

Spot Safety Project Evaluation

Order # 41000025155

Spot Safety Project # 06-07-217

**Spot Safety Project Evaluation of the Signal Change
(Doghouse Heads Replaced with Flashing Yellow Arrow)
NC 24/NC 210 (Grove St) at SR 1838 (Dunn Rd)
Cumberland County**

Documents Prepared By:

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

Principal Investigator



Justin Green

7-3-2013

Date

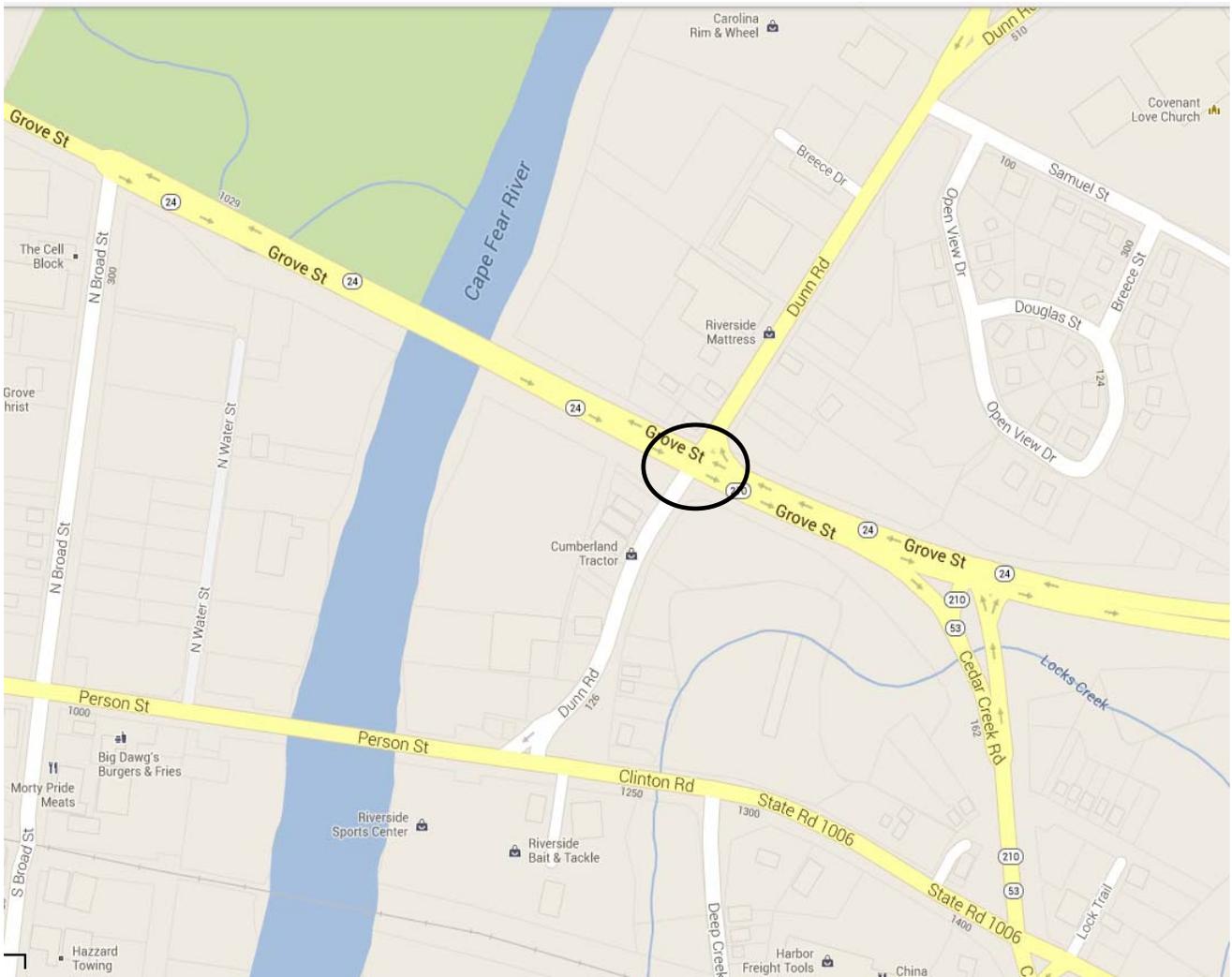
Traffic Safety Project Engineer

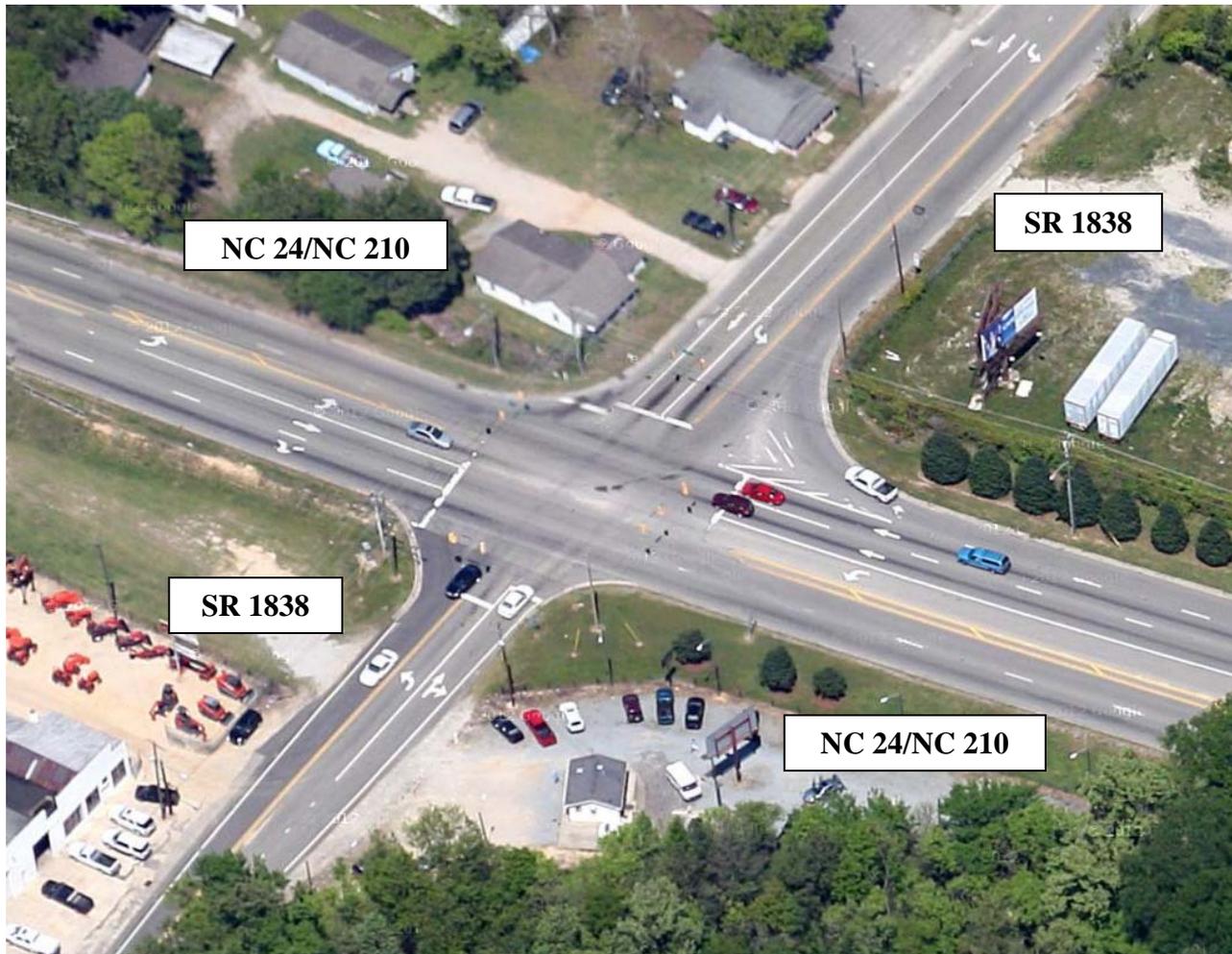
Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 06-07-217 located at the Intersection of NC 24/NC 210 (Grove St) at SR 1838 (Dunn Rd) in Cumberland County, City of Fayetteville.

