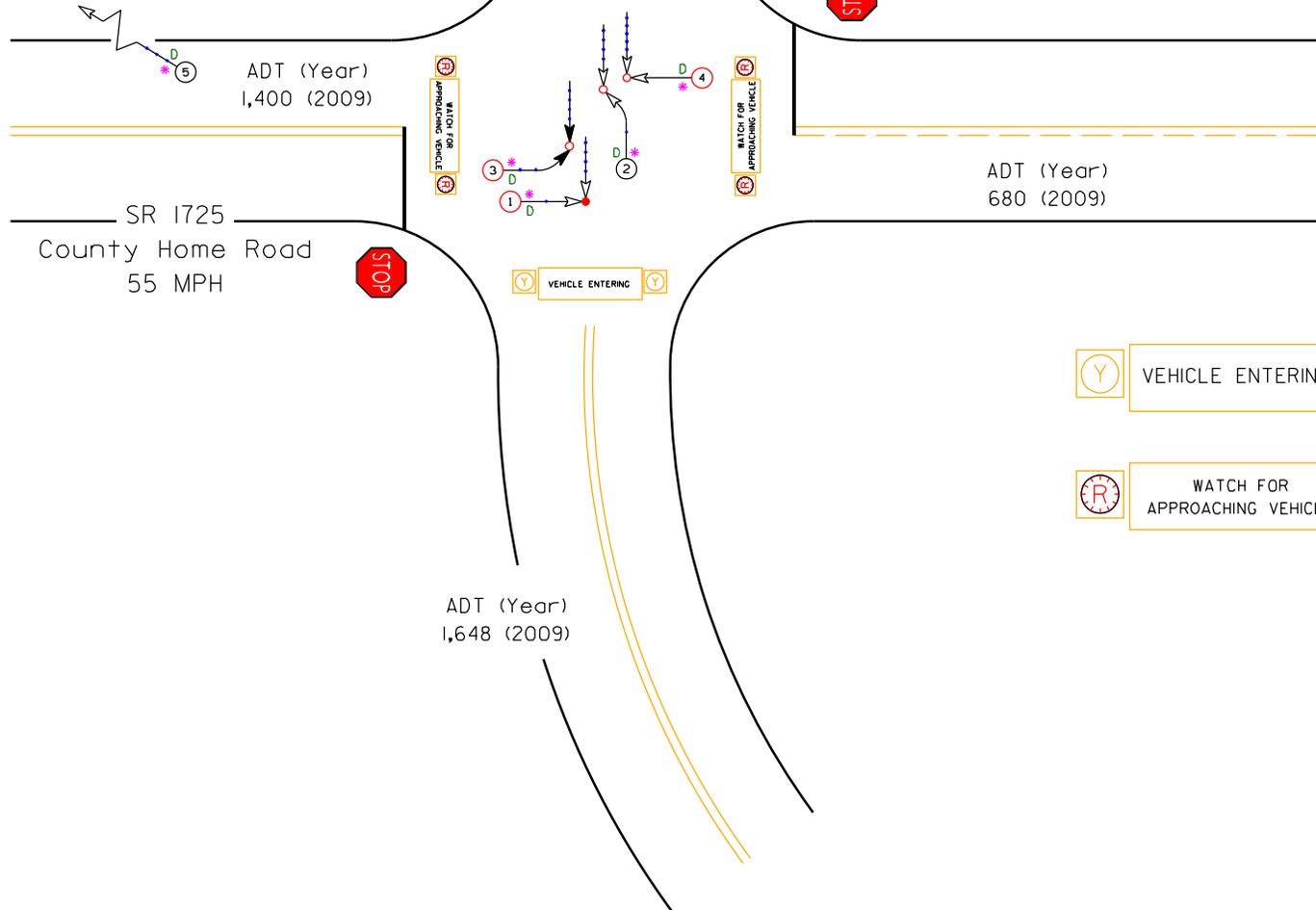
Date: 6-20-2011
Prepared By: J. Schronce

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		40 MPH TO 49		DRY
	HEAD ON		OUT OF CONTROL		50 MPH TO 59		WET
	REAR END		RAN OFF ROAD		60 MPH TO 69		ICY OR SNOW
	RAN OFF ROAD		HAZY		TO AND UP		KEY OR SMOKY
			FATALITY		SPEED UNKNOWN		ONLY

SR 1753
Stokestown-St. John Rd
55 MPH Roadway
45 MPH Advisory

ADT (Year)
990 (2009)

SS# 02-05-202
Order# 41000011864
Pitt County
AFTER Period
5/1/07 - 1/31/11



VEHICLE ENTERING SR 1753 Approaches

WATCH FOR APPROACHING VEHICLE SR 1725 Approaches

Frontal Impact
Target Crashes

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

TRAFFIC SAFETY UNIT

Date: 6-30-2011 Prepared By: J. Schronce