

Spot Safety Project Evaluation

Spot Safety Project # 05-04-007

**Spot Safety Project Evaluation of Intersection Changes
(Widen westbound Holden Road to accommodate dual left turn lanes and add
protected-permitted left turn phasing for northbound and southbound US 1)**

**US-1 (Capital Boulevard) at SR 1147 (Holden Road)
Franklin 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

Amy Faulkner

Amy Faulkner

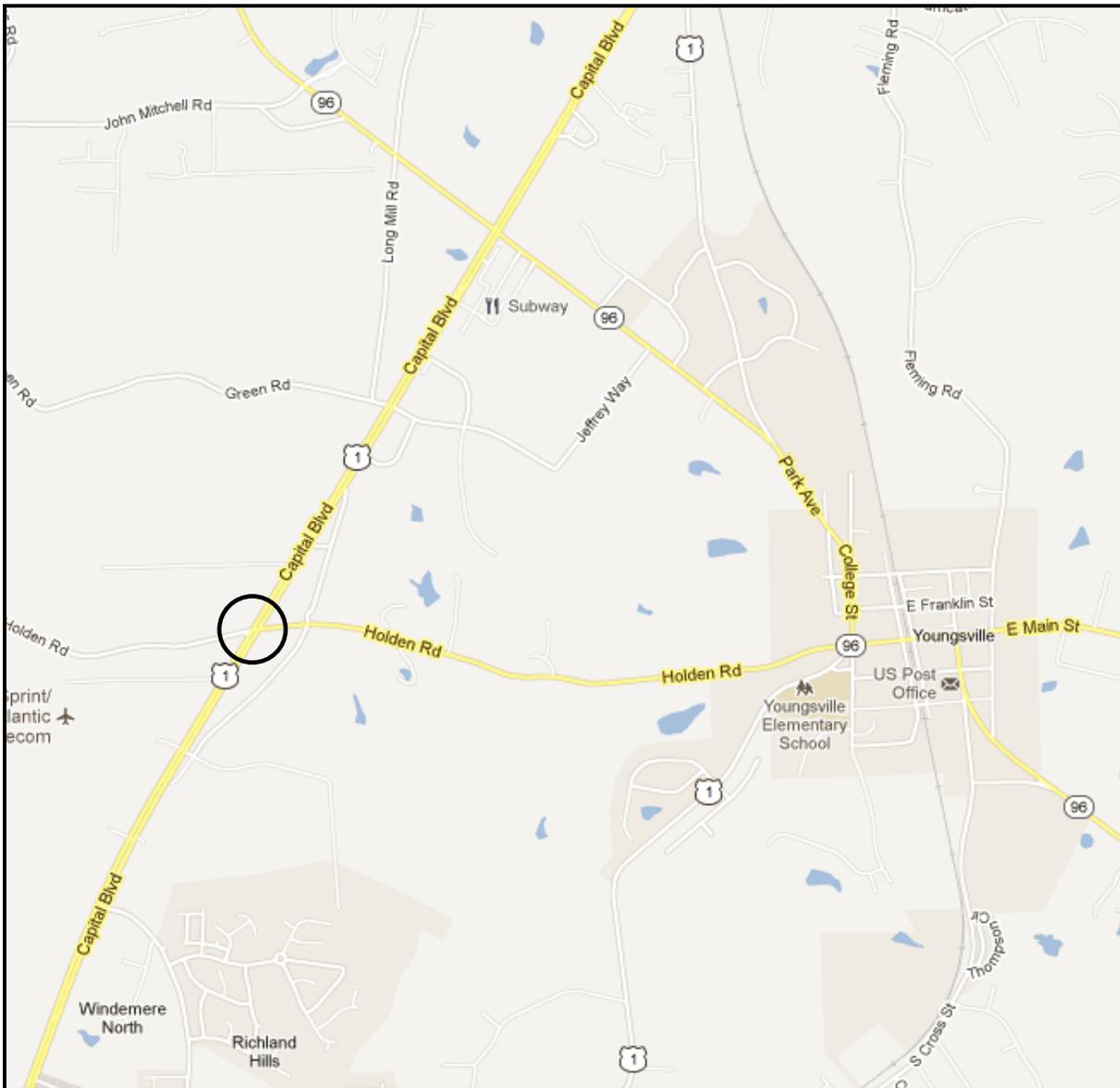
5-3-2013
Date

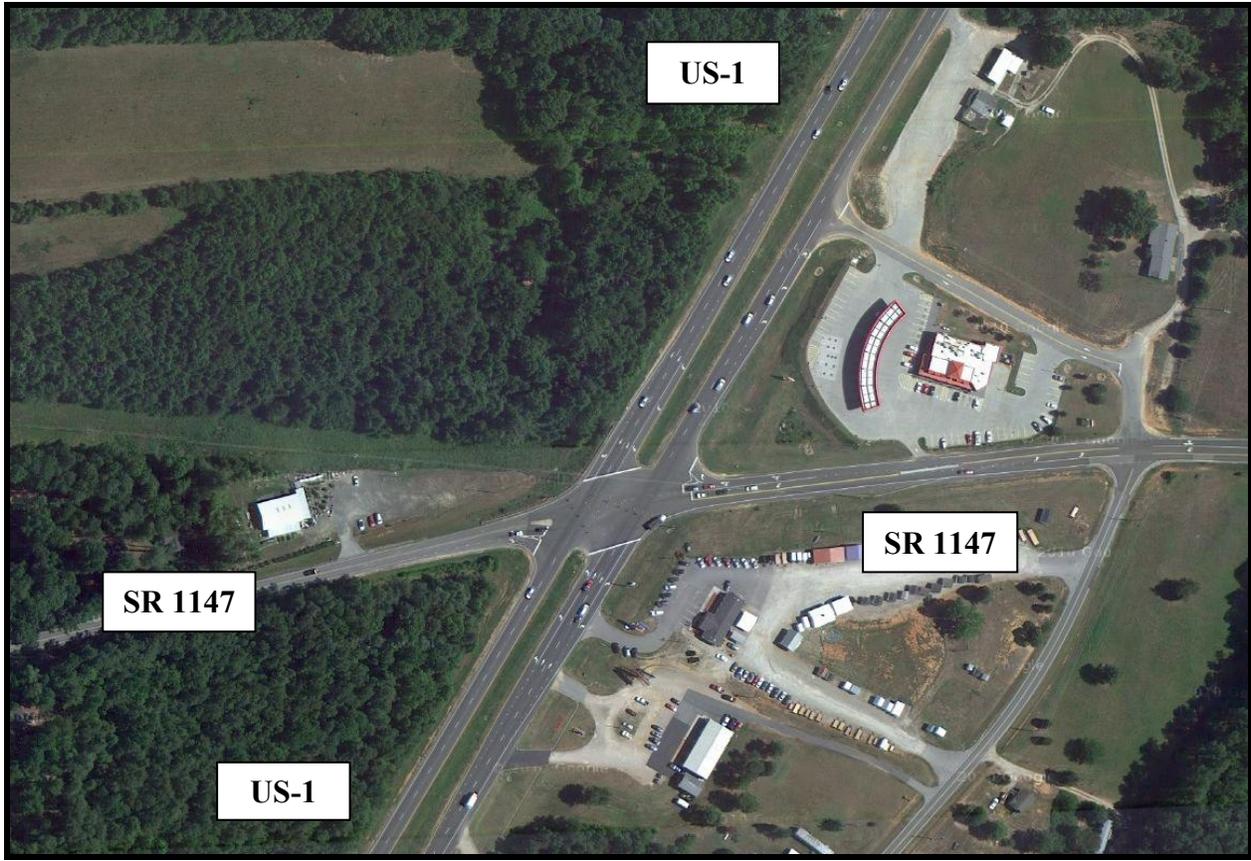
Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 05-04-007 located at the Intersection of US-1 (Capital Boulevard) at SR 1147 (Holden Road) in Franklin County, west of Youngsville.

The Signal ID is 05-1703 for this 6-Phase Fully Actuated Traffic Signal.





