

Spot Safety Project Evaluation

Project Log # 200908069

Spot Safety Project # 01-03-202

**Spot Safety Project Evaluation of the Traffic Signal Installation at the Intersection of
US 158/NC 24 and SR 1139 (Country Club Rd)
Camden 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

8/31/2009

Date

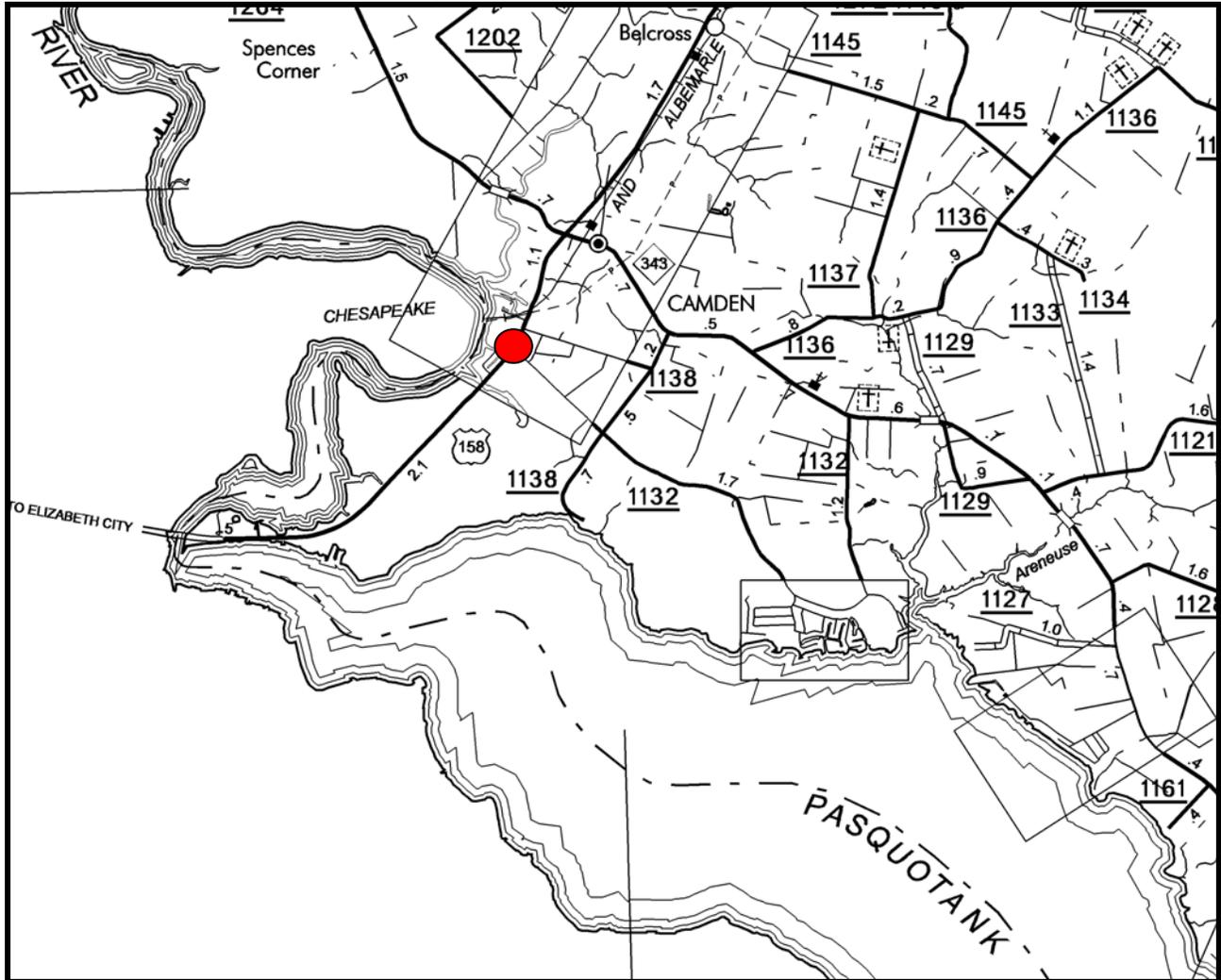
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 01-03-202 – The Intersection of US 158/NC 34 and SR 1139 (Country Club Rd) in Camden County.

