

# Spot Safety Project Evaluation

Order # 41000010421

Spot Safety Project # 04-03-208

**Spot Safety Project Evaluation of the Installation of a Traffic Signal  
With left-turn lanes along SR 1926 (Old Mount Olive Road)  
At the Intersection of SR 1926 (Old Mount Olive Road) and SR 1927 (Genoa Road)  
South of Goldsboro, In Wayne 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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Chad J. Neilson

01-06-2011

Date

Traffic Safety Project Engineer

# Spot Safety Project Evaluation Documentation

## Subject Location

Evaluation of Spot Safety Project Number 04-03-208 located at the intersection of SR 1926 (Old Mount Olive Road) and SR 1927 (Genoa Road) south of Goldsboro, Wayne County.

The signal ID for the new signal is 04-1303.



## 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 with left turn lanes. SR 1926 (Old Mount Olive Road) is a two-lane facility at the subject intersection with speed limit of 55 mph for both approaches. SR 1927 (Genoa Road) is a two-lane facility with a speed limit of 55 mph for both approaches. The subject location is a stop sign controlled, four-leg intersection with the SR 1927 (Genoa Road) approaches encountering the stop sign condition.

The original statement of problem was the high volume of angle crashes and lack of safety for the motoring public.

The initial crash analysis was completed from June 1, 1999 to May 31, 2002 with twenty-four (24) reported crashes, of which twenty-two (22) were deemed correctable. The final completion date on file for the improvement at the subject intersection was on February 2, 2006 with a total cost of \$250,000.00. While reviewing crashes for this evaluation, it appears the signal was completed and operational by July 2005.

### 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 2005 through August 2005. The before period consisted of reported crashes from March 1, 2000 through May 31, 2005 (5 years and 3 months); and the after period consisted of reported crashes from September 1, 2005 through November 30, 2010 (5 years and 3 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	34	12	- 64.71 %
Total Crash Severity Index	14.49	4.70	- 67.56 %
Target Crashes	32	9	- 71.88 %
Target Crash Severity Index	14.87	5.93	- 60.12 %
Volume (2002, 2008)	10,900	9,100	- 16.51 %

<u>Injury Crash Summary</u>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	4	0	- 100.00 %
Class B injury Crashes	7	1	- 85.71 %
Class C Injury Crashes	14	5	- 64.29 %
Total Injury Crashes	25	6	- 76.00 %

The naive before and after analysis at the treatment location resulted in a sixty-four (64) percent decrease in Total Crashes, seventy-one (71) percent decrease of Target Crashes, and a sixty-seven (67) percent decrease in the Total Severity Index. The before period ADT year was 2002 and the after period ADT year was 2008.

## **Results and Discussion**

Referencing the *Collision Diagrams*, the before period presented thirty-two (32) target crashes. There was an eastbound angle crash pattern that accounted for fourteen (14) target crashes. There was a westbound angle crash pattern that accounted for five (5) target crashes. There was a combined northbound and southbound left-turn lane, same direction crash pattern that accounted for twelve (12) target crashes. After the installation of the signal and left-turn lanes, there were nine (9) target crashes. The eastbound angle crash pattern decreased in the after period to three (3) target crashes. The westbound angle crash pattern decreased to one (1) target crash. The combined northbound and southbound crash pattern decreased to four (4) target crashes.

The calculated benefit to cost ratio for this project is **13.49 considering total crashes**. The benefit to cost ratio **considering only target crashes is 13.36**. 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.

Photos were provided for this location by Google Street View for all four approaches of this 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 1926 (Old Mount Olive Road)



Looking West on SR 1927 (Genoa Road)



Looking South on SR 1926 (Old Mount Olive Road)



Looking East on SR 1927 (Genoa Road)

