Spot Safety Project Evaluation

Order # 41000008959

Spot Safety Project # 07-04-211

Spot Safety Project Evaluation of the Signal Installation
At The Intersection of SR 3163 (East Market Street) and Holts Chapel Road
Greensboro, Guilford County

Documents Prepared By:

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

Principal Investigator

_____ 10/14/2010

Chad J. Neilson Date

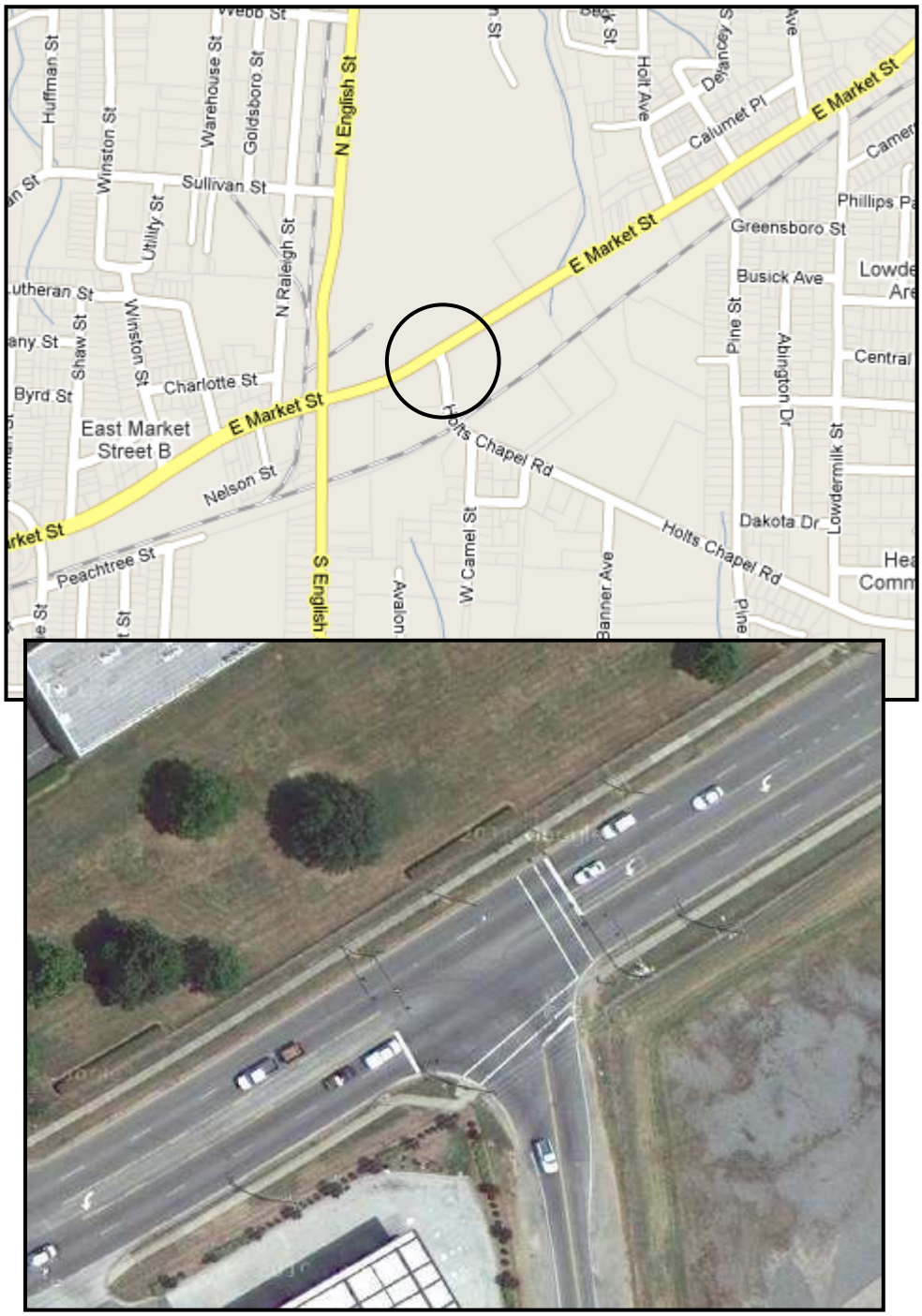
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 07-04-211 located at the Intersection of SR 3163 (East Market Street) and Holts Chapel Road in Greensboro, Guilford County.

The Signal ID is 07-2076 for this newly installed traffic signal.



