

# Spot Safety Project Evaluation

Work Order #41000012651

Spot Safety Project # 04-06-206

**Spot Safety Project Evaluation of the Traffic Signal Revision to Allow For  
Protected/Permitted Left Turn Phasing on SR 1010 (Cleveland School Rd)  
At its Intersection with SR 1525 (Cornwallis Rd)  
Johnston County**

Documents Prepared By:

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

**Principal Investigator**



Brad Robinson, PE

6/16/2011

Date

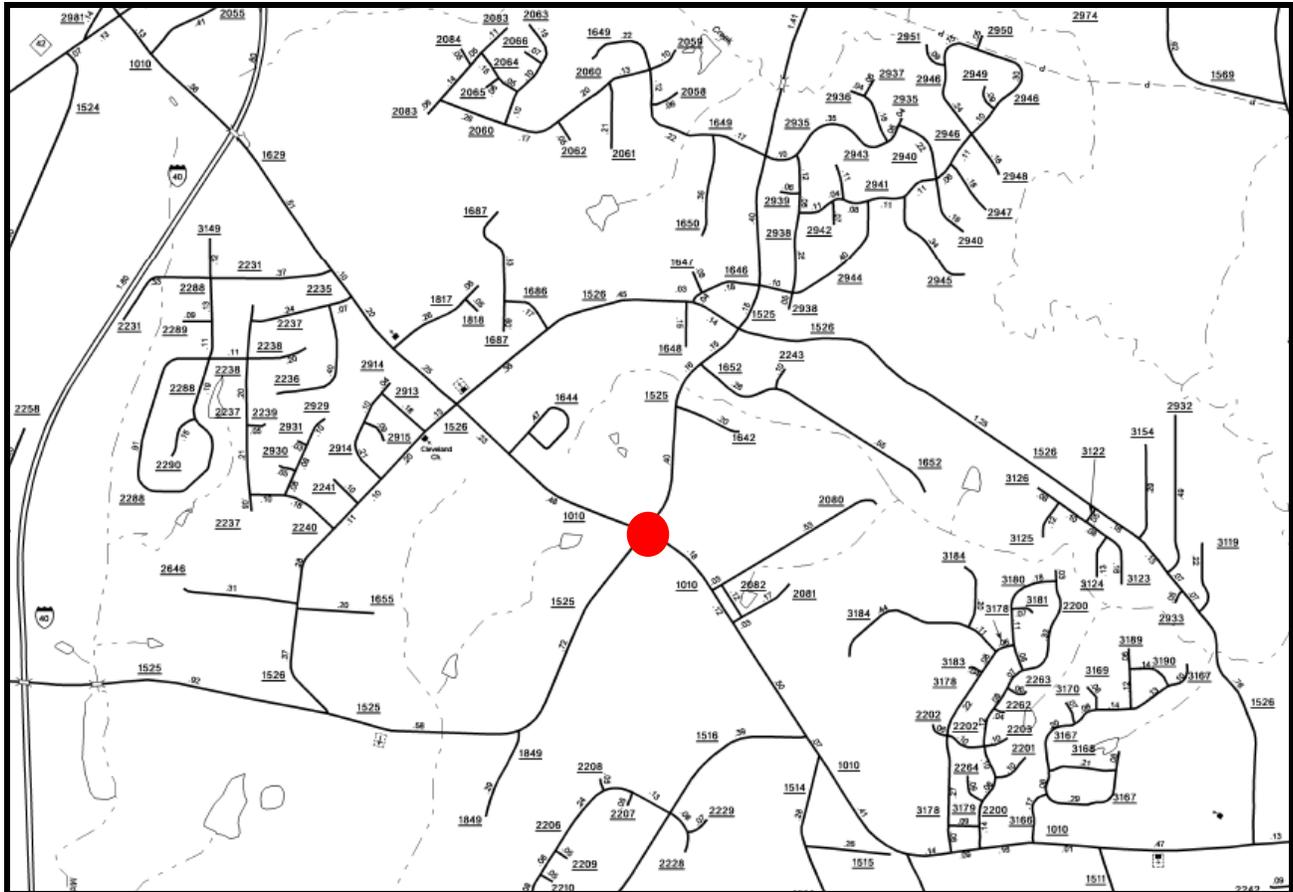
Traffic Safety Project Engineer

# *Spot Safety Project Evaluation Documentation*

## **Subject Location**

Evaluation of Spot Safety Project Number 04-06-206 – The intersection of SR 1010 (Cleveland School Rd) and SR 1525 (Cornwallis Rd) in Johnston County.

