

# Spot Safety Project Evaluation

Order # 41000012517

Spot Safety Project # 05-02-209

**Spot Safety Project Evaluation of the  
Intersection Geometric Changes and Signal Modifications  
NC 55 (Williams Street) at SR 1160 (Olive Chapel Road) / Hunter Street  
Wake County, Town of Apex**

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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Jason B. Schronce

8-10-2011

Date

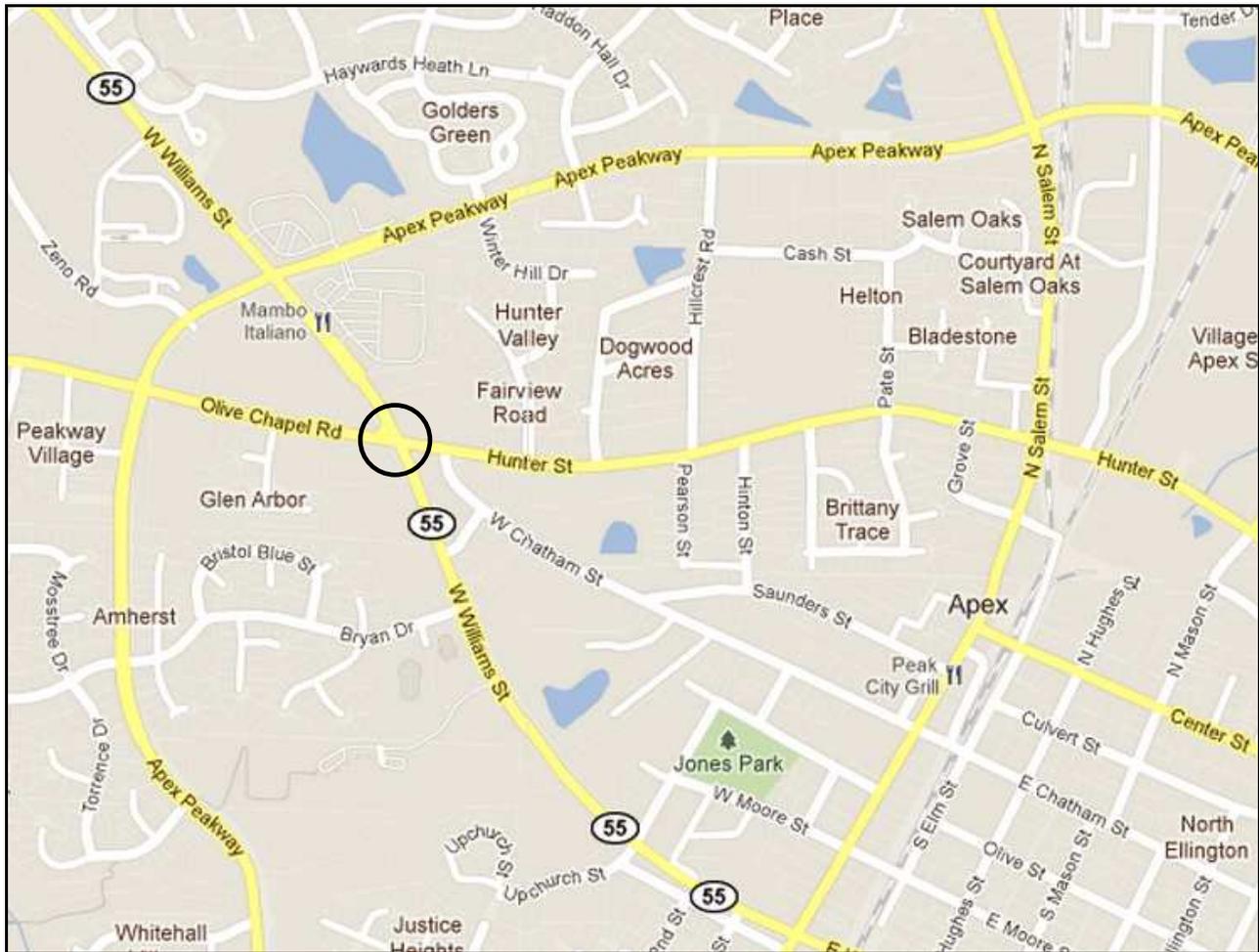
Traffic Safety Project Engineer

# Spot Safety Project Evaluation Documentation

## Subject Location

Evaluation of Spot Safety Project Number 05-02-209 located at the Intersection of NC 55 (N. Williams Street) and SR 1160 (Olive Chapel Road) / Hunter Street in Wake County, in the Town of Apex.

The Sig ID is 05-0608 for this modified traffic signal.





Aerial Photograph provided by BING Maps

### **Project Information and Background from the Project File Folder**

The spot safety project improvement countermeasures chosen for the subject location were the additions of eastbound SR 1160 (Olive Chapel Rd) left and right turn lanes, a westbound Olive Chapel Road through lane, and protected/permitted signal phasing for SR 1160 and Hunter Street. The spot safety funds were added to other funding sources initiated by the Town of Apex.