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. SR 3163 (East Market Street) is a five lane facility with a center two-way-left-turn-lane and a speed limit of 35 mph. Holts Chapel Road is a two lane facility and a has a speed limit of 35 mph. The subject location is a three-leg intersection, which was controlled by a stop sign for the Holts Chapel Road approach.

The original statement of problem was the concern of angle crashes occurring when vehicles from a lower volume road attempt to enter a higher volume highway. The intended purpose of the new signal is to create gaps in traffic along SR 3163 (East Market Street) and alleviate crashes.

The initial crash analysis was completed from January 1, 2000 to June 5, 2004 with twenty-one (21) reported crashes, fourteen (14) of which were deemed correctable. The final completion date for the improvement at the subject intersection was on September 18, 2006 with a total cost of $48,402.00.

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 were the months of August 2006 through October 2006. The before period consisted of reported crashes from October 1, 2002 through July 31, 2006 (3 years and 10 months); and the after period consisted of reported crashes from November 1, 2006 through August 31, 2010 (3 years and 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 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.

Treatment Information	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	16	4	- 75.00 %
Total Severity Index	8.51	2.85	- 66.51 %
Target Crashes	13	1	- 92.31 %
Target Crash Severity Index	9.11	1	- 89.02 %
Volume (2004, 2008)	14,100	16,000	13.48 %

Injury Crash Summary	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal Injury Crashes	0	0	N/A
Class A Injury Crashes	1	0	- 100.00 %
Class B Injury Crashes	1	1	0.00 %
Class C Injury Crashes	5	0	- 100.00 %
Total Injury Crashes	9	3	- 66.67 %

The naive before and after analysis at the treatment location resulted in a seventy-five (75) percent decrease in Total Crashes, a ninety-two (92) percent decrease in Target Crashes, and a sixty-six (66) percent increase in the Total Severity Index. The before period ADT year was 2004 and the after period ADT year was 2008.

Results and Discussion

Referencing the *Collision Diagrams*, the before period left-turn crash patterns at the intersection consisted of twelve (12) target crashes. After the signal installation, this pattern was reduced to one (1) target crash.

The calculated benefit to cost ratio for this project is **19.51 considering total crashes**. The benefit to cost ratio **considering only target crashes is 19.11**. 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 Google Street View for all three 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

Looking East on SR 3163 (E. Market St)

Looking North on Holts Chapel Rd

Looking West on SR 3163 (E. Market St)

BENEFIT-COST ANALYSIS WORKSHEET - TOTAL

LOCATION: SR 3163 (E. Market St) at Holts Chapel Rd
COUNTY: Guilford
FILE NO.: SS 07-04-211

BY: C Neilson
DATE: 10/12/2010

DETAILED COST: TYPE IMPROVEMENT - Signal Installation

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$48,402	10	0.149	$7,213
	$0	0	0.000	$0
Right-of-Way	$0	0	0.000	$0
TOTALS	$48,402	10	0.149	$7,213

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $2,000
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $900

TOTAL ANNUAL COST= $10,113
TOTAL COST OF PROJECT= $48,402

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	3.83	1	0.26	6	1.57	9	2.35	$205,927
AFTER	3.83	0	0.00	1	0.26	3	0.78	$8,590

Annual Benefits from Crash Cost Savings $197,337

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = $187,223

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 19.51

TOTAL COST OF PROJECT - $48,402 COMPREHENSIVE B/C RATIO - 19.51

BENEFIT-COST ANALYSIS WORKSHEET - TARGET

LOCATION: SR 3163 (E. Market St) at Holts Chapel Rd
COUNTY: Guilford
FILE NO.: SS 07-04-211

BY: C Neilson
DATE: 10/12/2010

DETAILED COST: TYPE IMPROVEMENT - Signal Installation

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TOTAL COST OF PROJECT= $48,402

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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	3.83	1	0.26	4	1.04	8	2.09	$194,360
AFTER	3.83	0	0.00	0	0.00	1	0.26	$1,123