The Sig ID is 06-0371 for this modified 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 the replacement of the pre-existing 5-section (doghouse) signal heads with the new Flashing Yellow Arrow design for the eastbound and westbound NC 24/NC 210 left turn approaches.

NC 24/NC 210 is a five lane curb and gutter section. SR 1838 is a multi-lane section roadway that intersects with NC 24/NC 210. The posted speed limit for NC 24/NC 210 is 45 mph. The posted speed limit for SR 1838 is 35 mph. The subject location is a four-leg crossroads intersection, which is controlled by an existing traffic signal.

The original statement of problem was vehicles traveling on NC 24/NC 210 attempting to turn left onto SR 1838 are failing to yield to vehicles on NC 24/NC 210. The initial crash analysis was completed from July 1, 2002 to June 30, 2007 with fifty-five (55) reported crashes. From the signal database the final completion date for the improvement at the subject intersection was on June 12, 2008 with a total cost of \$26,000.00.

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 April 1, 2008 through June 30, 2008. The before period consisted of reported crashes from October 1, 2003 through March 31, 2008 (4 years, 6 months); and the after period consisted of reported crashes from July 1, 2008 through December 31, 2012 (4 years, 6 months). This route has been used as a detour route since January 1, 2013 therefore the ending date for this analysis is December 31, 2012.

The treatment data consisted of all crashes within 150 feet of the subject intersection for the NC 24/NC 210 and SR 1838 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 Left Turn Same Roadway (LTSR) Crashes were the target crashes for the applied countermeasure. The target crashes were only on the approaches where the Flashing Yellow Arrow was installed in the after period; which include the intersection approaches eastbound/westbound NC 24/NC 210.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	43	27	- 37.2 %
Total Severity Index	6.20	6.82	+10.0 %
Target Crashes	6	6	N/A
Target Crash Severity Index	16.10	5.93	- 63.2 %
Volume (2005, 2010)	27,400	21,800	- 20.4 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	1	0	- 100.0 %
Class A injury Crashes	0	1	+ 100.0 %
Class B injury Crashes	6	4	- 33.3 %
Class C Injury Crashes	14	7	- 50.0 %
Property Damage Only	22	15	- 31.8 %

The naive before and after analysis at the treatment location resulted in a 37 percent reduction in Total Crashes and a 10 percent increase in the Total Severity Index. There was no change in the Target Left Turn Crashes but there was a 63 percent change in the Target Left Turn Crash Severity Index. The before period ADT year was 2005 and the after period ADT 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 (+)
Eastbound NC 24/NC 210 LTSR (Target)	4	6	+ 50.0 %
Westbound NC 24/NC 210 LTSR (Target)	2	0	- 200.0 %
Intersection Red Light Run Crashes	10	9	- 10.0 %
Total Rear End Crashes	17	6	- 64.7 %

Results and Discussion

Referencing the *Collision Diagrams*, the Eastbound NC 24/NC 210 target crashes experienced a 50 percent increase in LTSR type roadway collisions; from four (4) to six (6). The Westbound NC 24/NC 210 target crashes were totally eliminated during the after period for these LTSR type roadway collisions; from two (2) to zero.

From the additional information chart above, the total intersection red light run crashes was reduced by 10 percent in the after period. The total amount of rear end type crashes was reduced by 65 percent in the after period.

