

Spot Safety Project Evaluation

Spot Safety Project # 03-07-223

**Spot Safety Project Evaluation of Signal Modification
(Install Four-Section Flashing Yellow Arrow Signal Heads)
US 76 (Oleander Drive) at Greenville Loop Road/Greenville Avenue
New Hanover County**

Documents Prepared By:

Hatch Mott MacDonald for

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

Principal Investigator

Travis Braswell

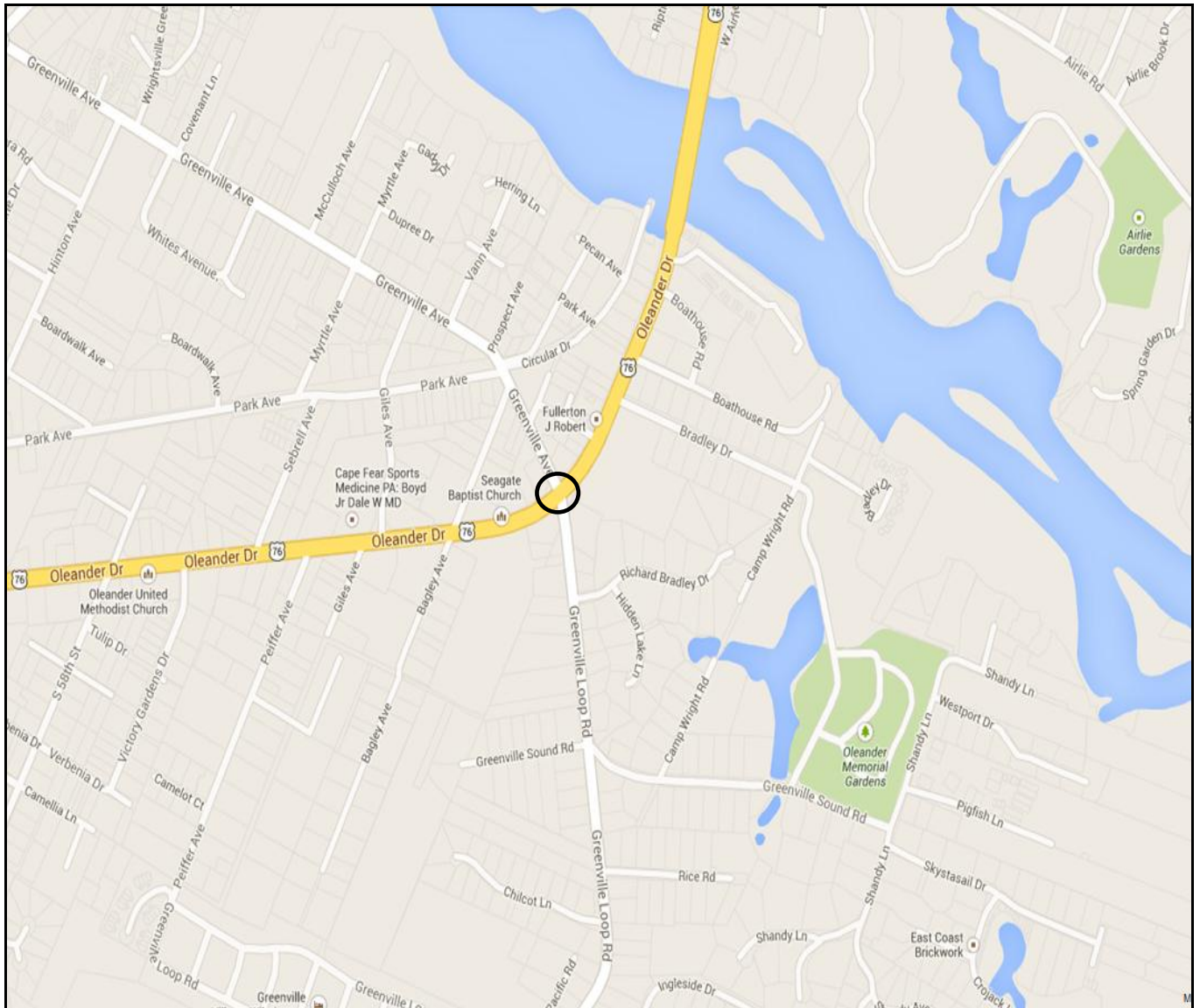
9-11-2013
Date

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 03-07-223 located at the intersection of US 76 (Oleander Drive) at Greenville Loop Road in New Hanover County.