Annual Benefits from Crash Cost Savings $193,238

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = $183,124

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 19.11

TOTAL COST OF PROJECT - $48,402 COMPREHENSIVE B/C RATIO - 19.11

SS# 07-04-211
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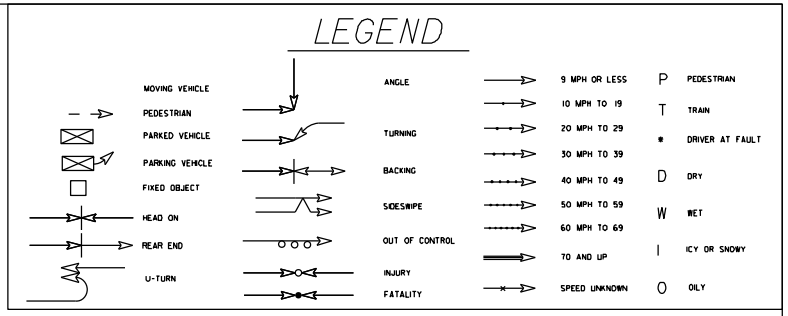
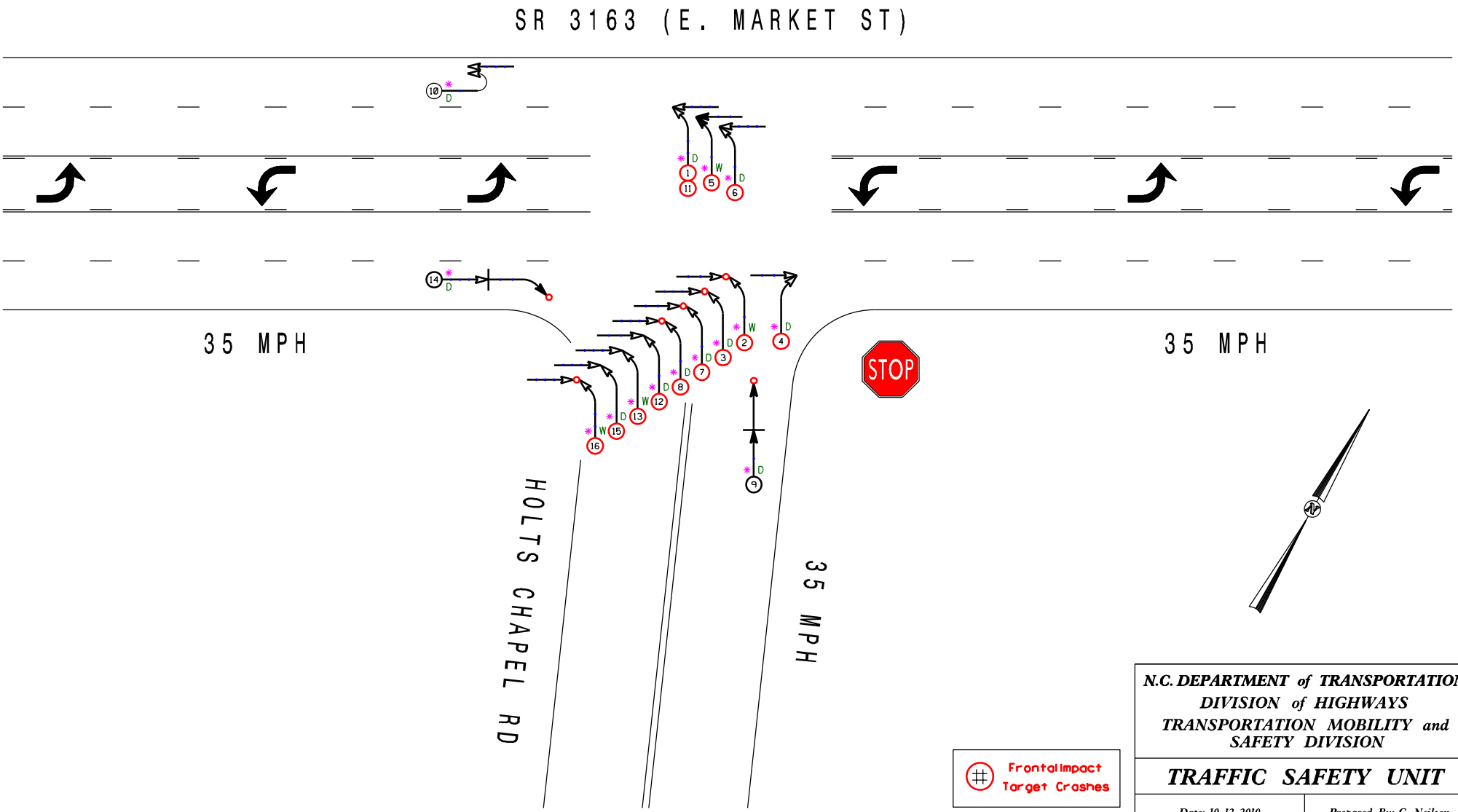
Guilford County
BEFORE Period
10/1/02 - 7/31/06