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 to widen SR 1147 (Holden Road) to accommodate dual left turn lanes with 200 feet of storage, and to add protected-permitted left turn phasing for northbound US 1 (Capital Boulevard). Also, the signal was modified to add protected-permitted left turn phasing for southbound US 1 (Capital Boulevard), and the traffic island on the westbound approach was removed.

The subject location is a four-leg intersection controlled by an existing traffic signal. US-1 (Capital Boulevard) is a 4-lane divided facility that widens to include left and right turn lanes on both the northbound and southbound approaches at the intersection. SR 1147 (Holden Road) is a 2-lane facility. The eastbound approach has a through-left lane and a right turn lane. The westbound approach was a single lane approach. The speed limit on US 1 (Capital Boulevard) is 55-mph, and the speed limit on SR 1147 (Holden Road) is 45-mph.

The original statement of problem was the existence of left turn crash patterns for westbound SR 1147 (Holden Road) and northbound US 1 (Capital Boulevard). The initial crash analysis was completed from September 1, 1999 to August 31, 2004 with thirty-four (34) reported crashes. The final completion date for the improvement at the subject intersection was on April 18, 2008 with a total cost of \$157,500.

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 2008. The before period consisted of reported crashes from April 1, 2003 through January 31, 2008 (4 years, 10 months); and the after period consisted of reported crashes from May 1, 2008 through February 28, 2013 (4 years, 10 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 intersection of US-1 (Capital Boulevard at SR 1147 (Holden Road) for all approaches. *Please see attached location map and aerial map for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that the Target Crashes for the multiple countermeasure changes at this location are as follows:

- Target 1 – Left Turn Crashes for the Westbound SR 1147 (Holden Road) approach where the dual left turn lanes were installed
- Target 2 – Left Turn Same Roadway (LTSR) Crashes for the Northbound approach of US 1 (Capital Boulevard) where protected-permitted left turn signal phasing was installed
- Target 3 – Left Turn Same Roadway (LTSR) Crashes for the Southbound approach of US 1 (Capital Boulevard) where protected-permitted left turn signal phasing was installed

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	44	43	- 2.3 %
Total Severity Index	5.04	3.75	- 25.6 %
Target 1 – Westbound SR 1147 Left Turns	6	1	- 83.3 %
Target 1 Severity Index	7.17	8.40	17.2 %
Target 2 – Northbound US-1 LTSR	7	8	14.3 %
Target 2 Severity Index	7.34	6.55	- 10.8 %
Target 3 – Southbound US-1 LTSR	8	8	N/A
Target 3 Severity Index	6.55	3.78	- 42.3 %
Total Target Crashes	21	17	- 19.0 %
Total Target Crash Severity Index	7.34	5.35	- 27.1 %
Volume (2005, 2010)	36,900	36,200	- 1.9 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal Injury Crashes	0	0	N/A
Class A Injury Crashes	0	0	N/A
Class B Injury Crashes	7	3	- 57.1 %
Class C Injury Crashes	17	13	- 23.5 %
Property Damage Only	20	27	35.0 %

The naive before and after analysis shows a 2.3 percent reduction in Total Crashes at the intersection and a 25.6 percent reduction in the Total Severity Index. There was a 19 percent reduction in Total Target Crashes with a 27.1 percent reduction in the Total Target Crash Severity Index. The before period AADT year was 2005 and the after period AADT year was 2010.

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 (+)
Fixed Object Crashes @ WB SR 1147	3	0	- 100.0 %
Rear-End Crashes on NB US-1	6	5	-16.7 %
Rear-End Crashes on SB US-1	8	11	37.5 %

Results and Discussion

Referencing the *Collision Diagrams*, Target 1 Crashes (Westbound SR 1147 Left Turn Crashes) decreased from six (6) crashes during the before period to one (1) crash during the after period. That decrease is an 83.3 percent reduction in Target 1 crashes for the westbound movement. Target 2 Crashes (Northbound US-1 LTSR Crashes) increased by one (1) crash in the after period while the number of Target 3 Crashes (Southbound US-1 LTSR Crashes) remained the same.