The signal number for this location is 01-0450.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of a traffic signal on wooden poles.

The subject location is a three-leg intersection which was controlled by a stop sign on SR 1139 in the before period. US 158 is a two-lane, two-way roadway with a left turn lane onto SR 1139 and a 35 mph speed limit. SR 1139 is a two-lane, 2-way roadway that widens at the intersection to allow for left and right turns on US 158. The speed limit is 35 mph for SR 1139.

The original statement of problem was that the traffic volumes on US 158 had increased to the point where there were few gaps for motorists to enter from SR 1139

The initial crash analysis was conducted from June 1, 2000 to May 31, 2003 with a total of three reported crashes, none of which were considered correctable by the chosen countermeasure. The final completion date for the improvements at the subject intersection was on August 30, 2004 with a total cost of \$53,500.00.

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 July 1, 2004 to September 30, 2004. The before period consisted of reported crashes from October 1, 1999 through June 30, 2004 (4 years and 9 months) and the after period consisted of reported crashes from October 1, 2004 through June 30, 2009 (4 years and 9 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 crash types were the Target Crashes for the applied countermeasure. These crash types considered are as follows: Left Turn, same roadway; Left Turn, different roadway; Right Turn, same roadway; Right Turn, different roadway; Head On and Angle. The target crashes are clearly identified in the before and after period collision diagrams.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	4	7	75.0
Total Severity Index	4.7	5.23	11.3
Target Crashes	2	2	0.0
Target Crash Severity Index	1	4.7	370.0
Volume	15,900	16,200	1.9
<u>Crash Severity Summary</u>			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	0	0	N/A
Class C Crashes	2	4	100.0
PDO Crashes	2	3	50.0

The naive before and after analysis at the treatment location resulted in a 75 percent increase in Total Crashes, no change in Target Crashes, and a 2 percent increase in Average Daily Traffic (ADT). The before period ADT year was 2002 and the after period ADT year was 2007.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 75 percent increase in Total Crashes and no change in Target Crashes. The Total Severity Index increased by 11 percent and the Target Severity Index increased by 370 percent. The summary results above demonstrate that while Total Crashes appear to have increased, Target Crashes have remained constant at the treatment location from the before to the after period.

The calculated benefit to cost ratio for this project is -0.86 considering total crashes. The benefit to cost ratio considering only target crashes is also -0.31. 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.

The two before period Target Crashes were Left Turn-Different Roadway Crashes involving a vehicle turning left from SR 1139. Neither crash resulted in an injury. The two after period Target Crashes included a Left Turn-Different Roadway Crash and a Right Turn-Different Roadway Crash. In the former the US 158 vehicle was at fault for running the signal and in the latter the right turning vehicle from SR 1139 was at fault.

The increase in Total Crashes can be attributed to an increase in Rear-End Crashes on US 158 (from zero to five). An increase in Rear-End Crashes is common after a signal installation.

Please see the attached *Treatment Site Photos*. Photos were obtained from Google Street-view. 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

LOCATION: US 158 and SR 1139
 COUNTY: Camden
 FILE NO.: SS 01-03-202

BY: BDR
 DATE: 8/28/2009

DETAILED COST: TYPE IMPROVEMENT - Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
Right-of-Way	\$53,500	10	0.149	\$7,973
	\$0	0	0.000	\$0
TOTALS	\$53,500	10	0.149	\$7,973

ESTIMATED INCREASE IN ANNUAL MAINT. COST =	\$2,000
ESTIMATED INCREASE IN ANNUAL UTILITY COST =	\$900
TOTAL ANNUAL COST=	\$10,873
TOTAL COST OF PROJECT=	\$53,500

COMPREHENSIVE COST REDUCTION:

TIME PERIOD	YEARS	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES						ANNUAL COSTS
		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	
BEFORE	4.75	0	0.00	2	0.42	2	0.42	\$10,189
AFTER	4.75	0	0.00	4	0.84	3	0.63	\$19,495

Annual Benefits from Crash Cost Savings (\$9,305)

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$20,178)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = -0.86