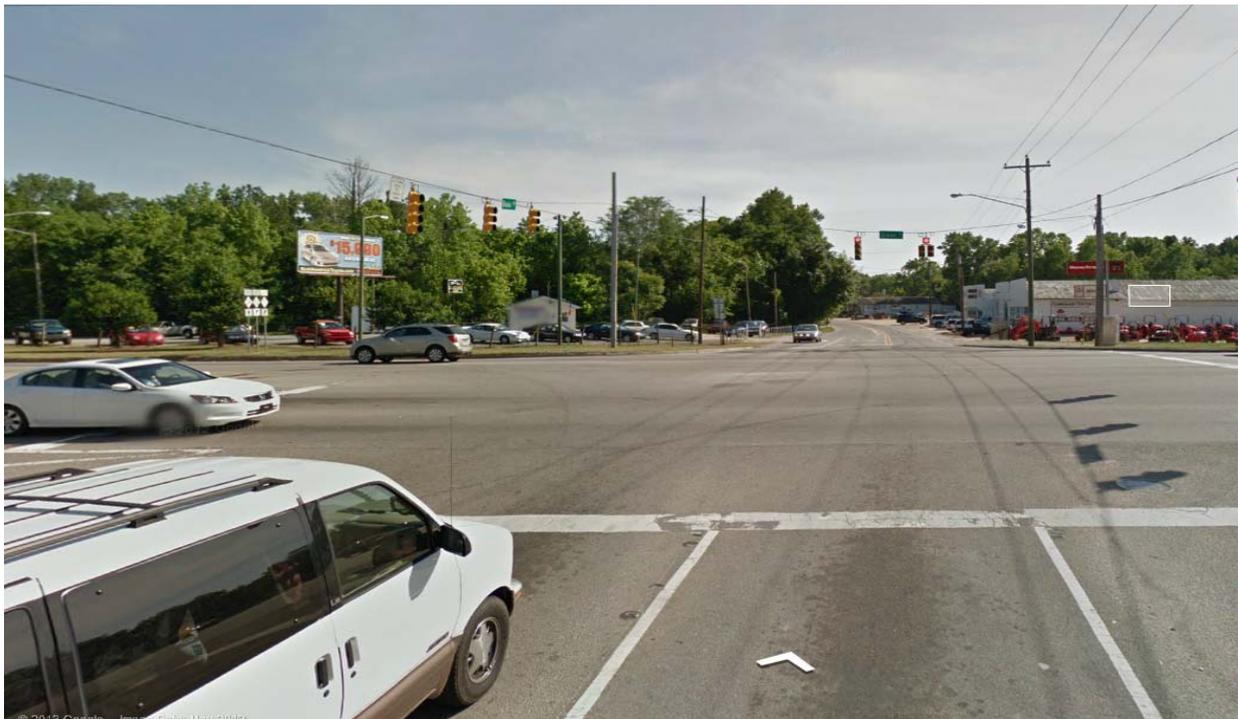
Overall target Left Turn Same Roadway crashes on the NC 24/NC 210 approaches remained the same in the after period.

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 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 from Google Street View



Google Maps (May 2012) – Looking North on NC 24/NC 210 Approach



Google Maps (May 2012) – Looking South on NC 24/NC 210 Approach



Google Maps (May 2012) – Looking East from SR 1838 Approach



Google Maps (May 2012) – Looking West from SR 1838 Approach

SS# 06-07-217
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 Cumberland County
 BEFORE Period
 10/1/03 - 3/31/08

NC 24/NC 210 (Grove St)
 45 MPH
 ADT (Year)
 30,500 (2005)