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

TRAFFIC SAFETY UNIT

Date: 10-12-2010 | Prepared By: C Neilson

SS# 07-04-211
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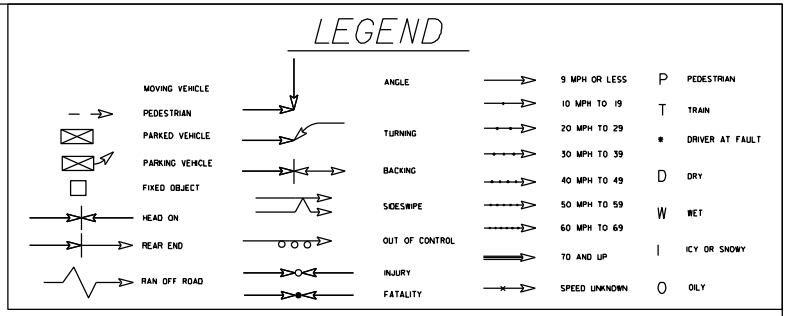
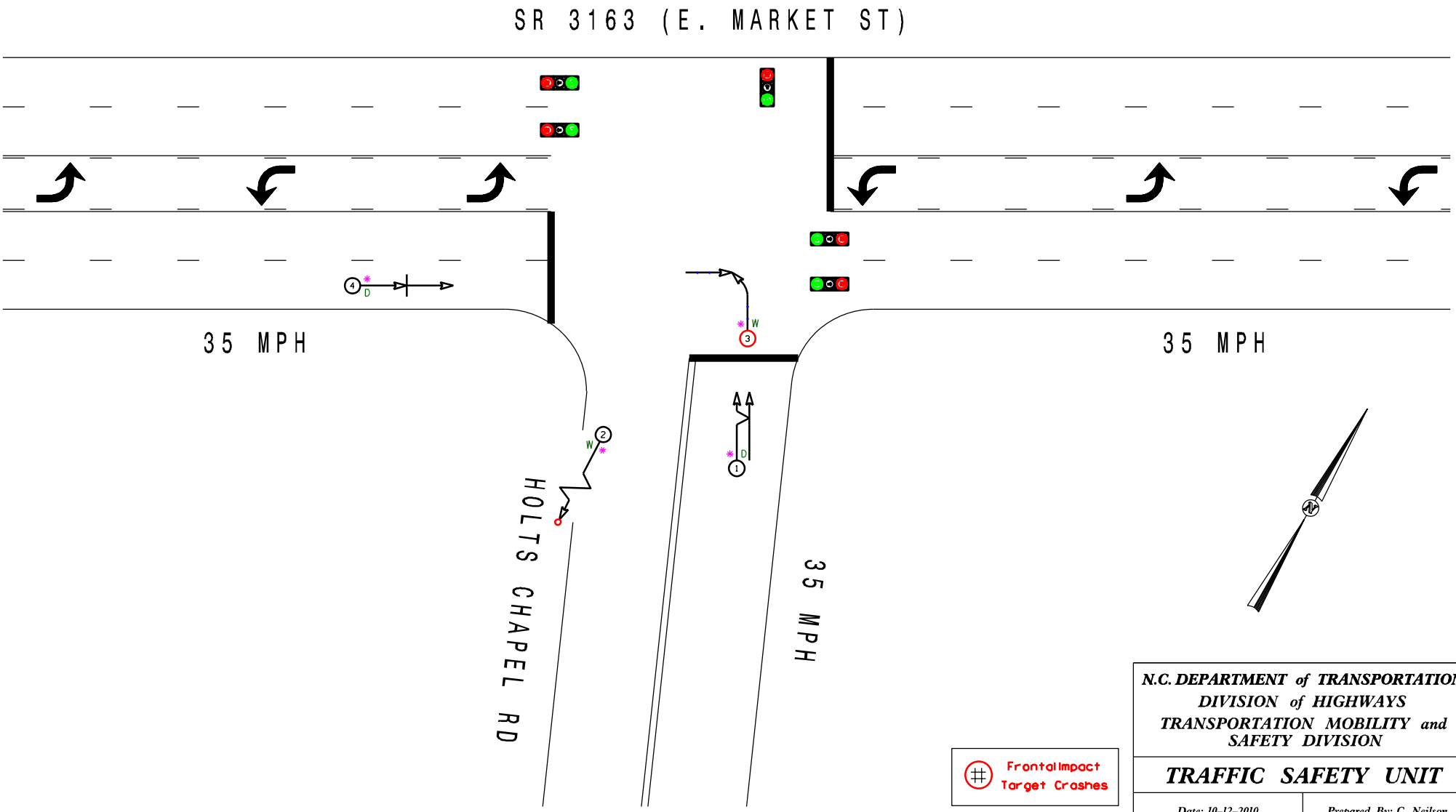
AFTER Period
11/1/06 - 8/31/10





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