The signal number for this location is 04-0709.



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

The spot safety project improvement countermeasure chosen for the subject location was to revise the traffic signal in order to provide protected/permitted left turn phasing for SR 1010.

The subject location is a four-leg intersection which was controlled by a signal in both the before and after periods. All approaches to the intersection have left turn lanes and speed limits of 45 mph. Left turns from SR 1525 were already operating under protected/permitted phasing prior to the project.

The initial crash analysis was conducted from March 1, 2001 to February 28, 2006 with a total of two crashes that were considered correctable by the chosen countermeasure. The final completion date for the improvements at the subject intersection was on July 31, 2007 with a total cost of \$6,000.00.

### 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 was from May 1, 2007 to August 31, 2007. The before period consisted of reported crashes from October 1, 2003 through April 30, 2007 (3 years and 7 months) and the after period consisted of reported crashes from September 1, 2007 through March 31, 2011 (3 years and 7 months). The ending date for this analysis was limited by the available crash data at the time the analysis was conducted.

The treatment data consisted of all reported crashes within 150 feet of the subject intersection. The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that left turn-same roadway crashes involving vehicles on SR 1010 were the Target Crashes for the applied countermeasure. The target crashes are clearly identified in the before and after period collision diagrams.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	8	9	12.5
Total Severity Index	5.62	4.29	-23.7
Target Crashes	0	1	N/A
Target Severity Index	0	1	N/A
Volume	14,300	13,800	-3.5
<u>Target Crash Severity Summary</u>			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	0	0	N/A
Class C Crashes	0	0	N/A
PDO Crashes	0	1	N/A

The naive before and after analysis at the treatment location resulted in a 13 percent increase in Total Crashes and an increase in Target Crashes from 0 to 1. The before period ADT year was 2005 and the after period ADT year was 2009.

### Results and Discussion

The project appears to have been implemented more to alleviate congestion than for safety issues. In the before period there were no left turn same roadway crashes involving vehicles on SR 1010. In the after period the single Target Crash involved a westbound vehicle which failed to yield to an eastbound vehicle while making a left turn during the permitted phase.

The calculated benefit to cost ratio for this project is 3.05 considering total crashes. The benefit to cost ratio considering only target crashes is -1.15. 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*. 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.

**BENEFIT-COST ANALYSIS WORKSHEET**

LOCATION: SR 1010 at SR 1525  
 COUNTY: Johnston  
 FILE NO.: SS 04-06-206

BY: bdr  
 DATE: 5/26/2011

DETAILED COST: TYPE IMPROVEMENT - Signal Revision - Protected/Permitted

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$6,000	10	0.149	\$894
Right-of-Way	\$0	0	0.000	\$0
<b>TOTALS</b>	<b>\$6,000</b>	<b>10</b>	<b>0.149</b>	<b>\$894</b>

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$0  
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$150  
 TOTAL ANNUAL COST= \$1,044  
 TOTAL COST OF PROJECT= \$6,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES				PDO		ANNUAL COSTS
		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	CRASHES	CRASHES PER YR	
BEFORE	3.58	0	0.00	5	1.40	3	0.84	\$31,536
AFTER	3.58	0	0.00	4	1.12	5	1.40	\$28,352

Annual Benefits from Crash Cost Savings \$3,184

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$2,140

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 3.05

TOTAL COST OF PROJECT - \$6,000 COMPREHENSIVE B/C RATIO - 3.05

**BENEFIT-COST ANALYSIS WORKSHEET**

LOCATION: SR 1010 at SR 1525  
 COUNTY: Johnston  
 FILE NO.: SS 04-06-206 Target Crashes Only

BY: bdr  
 DATE: 5/26/2011

DETAILED COST: TYPE IMPROVEMENT - Signal Revision - Protected/Permitted

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$6,000	10	0.149	\$894
Right-of-Way	\$0	0	0.000	\$0
<b>TOTALS</b>	<b>\$6,000</b>	<b>10</b>	<b>0.149</b>	<b>\$894</b>

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$0  
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$150  
 TOTAL ANNUAL COST= \$1,044  
 TOTAL COST OF PROJECT= \$6,000

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	3.58	0	0.00	0	0.00	0	0.00	\$0
AFTER	3.58	0	0.00	0	0.00	1	0.28	\$1,201

Annual Benefits from Crash Cost Savings (\$1,201)

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$2,245)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = -1.15