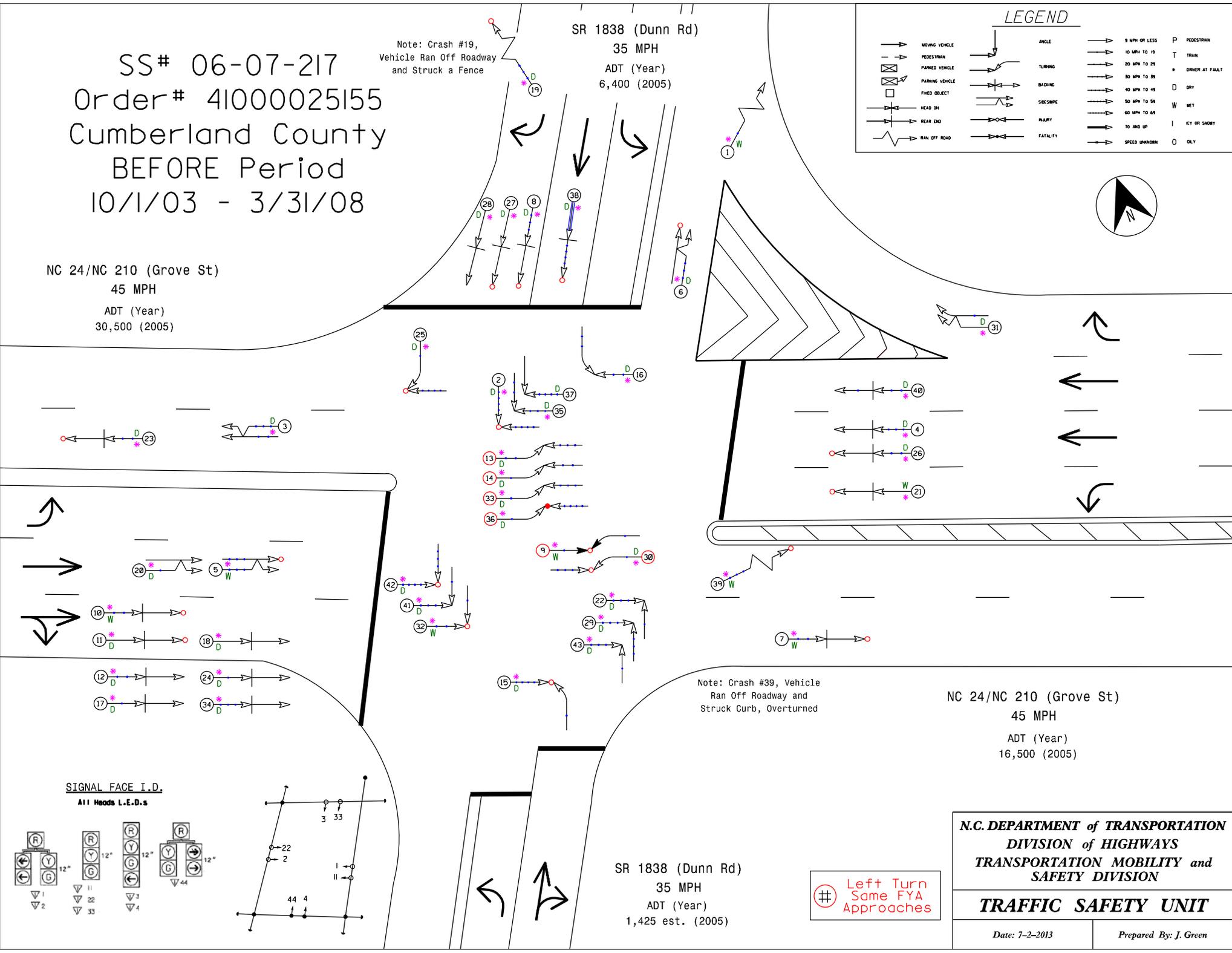
SR 1838 (Dunn Rd)
 35 MPH
 ADT (Year)
 6,400 (2005)

Note: Crash #19,
 Vehicle Ran Off Roadway
 and Struck a Fence

Note: Crash #39, Vehicle
 Ran Off Roadway and
 Struck Curb, Overturned

SR 1838 (Dunn Rd)
 35 MPH
 ADT (Year)
 1,425 est. (2005)

LEGEND							
	MOVING VEHICLE		ANGLE		5 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PAVED VEHICLE		20 MPH TO 29		30 MPH TO 39		DRIVER AT FAULT
	PARKING VEHICLE		40 MPH TO 49		50 MPH TO 59		DRY
	FIXED OBJECT		60 MPH TO 69		TO AND UP		WET
	HEAD ON		SUBSIDY		SPEED UNKNOWN		ICY OR SNOWY
	REAR END		HAZY				ONLY
	RAN OFF ROAD		FATALITY				



Left Turn
 Same FYA
 Approaches

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

TRAFFIC SAFETY UNIT

Date: 7-2-2013

Prepared By: J. Green

SS# 06-07-217
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 AFTER Period
 7/1/08 - 12/31/12

NC 24/NC 210 (Grove St)
 45 MPH
 ADT (Year)
 23,000 (2010)

SR 1838 (Dunn Rd)
 35 MPH
 ADT (Year)
 5,800 (2010)