The Sig ID is 03-0052 for this modified Five Phase fully actuated traffic signal.



Location Map Provided from Google Maps



Aerial Provided from Google 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 four-section signal heads with a flashing yellow arrow for the protected/permitted left turn movements from both US 76 (Oleander Dr.) approaches.

US 76 (Oleander Dr.) is a five-lane facility having a center left-turn lane. Greenville Loop Road/Greenville Avenue is a two-lane facility that widens for a right-turn lane on the northbound approach. Speed limits around the intersection range from 35 mph to 45 mph. The subject location is a four-leg crossroads intersection, which is controlled by an existing traffic signal.

The original statement of problem was the existence of a high number of left-turn, same road type crashes occurring within the intersection. The initial crash analysis was completed including data from January 1, 2002 to December 31, 2006 with sixty-six (66) reported crashes during that time frame. The final completion date for the improvement at the subject intersection was on November 4, 2008 with a total cost of \$8,000.00.

Naïve 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 includes the months of September through November 2008. The before period consists of reported crashes from February 1, 2004 through August 31, 2008 (4 years, 7 months). The after period consists of reported crashes from December 1, 2008 through June 30, 2013 (4 years, 7 months). The ending date for the analysis was determined by the date of the most recent available crash data at the time of analysis.

The treatment data consists of all crashes within 150 feet of the subject intersection. *Please see the above location map and aerial photo for further details.*

The following data table depicts the Naïve Before and After Analysis for the treatment location. Please note that Left Turn Same Roadway (LTSR) Crashes were the target crashes for the applied countermeasure. The target crashes considered were only on the approaches where the Flashing Yellow Arrow was installed, which includes the eastbound US 76 (Oleander Drive) and westbound US 76 (Oleander Drive) approaches.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	75	37	-50.7%
Total Severity Index	5.29	5.65	6.8%
Target Crashes	17	9	-47.1%
Target Crash Severity Index	4.05	12.71	213.8%
Volume (2006, 2011)	41,700	37,900	-9.1%

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal Injury Crashes	1	0	-100.0%
Class A Injury Crashes	1	1	0.0%
Class B Injury Crashes	8	4	-50.0%
Class C Injury Crashes	15	9	-40.0%
Property Damage Only	50	23	-54.0%

The Naïve Before and After Analysis at the treatment location shows a 50.7 percent reduction in the total crashes per year and a 47.1 percent reduction in target frontal impact crashes per year. The total severity index increased from the before period to the after period by 6.8 percent and the target crash severity index increased by 213.8 percent. The before period ADT year was 2006 and the after period ADT year was 2011.

To further analyze the intersection crash patterns, the following chart shows different traffic movements and the change in crash totals through the study:

<u>Additional Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Eastbound US 76 LTSR (Target)	5	5	0.0%
Westbound US 76 LTSR (Target)	12	4	-66.7%
Eastbound US 76 Rear-End Crashes	5	3	-40.0%
Westbound US 76 Rear-End Crashes	5	2	-60.0%
Intersection Red Light Run Crashes	11	7	-36.4%
Northbound Greenville Loop Road Rear-End Crashes	10	9	-10.0%

Results and Discussion

Referencing the *Collision Diagrams*, the target crashes (LTSR crashes which occurred on approaches where flashing yellow arrow signal heads were installed) experienced a 47.1 percent reduction. Although the target crashes were reduced, the severity of these crash types increased by 213.8 percent. From the *Additional Information* table above, the eastbound US 76 approach experienced no change in the number of target crashes. However, the westbound US 76 approach experienced a 66.7 percent reduction in left turn same roadway collisions.

Also in the *Additional Information* table, the after period experienced a 40 percent reduction and 60 percent reduction of rear end crashes on eastbound and westbound US 76, respectively. In addition, the number of red light run angle crashes for the intersection was reduced from eleven (11) in the before period to seven (7) in the after period. The data also shows a pattern of rear end crashes on northbound Greenville Loop Road that was consistent throughout the analysis.

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 facilitates additional spot safety review for these types of countermeasures, it is the goal to be able to provide objective and definite information regarding actual crash reduction factors for these types of treatments.