TOTAL COST OF PROJECT - \$53,500 COMPREHENSIVE B/C RATIO - -0.86

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: US 158 and SR 1139
 COUNTY: Camden
 FILE NO.: SS 01-03-202 Target Crashes Only

BY: BDR
 DATE: 8/28/2009

DETAILED COST: TYPE IMPROVEMENT - Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
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	\$0	0	0.000	\$0
TOTALS	\$53,500	10	0.149	\$7,973

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$2,000
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$900
 TOTAL ANNUAL COST= \$10,873
 TOTAL COST OF PROJECT= \$53,500

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES				PDO		ANNUAL COSTS
		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	CRASHES	CRASHES PER YR	
BEFORE	4.75	0	0.00	0	0.00	2	0.42	\$1,768
AFTER	4.75	0	0.00	1	0.21	1	0.21	\$5,095

Annual Benefits from Crash Cost Savings (\$3,326)

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$14,199)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = -0.31

TOTAL COST OF PROJECT - \$53,500 COMPREHENSIVE B/C RATIO - -0.31

Treatment Site Photos from Google Street-View



Looking North on US 158



Looking South on US 158



Looking East toward SR 1139 from intersection

Camden County
 US 158/NC 34 at
 SR 1139 (Country Club Rd)
 BEFORE Period
 10/1/99-6/30/04

LEGEND

MOVING VEHICLE		ANGLE		9 MPH OR LESS	P PEDESTRIAN
PEDESTRIAN		TURNING		10 MPH TO 19	T TRAIN
PARKED VEHICLE		BACKING		20 MPH TO 29	* DRIVER AT FAULT
PARKING VEHICLE		SIDESWIPE		30 MPH TO 39	D DRY
FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49	W WET
HEAD ON		INJURY		50 MPH TO 59	I ICY OR SNOWY
REAR END		FATALITY		60 MPH TO 69	O OILY
RAN OFF ROAD				70 AND UP	
				SPEED UNKNOWN	

US 158/NC 34
 (Camden Causeway)
 35 mph

US 158/NC 34
 (Camden Causeway)
 35 mph

SHELL GAS
 STATION

(COUNTRY CLUB RD)
 SR 1139
 35 mph



Target Crash



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 1	AREA:
STUDY PERIOD: 10/1/99-6/30/04		
DISTANCE: Y-LINE = 150 FT		
ANALYSIS PREPARED BY: BDR		
ANALYSIS CHECKED BY:		
DIAGRAM PREPARED BY: BDR		
DIAGRAM REVIEWED BY:		
SCALE: NOT TO SCALE		
DATE: August 2009		
LOG NUMBER: 200908069		

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

Camden County
 US 158/NC 34 at
 SR 1139 (Country Club Rd)
 AFTER Period
 10/1/2004-6/30/2009