TOTAL COST OF PROJECT - \$6,000 COMPREHENSIVE B/C RATIO - -1.15

**Treatment Site Photos Taken May 25, 2011**



**Looking Westbound on SR 1010 (Cleveland School Rd)**



**Looking Eastbound on SR 1010 (Cleveland School Rd)**



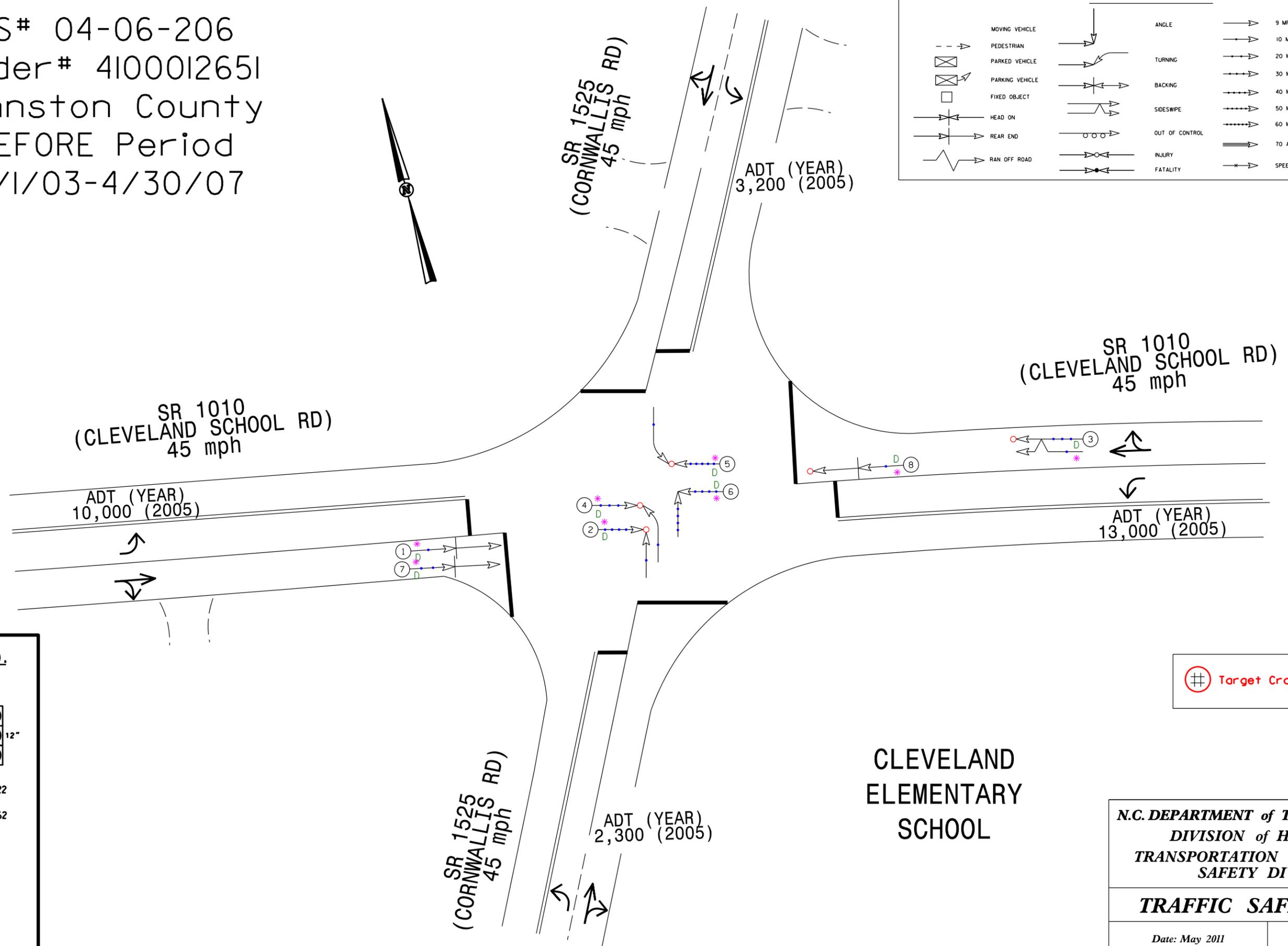
**Looking Northbound on SR 1525 (Cornwallis Rd)**



**Looking Southbound on SR 1525 (Cornwallis Rd)**

SS# 04-06-206  
 Order# 4100012651  
 Johnston County  
 BEFORE Period  
 10/1/03-4/30/07