Treatment Site Photos from Google Street View



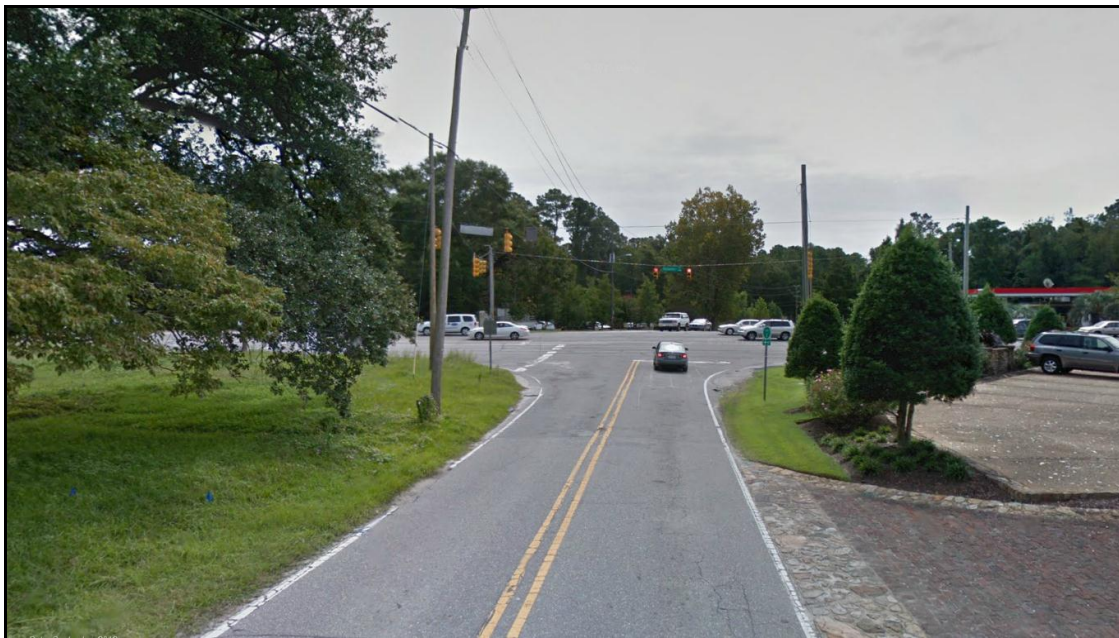
Google Maps (August 2012) – Looking East on US 76 Approach



Google Maps (August 2012) – Looking West on US 76 Approach



Google Maps (July 2012) – Looking North on Greenville Loop Road Approach



Google Maps (September 2012) – Looking South on Greenville Avenue Approach

SS# 03-07-223
 New Hanover County
 BEFORE Period
 2/1/04 - 8/31/08

ADT (Year)
 2,850 (2006)

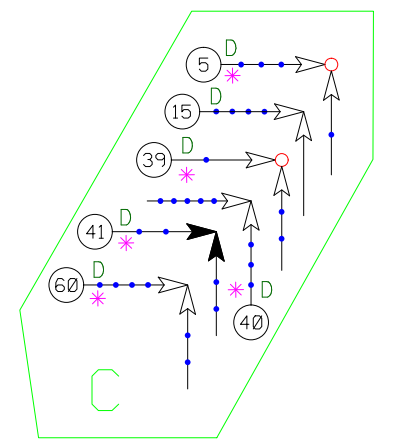
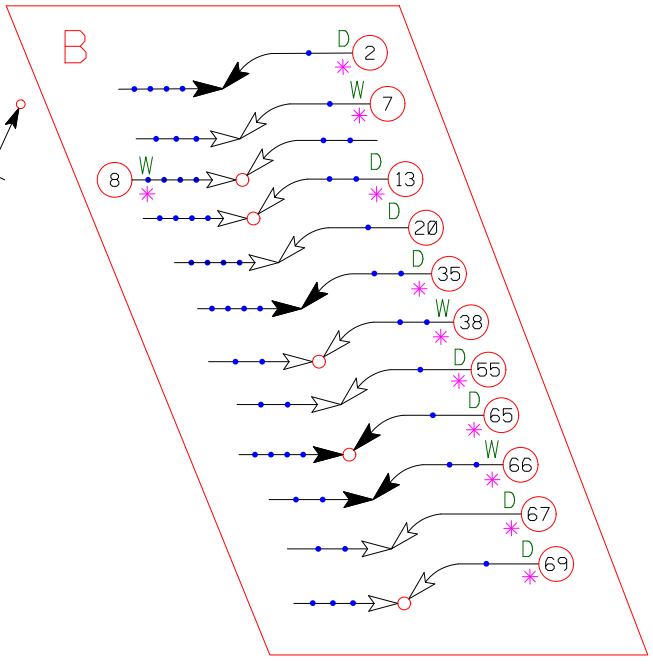
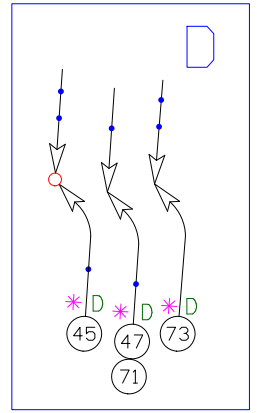
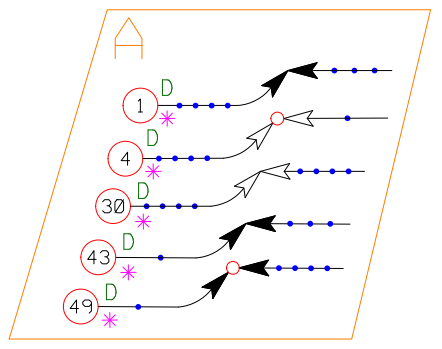
ADT (Year)
 28,000 (2006)