As shown on the *Before Period Collision Diagram*, three (3) crashes occurred during the before period at the traffic island on the westbound approach of SR 1147 (Holden Road). Crash #13 and crash #21 were single vehicle crashes that involved the vehicle hitting the island and traffic sign that was mounted on the island. Crash #10 involved a vehicle hitting a car that was stopped on westbound SR 1147 in addition to hitting the traffic island and sign. 100 percent of these types of crashes were eliminated after removal of the island.

Also noted on the *Collision Diagrams* is the occurrence of Rear-End Crashes on US-1. The northbound approach of US-1 experienced a 16.7 percent reduction in this type of crash. However, the southbound approach experienced a 37.5 percent increase in Rear-End Crashes.

Please see the attached *Treatment Site Photos*. Photos are provided from Google Street View for all four approaches to the study intersection. As the Safety Evaluation Group facilitates additional spot safety reviews 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 (May 2012) – Looking West on SR 1147 Approach



Google Maps (May 2012) – Looking South on US 1 Approach



Google Maps (March 2009) – Looking East on SR 1147 Approach



Google Maps (June 2011) – Looking North from US 1 Approach

SS# 05-04-007
Franklin County
BEFORE Period
4/1/2003 - 1/31/2008

AAADT (Year)
3300 (2005)

SR 1147 (Holden Rd.)
45 mph

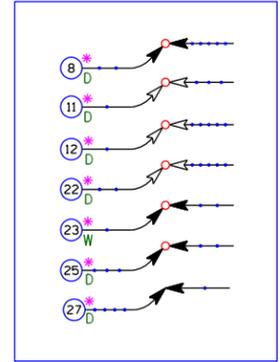
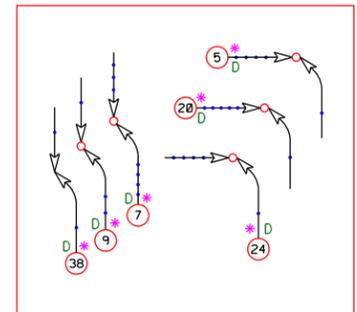
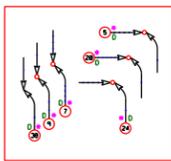
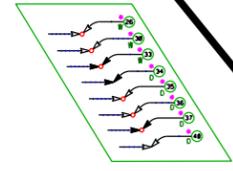
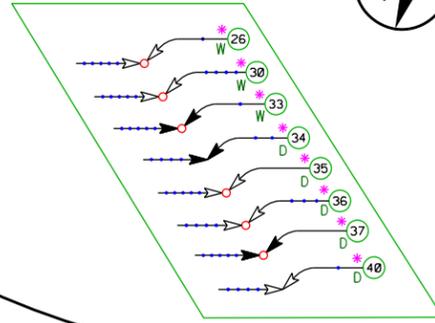
US 1 (Capital Blvd.)
55 mph

US 1 (Capital Blvd.)
55 mph

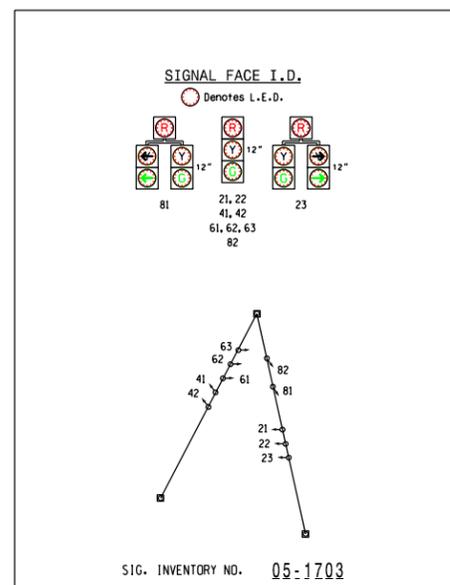
AAADT (Year)
32,000 (2005)

AAADT (Year)
6500 (2005)

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



- Target 1 - Westbound SR 1147 Left Turn Crashes
- Target 2 - Northbound US-1 LTSR Crashes
- Target 3 - Southbound US-1 LTSR Crashes