Note: Crash #6, Vehicle
 Ran Off Roadway and
 Struck a Fence

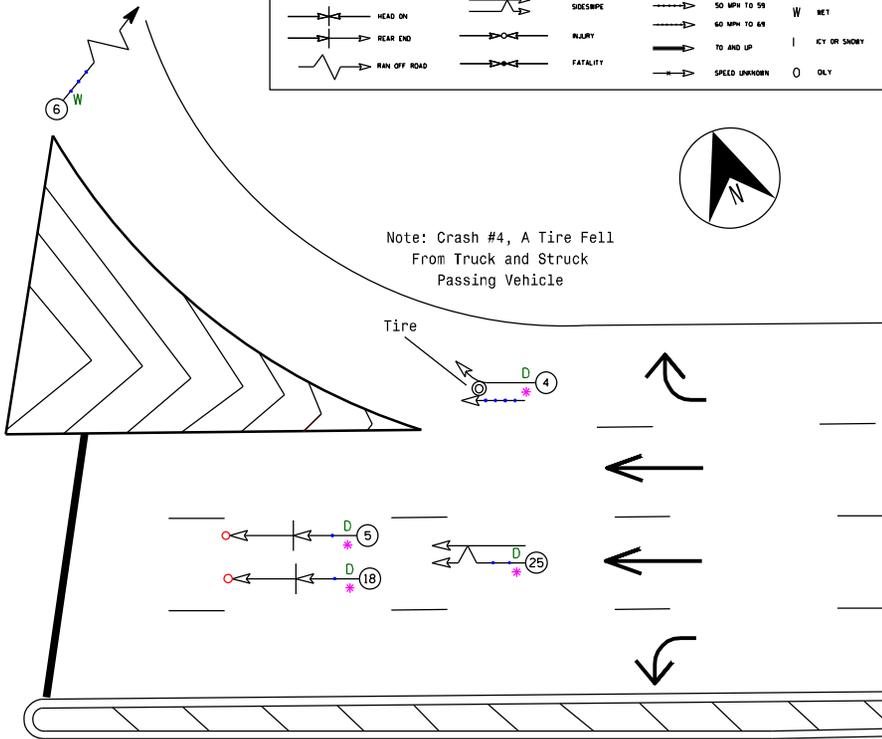
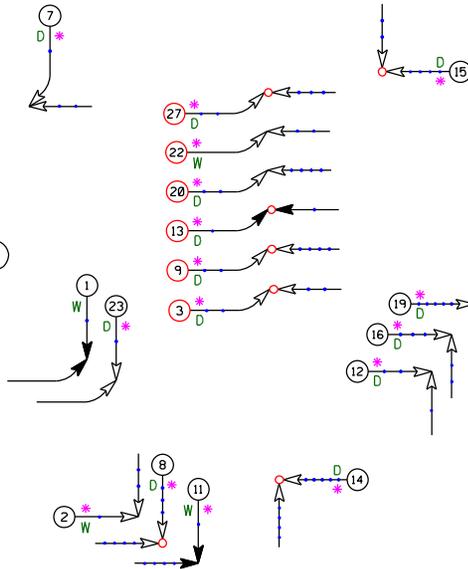
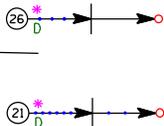
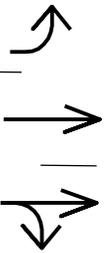
LEGEND

	MOVING VEHICLE		ANGLE		5 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PARKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PARKING VEHICLE		SIDE SWIPE		30 MPH TO 39		DRY
	FIXED OBJECT		REAR END		40 MPH TO 49		WET
	HEAD ON		REAR END		50 MPH TO 59		ICY OR SNOWY
	REAR END		REAR END		60 MPH TO 69		UP AND UP
	RAN OFF ROAD		FATALITY		SPEED UNKNOWN		ONLY



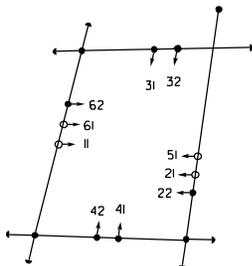
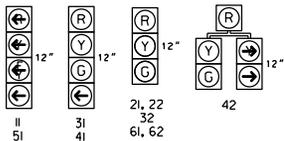
Note: Crash #4, A Tire Fell
 From Truck and Struck
 Passing Vehicle

Tire



SIGNAL FACE I.D.

All Heads L.E.D.s



SR 1838 (Dunn Rd)
 35 MPH
 ADT (Year)
 1,700 (2010)

⊕ Left Turn
 Same FYA
 Approaches

NC 24/NC 210 (Grove St)
 45 MPH
 ADT (Year)
 13,000 (2010)

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

TRAFFIC SAFETY UNIT

Date: 7-2-2013

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