US 76 (Oleander Drive)

ADT (Year)
 34,000 (2006)

LEGEND

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



ADT (Year)
 18,500 (2006)

Greenville Loop Road

Greenville Avenue

35 MPH

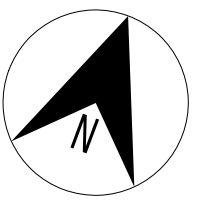
45 MPH

45 MPH

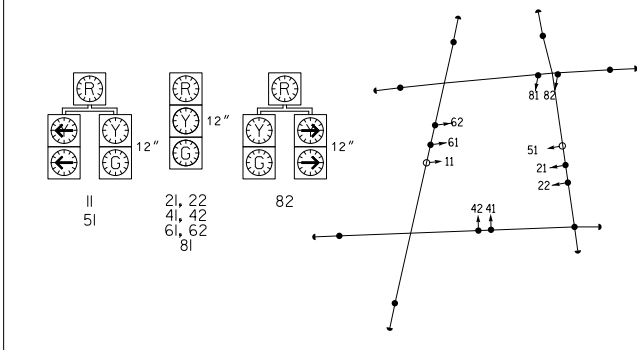
US 76 (Oleander Drive)

40 MPH

Target Crashes -
 Left Turn Same
 FYA Approaches



SIG ID 03-0052 (Actuated Isolated)
 Note: Signal Heads 11 & 51 assumed



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

TRAFFIC SAFETY UNIT

Date: 9/4/2013

Prepared By: T. Braswell



SS# 03-07-223
 New Hanover County
 AFTER Period
 12/1/08 - 6/30/13

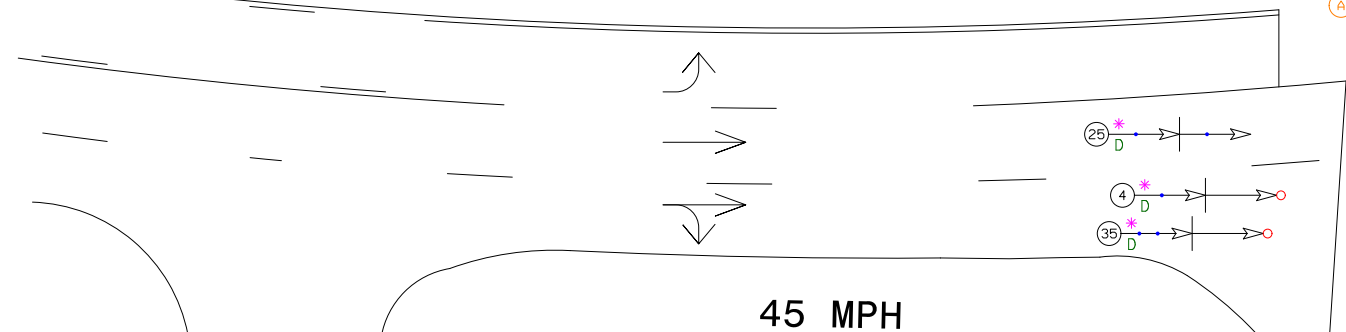
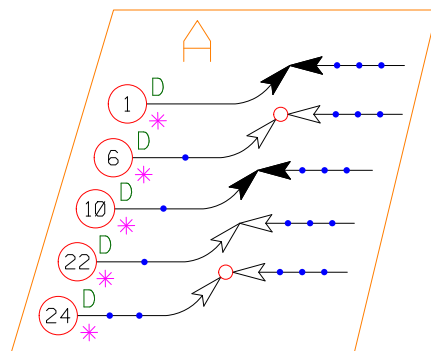
ADT (Year)
 1,800 (2011)