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

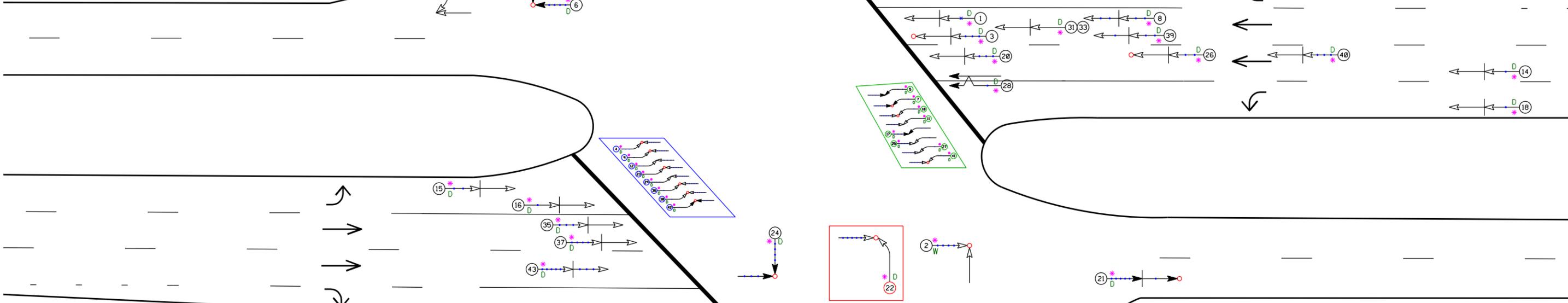
TRAFFIC SAFETY UNIT

Date: 5-3-13 Prepared By: Amy Faulkner, EI

SS# 05-04-007
Franklin County
AFTER Period
5/1/2008 - 2/28/2013

SR 1147 (Holden Rd.)
45 mph

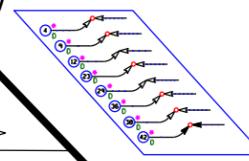
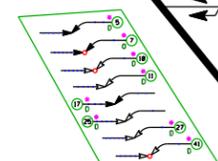
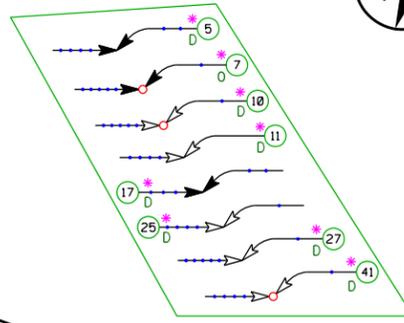
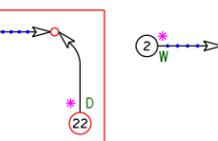
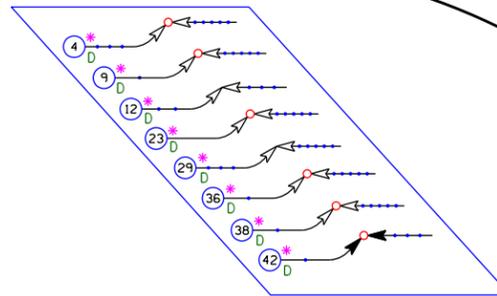
US 1 (Capital Blvd.)
55 mph



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

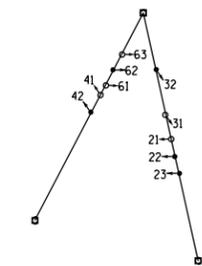
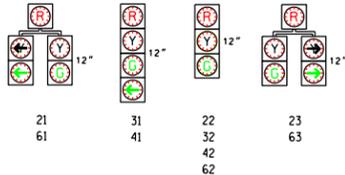
AAADT (Year)
31,000 (2005)

US 1 (Capital Blvd.)
55 mph



SIGNAL FACE I.D.

Denotes L.E.D.



SIG. INVENTORY NO. 05-1703

- Target 1 - Westbound SR 1147 Left Turn Crashes
- Target 2 - Northbound US-1 LTSR Crashes
- Target 3 - Southbound US-1 LTSR Crashes

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

TRAFFIC SAFETY UNIT

Date: 5-3-13 Prepared By: Amy Faulkner, EI