**BENEFIT-COST ANALYSIS WORKSHEET - TOTAL**

LOCATION: SR 1926 (Old Mount Olive Road) at SR 1927 (Genoa Road)		BY: C Neilson	
COUNTY: Wayne		DATE: 1/5/2011	
FILE NO.: SS 04-03-208			
DETAILED COST:	TYPE IMPROVEMENT -	Signal with Left-turn Lanes	
	ITEMS	TOTAL	SERVICE
	Construction	\$247,500	10
		\$0	0
	Right-of-Way	\$2,500	50
			0.149
			0.000
			0.082
	TOTALS	\$250,000	10
			0.148
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =		\$2,000
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =		\$900
	TOTAL ANNUAL COST=		\$39,989
	TOTAL COST OF PROJECT=		\$250,000
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	5.25	4	0.76
AFTER	5.25	0	0.00
		21	6
		4.00	1.14
		9	6
		1.71	1.14
			\$567,371
			\$27,771
			Annual Benefits from Crash Cost Savings
			\$539,600
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST		= \$499,611
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST		= 13.49
	TOTAL COST OF PROJECT -	\$250,000	COMPREHENSIVE B/C RATIO -
			13.49

**BENEFIT-COST ANALYSIS WORKSHEET - TARGET**

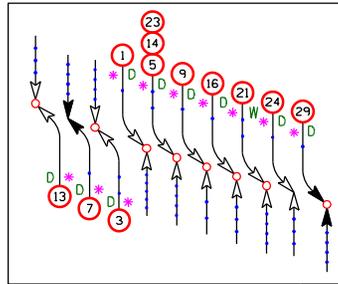
LOCATION: SR 1926 (Old Mount Olive Road) at SR 1927 (Genoa Road)		BY: C Neilson	
COUNTY: Wayne		DATE: 1/5/2011	
FILE NO.: SS 04-03-208			
DETAILED COST:	TYPE IMPROVEMENT -	Signal with Left-turn Lanes	
	ITEMS	TOTAL	SERVICE
	Construction	\$247,500	10
		\$0	0
	Right-of-Way	\$2,500	50
			0.149
			0.000
			0.082
	TOTALS	\$250,000	10
			0.148
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =		\$2,000
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =		\$900
	TOTAL ANNUAL COST=		\$39,989
	TOTAL COST OF PROJECT=		\$250,000
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	5.25	4	0.76
AFTER	5.25	0	0.00
		19	6
		3.62	1.14
		9	3
		1.71	0.57
			\$559,752
			\$25,314
			Annual Benefits from Crash Cost Savings
			\$534,438
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST		= \$494,449
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST		= 13.36
	TOTAL COST OF PROJECT -	\$250,000	COMPREHENSIVE B/C RATIO -
			13.36

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		TO AND LIP
	RAN OFF ROAD		SPEED UNKNOWN		70 MPH TO 79		ONLY

SS# 04-03-208  
 Order# 41000010421  
 Wayne County  
 BEFORE Period  
 3/1/00 - 5/31/05

SR 1927 (GENOA ROAD)



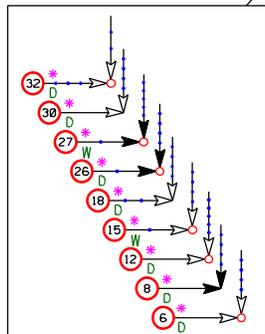
AAADT (YEAR)  
 5200 (2002)

AAADT (YEAR)  
 5200 (2002)

55 MPH



SR 1926  
 (OLD MOUNT OLIVE ROAD)



AAADT (YEAR)  
 4300 (2002)

SR 1927 (GENOA ROAD)

55 MPH



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

**TRAFFIC SAFETY UNIT**

Date: 01-04-2011

Prepared By: C Neilson

SS# 04-03-208  
 Order# 41000010421  
 Wayne County  
 AFTER Period  
 9/1/05 - 11/30/10

AADT (YEAR)  
 5600 (2008)

45 MPH

SR 1926  
 (OLD MOUNT OLIVE ROAD)

**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		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		TO AND LIP
	RAN OFF ROAD		SPEED UNKNOWN		70 MPH TO 79		O ONLY



COUNTERMEASURE :  
 NEW SIGNAL ID : 04-1303

COUNTERMEASURE

NOTE : CRASH #1 IS A  
 TARGET CRASH - OCCURRED TO AVOID  
 ANGLE CRASH WITH PHANTOM VEHICLE

SR 1927 (GENOA ROAD)

45 MPH

AADT (YEAR)  
 4500 (2008)

45 MPH

SR 1926  
 (OLD MOUNT OLIVE ROAD)

45 MPH

SR 1927 (GENOA ROAD)

COUNTERMEASURE

AADT (YEAR)  
 3500 (2008)



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

Date: 01-04-2011

Prepared By: C Neilson