LEGEND							
	MOVING VEHICLE		ANGLE		9 MPH OR LESS		A ANIMAL
	PARKED VEHICLE		TURNING		10 MPH TO 19		P PEDESTRIAN
	PARKING VEHICLE		BACKING		20 MPH TO 29		B BICYCLE
	MOVABLE OBJECT		SIDESWIPE		30 MPH TO 39		T TRAIN
	HEAD ON		INJURY		40 MPH TO 49		D DRY
	REAR END		FATALITY		50 MPH TO 59		W WET
	RAN OFF ROAD				60 MPH TO 69		I ICY OR SNOWY
	DAYLIGHT CRASH				70 AND UP		O Other
	NIGHT CRASH				SPEED UNKNOWN		

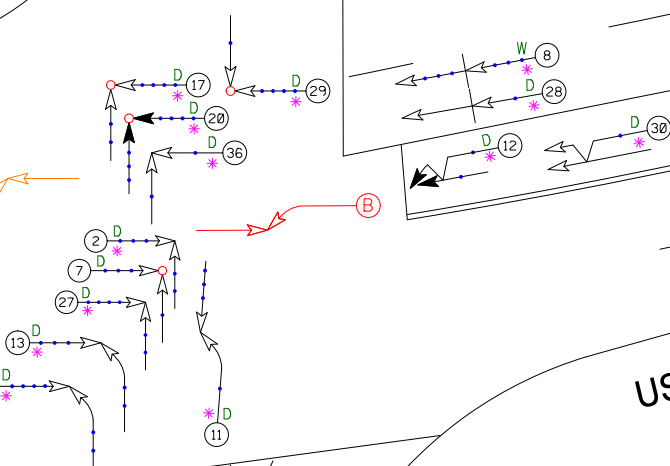
ADT (Year)
 26,000 (2011)

US 76 (Oleander Drive)

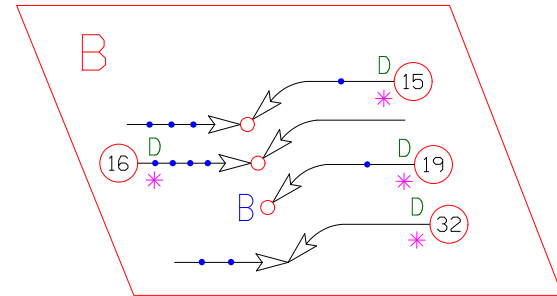
ADT (Year)
 34,000 (2011)



45 MPH



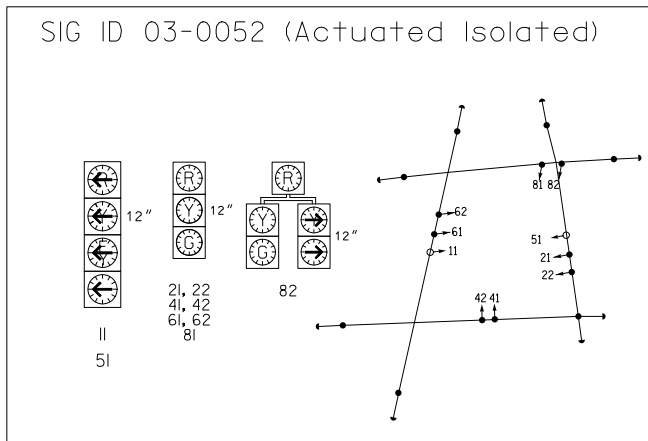
US 76 (Oleander Drive)



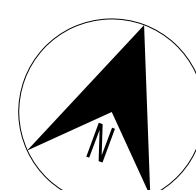
Greenville Loop Road

40 MPH

ADT (Year)
 14,000 (2011)



Target Crashes -
 Left Turn Same
 FYA Approaches



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

TRAFFIC SAFETY UNIT

Date: 9/4/2013 Prepared By: T. Braswell