The subject intersection is a crossroads type with an existing traffic signal. In the before period, southbound NC 55 presented a three lane approach with a dedicated left turn lane and a right turn slip ramp. Northbound NC 55 is a two lane approach with a dedicated left turn lane. The Hunter Street approach provides a right turn lane and a left turn lane with a small concrete median barrier to prevent left turns from the drug store driveway. SR 1160 (Olive Chapel Road) was a single lane approach in the before period. The speed limits are 45-mph on each approach except for Hunter Street which operates at 35-mph.

The original statement of problem was that growth in the area and an increase in traffic volumes was creating congestion and delay issues at this intersection. This intersection's traffic signal was additionally provided the Flashing Yellow Arrow for the NC 55 approaches on September 29, 2009.

The initial crash analysis was completed from February 1, 1999 to January 31, 2002 with twenty-nine (29) reported crashes, five (5) of which were deemed correctable. The final completion date (reimbursement to the Town of Apex) for the improvements was on June 7, 2006. The total cost of the project was \$500,000; of which Spot Safety provided \$80,000, the Town of Apex supplied \$270,000, and Small Urban Funds gave \$150,000.

### 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 was split into the following time periods due to multiple improvements:

Before Period: July 1, 2002 to June 30, 2005 (3 Years)  
 Construction 1 Period: July 2005 to June 2006  
 After 1 Period (SS Project): July 1, 2006 to August 31, 2009 (3 Years, 2 Months)  
 Construction 2 Period: September 2009  
 After 2 Period (FY Arrow): October 1, 2009 to March 31, 2011 (1 Year, 6 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 only PVA entrance that is located within 150 feet is the drug store driveway on Hunter Street.

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that since the project was completed for congestion and delay concerns, a specific Target Crash type was not highlighted and presented in this report.

<b><u>Treatment Information</u></b>	<b>Before 3.0 Years</b>	<b>After 1 3.17 Years</b>	<b>After II 1.50 Years</b>
Total Crashes	27	26	13
Total Severity Index	2.92	2.99	2.14
Total Crashes per Year	9.0	8.2	8.7
Volume (2003, 2008, 2010)	31,600	35,800	33,900

<b><u>Injury Crash Summary</u></b>	<b>Before 3.0 Years</b>	<b>After 1 3.17 Years</b>	<b>After II 1.50 Years</b>
Fatal injury Crashes	0	0	0
Class A injury Crashes	0	0	0
Class B injury Crashes	3	4	0
Class C Injury Crashes	4	3	2
Total Injury Crashes	7	7	2
Injury Crashes per Year	2.3	2.2	1.33

## Results and Discussion

Referencing the *Collision Diagrams* and the tables above, the crashes at the intersection have been consistent between 8 and 9 crashes year. The before period to the after 1 period indicate similar patterns of left turn same roadway crashes and rear-end collisions on the NC 55 approaches. With the installation of the Flashing Yellow Arrow, the left turn crash patterns have appeared to be decreasing and the occurrence of injury crashes per year have been reduced by nearly half.

The calculated benefit to cost ratio for this project is **0.07 considering total crashes between the Before Period and the After 1 Period**. 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 July 6<sup>th</sup>, 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 Photos – Field Visit 7/6/2011



Travelling Eastbound on SR 1160 (Olive Chapel Rd) – Geometric Changes



**Travelling Westbound on Hunter Street**



**Travelling Northbound on NC 55 (Williams Street)**



**Travelling Southbound on NC 55 (Williams Street) in the right turn lane**





GAS STATION

DRUG STORE

FUNERAL HOME

NC 55  
Williams Street  
45-mph

Hunter Street  
35-mph

SR 1160  
Olive Chapel Rd  
45-mph

NC 55  
Williams Street  
45-mph

**LEGEND**

	MOVING VEHICLE		ANGLE		5 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		DRIVER AT FAULT
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		DRIVER AT FAULT
	HEAD ON		OUT OF CONTROL		50 MPH TO 59		DRIVER AT FAULT
	REAR END		OUT OF CONTROL		60 MPH TO 69		DRIVER AT FAULT
	RAN OFF ROAD		BLURRY		70 MPH TO 79		DRIVER AT FAULT
			FATALITY		80 MPH TO 89		DRIVER AT FAULT
			90 MPH TO 99		100 MPH OR MORE		DRIVER AT FAULT
			SPEED UNKNOWN				DRIVER AT FAULT

SS# 05-02-209  
 Order# 41000012517  
 Wake County  
 City of Apex  
 BEFORE Period  
 7/1/02 - 6/30/05  
 3.0 Years