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



**SIGNAL FACE I.D.**  
 Denotes L.E.D.

Target Crashes

CLEVELAND  
 ELEMENTARY  
 SCHOOL

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

**TRAFFIC SAFETY UNIT**

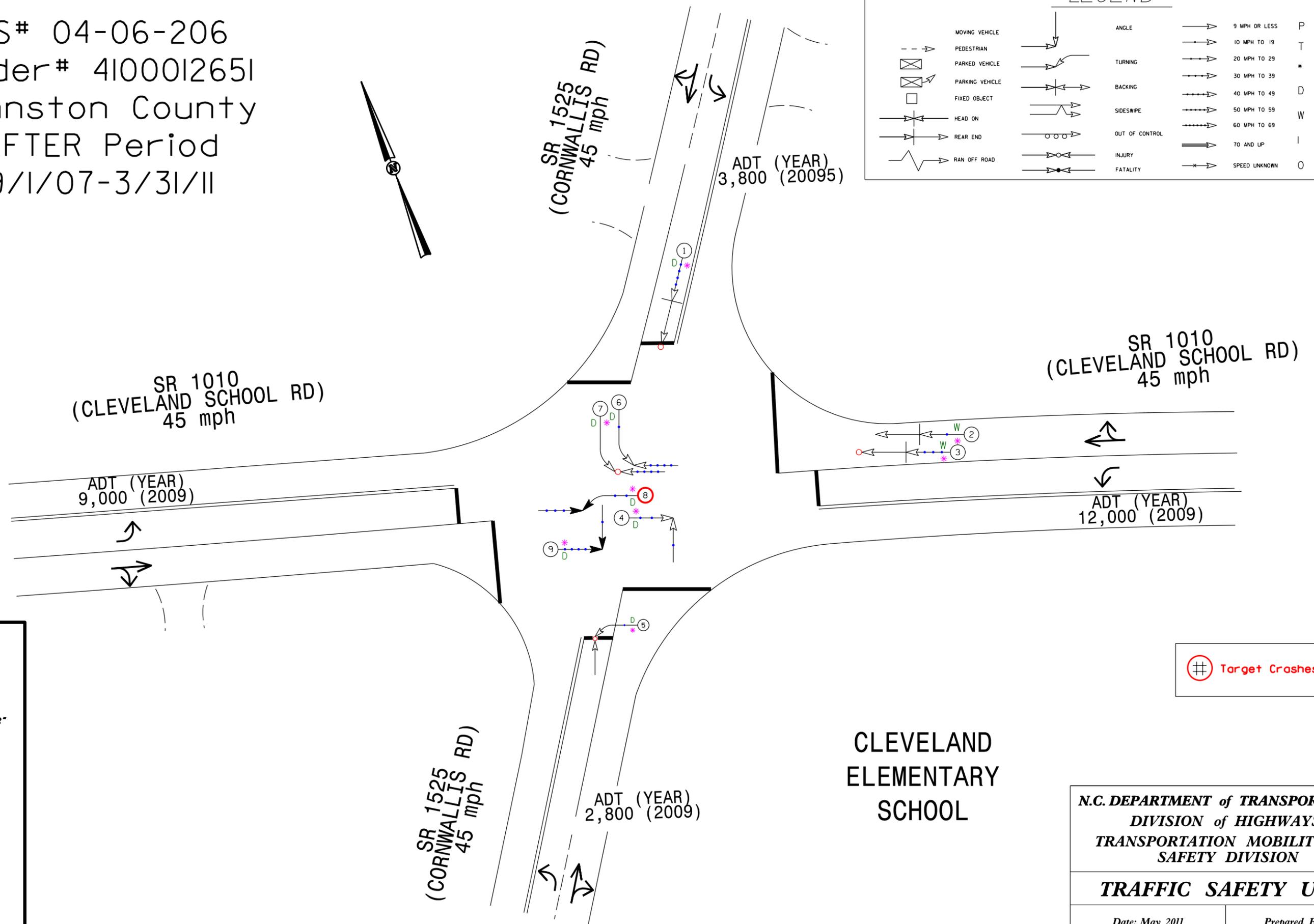
Date: May 2011 Prepared By: bdr

SS# 04-06-206  
 Order# 4100012651  
 Johnston County  
 AFTER Period  
 9/1/07-3/31/11



**LEGEND**

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PARKED 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		INJURY		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		ICY OR SNOWY
	RAN OFF ROAD		SPEED UNKNOWN		70 AND UP		OILY



**SIGNAL FACE I.D.**

Denotes L.E.D.


12"

62 81 82

61 21 22

42 41

Target Crashes

CLEVELAND  
 ELEMENTARY  
 SCHOOL

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

**TRAFFIC SAFETY UNIT**

Date: May 2011  
 Prepared By: bdr