LEGEND

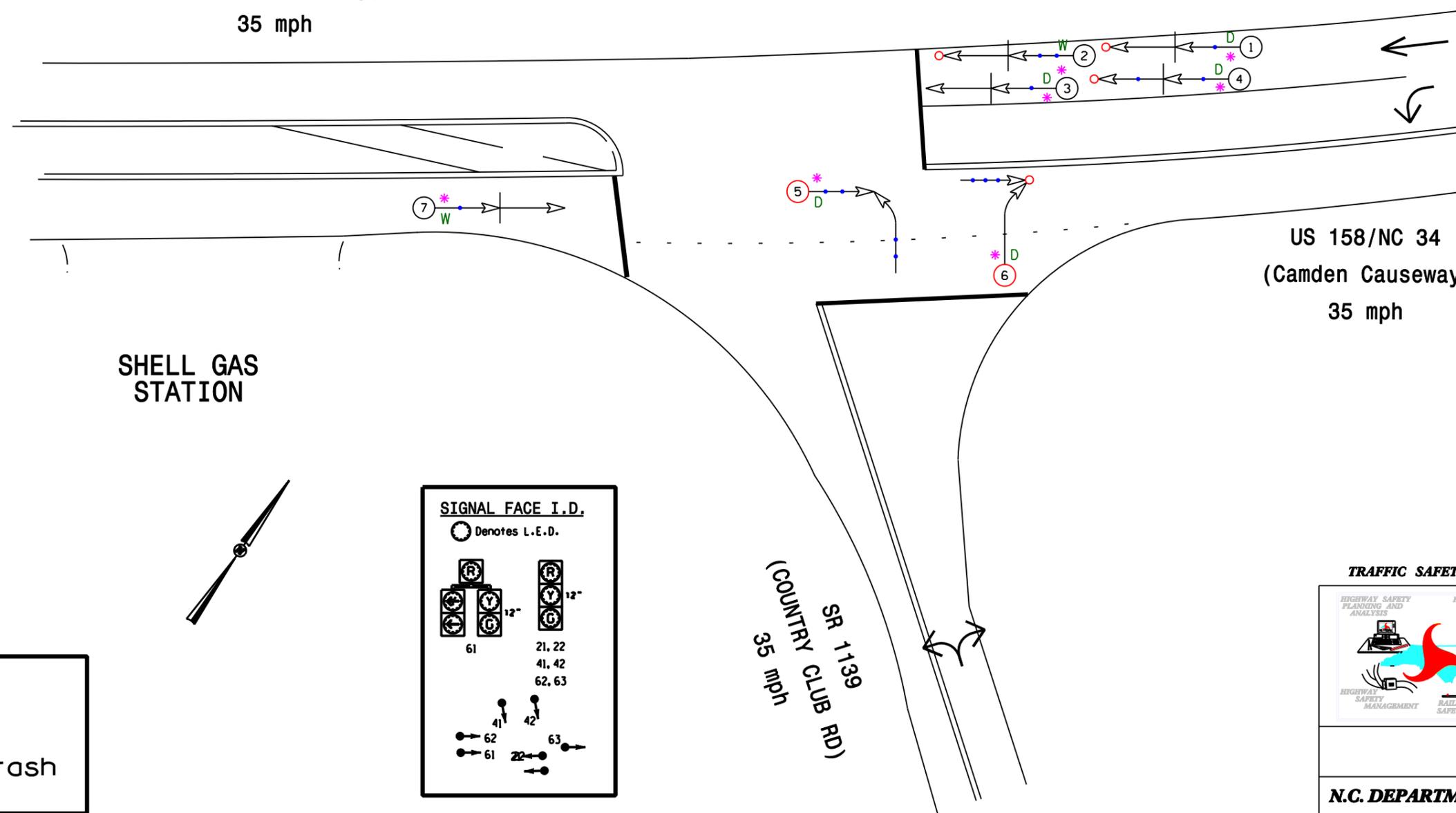
MOVING VEHICLE	ANGLE	9 MPH OR LESS	P PEDESTRIAN
PARKED VEHICLE	TURNING	10 MPH TO 19	T TRAIN
PARKING VEHICLE	BACKING	20 MPH TO 29	* DRIVER AT FAULT
FIXED OBJECT	SIDESWIPE	30 MPH TO 39	D DRY
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RAN OFF ROAD	INJURY	50 MPH TO 59	I ICY OR SNOWY
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		70 AND UP	
		SPEED UNKNOWN	

US 158/NC 34
 (Camden Causeway)
 35 mph

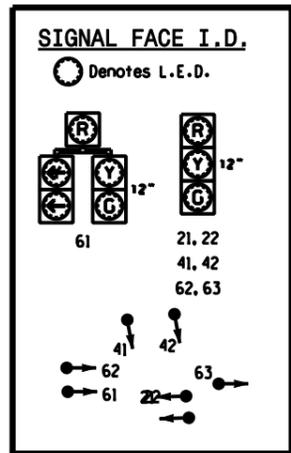
US 158/NC 34
 (Camden Causeway)
 35 mph

SHELL GAS
 STATION

(COUNTRY CLUB RD)
 SR 1139
 35 mph



 Target Crash



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 1	AREA:
	STUDY PERIOD: 10/1/04-6/30/09	
	DISTANCE: Y-LINE = 150 FT	
	ANALYSIS PREPARED BY: BOR	
ANALYSIS CHECKED BY:		
DIAGRAM PREPARED BY: BOR		
DIAGRAM REVIEWED BY:		
SCALE: NOT TO SCALE		
DATE: August 2009		
LOG NUMBER: 200908069		

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DIVISION of HIGHWAYS
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