Existing  
 Traffic Signal  
 Sig ID 05-0608

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

**TRAFFIC SAFETY UNIT**

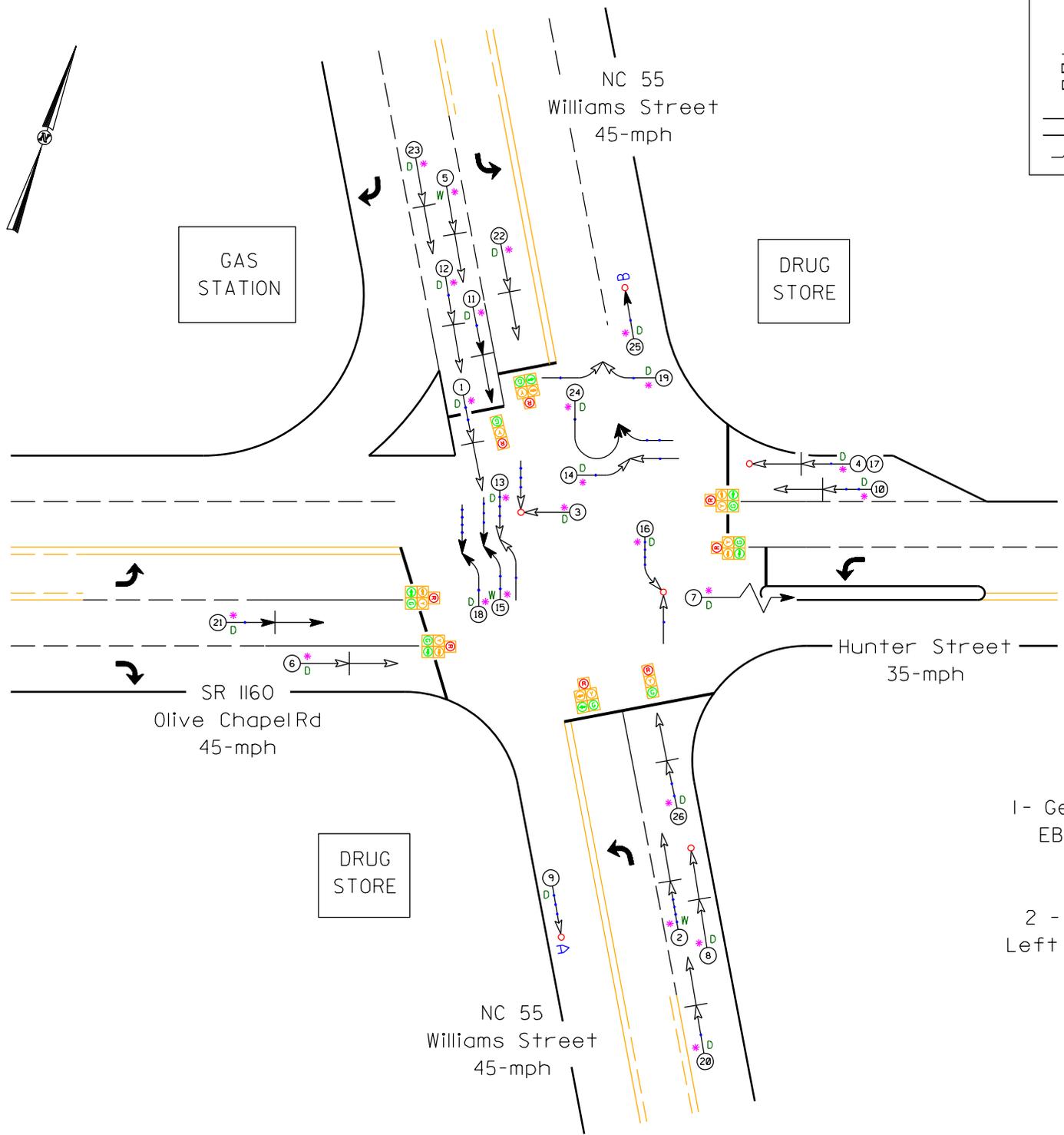
Date: 8-9-2011

Prepared By: J. Schronce

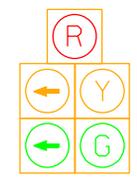


**LEGEND**

	MOVING VEHICLE		ANGLE		5 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PAKED 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		RAN OFF ROAD		50 MPH TO 59		ICY OR SNOWY
	REAR END		HAZY		60 MPH TO 69		TO AND UP
	FATALITY		SPEED UNKNOWN		FATALITY		ONLY



SS# 05-02-209  
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 Wake County  
 City of Apex  
 AFTER 1 Period  
 7/1/06 - 8/31/09  
 3.17 Years



Modified  
 Traffic Signal  
 Sig ID 05-0608

Countermeasures:

- 1- Geometry Changes to SR 1160  
 EB Left / Right Turn Lane  
 WB Through Lane
- 2 - Signal Phase Modifications  
 Left Turn Protected/Permissive

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Prepared By: J. Schronce



**LEGEND**

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

SS# 05-02-209  
 Order# 41000012517  
 Wake County  
 City of Apex  
 AFTER II Period  
 10/1/09 - 3/31/11  
 1.50 Years

Modified  
 Traffic Signal  
 Sig ID 05-0608

Countermeasure:  
 NC-55 Left Turns equipped  
 with "Flashing Yellow Arrow"  
 on Sept 29, 2009

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

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Date: 8-9-2011 Prepared By: J. Schronce

