

# Spot Safety Project Evaluation

Work Order #s 41000006241 & 41000006236

Spot Safety Project #s 05-00-210 & 05-00-211

**Spot Safety Project Evaluation of the Traffic Signal and Turn Lane Installation at the Intersection of SR 1010 and NC 50, the Closing of the Intersection of SR 2731 and NC 50, and The Construction of a Three-Lane Section on SR 1010 Between SR 2731 and NC 50.  
Wake 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

6/03/2010

Date

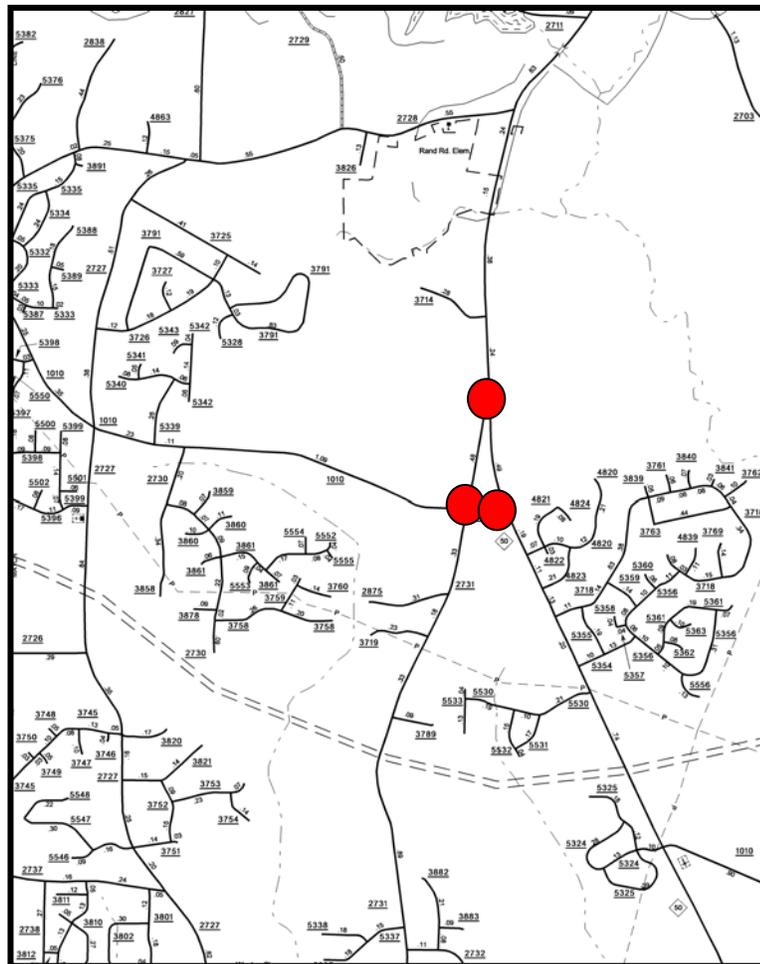
Traffic Safety Project Engineer

# *Spot Safety Project Evaluation Documentation*

## **Subject Location**

Evaluation of Spot Safety Project Numbers 05-00-210 and 05-00-211 – The intersection of NC 50 and SR 1010 (Ten-Ten), the intersection of NC 50 and SR 2731 (Jordan Rd), and the intersection of SR 1010 and SR 2731 in Wake County.

The signal number for this location is 05-1182.



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

This report combines the evaluations of two spot safety projects that were constructed approximately one year apart and involved some of the same roadways.

Spot Safety project #05-00-210 involved closing the intersection of SR 2731 (Jordan Rd) and NC 50 and the construction of a three-lane section on SR 1010 from SR 2731 to NC 50. Spot Safety

Project #05-00-211 involved a signal installation at the intersection of NC 50 and SR 1010 and the construction of a right turn lane on southbound NC 50.

Prior to the projects all of the subject roadways had single lane approaches with the exception of northbound NC 50, which had a left turn lane at its intersection with SR 1010. SR 2731 (Jordan Rd) intersected NC 50 at a sharp angle prior to the intersection closing. NC 50 has a speed limit of 55 mph. SR 1010 and SR 2731 have speed limits of 45 mph.

The final completion date for SS #05-00-210 was on October 19, 2004 with a total cost of \$150,000.00. The final completion date for SS #05-00-211 was on November 17, 2005 with a total cost of \$105,000.00.

### Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject locations, the crash data omitted from this analysis to consider for an adequate construction period was from September 1, 2004 to December 31, 2005. The entire period between the two projects was considered to be part of the construction period. The before period consisted of reported crashes from June 1, 2000 through August 31, 2004 (4 years and 3 months) and the after period consisted of reported crashes from January 1, 2006 through March 31, 2010 (4 years and 3 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 intersections, in addition to any on the strip of SR 1010 between NC 50 and SR 2731. The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Frontal Impact crash types that occurred at the intersections of NC 50 and SR 1010 or NC 50 and SR 2731 were the Target Crashes for the applied countermeasure. These crash types are considered as follows: Left Turn, same roadway; Left Turn, different roadway; Right Turn, same roadway; Right Turn, different roadway; Head On and Angle. The target crashes are clearly identified in the before and after period collision diagrams.

<b><u>Treatment Information</u></b>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total Crashes	43	43	0.0
Total Severity Index	3.93	5.69	44.8
Target Crashes	5	13	160.0
Target Severity Index	5.44	4.42	-18.8
Volume	12,800	17,400	35.9
<b><u>Target Crash Severity Summary</u></b>			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	3	4	33.3
Class C Crashes	0	2	N/A
PDO Crashes	2	7	250.0

The naive before and after analysis at the treatment location resulted in no change in Total Crashes, a 160 percent increase in Target Crashes, and a 36 percent decrease in Average Daily Traffic (ADT). The before period ADT year was 2001 and the after period ADT year was 2008.

The following three tables show the crash data by intersection. The only crashes that occurred on the strip of SR 1010 between NC 50 and SR 2731 were Left Turn-Different Roadway Crashes related to vehicles turning out of the PVA and one Animal Crash.

<b>NC 50 at SR 1010 Intersection</b>			
	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total Crashes	19	34	78.9
Total Severity Index	3.34	6.06	81.4
Target Crashes	3	13	333.3
Target Severity Index	5.93	4.42	-25.5

The intersection of NC 50 at SR 1010 experienced a 79 percent increase in Total Crashes and a 333 percent increase in Target Crashes from the before to the after period.

<b>NC 50 at SR 2731 Intersection</b>			
	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total Crashes	7	0	-100.0
Total Severity Index	2.06	0	-100.0
Target Crashes	2	0	-100.0
Target Severity Index	4.7	0	-100.0

The intersection of NC 50 and SR 2731 experienced a 100 percent decrease in Total Crashes and Target Crashes. This intersection no longer existed in the after period.

<b>SR 1010 at SR 2731 Intersection</b>			
	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total Crashes	16	6	-62.5
Total Severity Index	5.62	4.7	-16.4

The intersection of SR 1010 and SR 2731 experienced a 63 percent decrease in Total Crashes. There were no Target Crashes identified for this intersection.

## **Results and Discussion**

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a no change in Total Crashes and a 160 percent increase in Target Crashes. The summary results above demonstrate that although Total Crashes appeared to have remained constant from the before to the after period, Target Crashes have actually increased from the before to the after period.

The majority of Frontal Impact Crashes in the after period (10 of 13) were Left Turn-Same Roadway Crashes involving northbound NC 50 turning left onto SR 1010. In all but one of these crashes the reporting officer faulted the left turning vehicle for failing to yield to the southbound vehicle. The signal has protected/permitted left turn phasing for this movement.

Frontal Impact Crashes decreased at the intersection of SR 1010 and SR 2731, although these were not Target Crashes. In the before period there was a total of 13 frontal Impact Crashes in this intersection. In the after period there were only six. This decrease might be related to the closing of the intersection between SR 2731 and NC 50 to the north, possibly leading to less vehicles entering and exiting the northern leg of the intersection.

Please see the attached *Treatment Site Photos*. Photos were obtained from Google Street-view. 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 roadway.

**Treatment Site Photos from Google Street-View**



**Looking north on NC 50 at its intersection with SR 1010**



**Looking south on NC 50 at its intersection with SR 1010**



**Looking east on SR 1010 at its intersection with NC 50**



**Looking west on SR 1010**



**Looking west on SR 1010 at its intersection with SR 2731 (Jordan Rd)**



**Looking east on SR 1010 at its intersection with SR 2731 (Jordan Rd)**



**Looking north on SR 2731 (Jordan Rd) at its intersection with 1010**



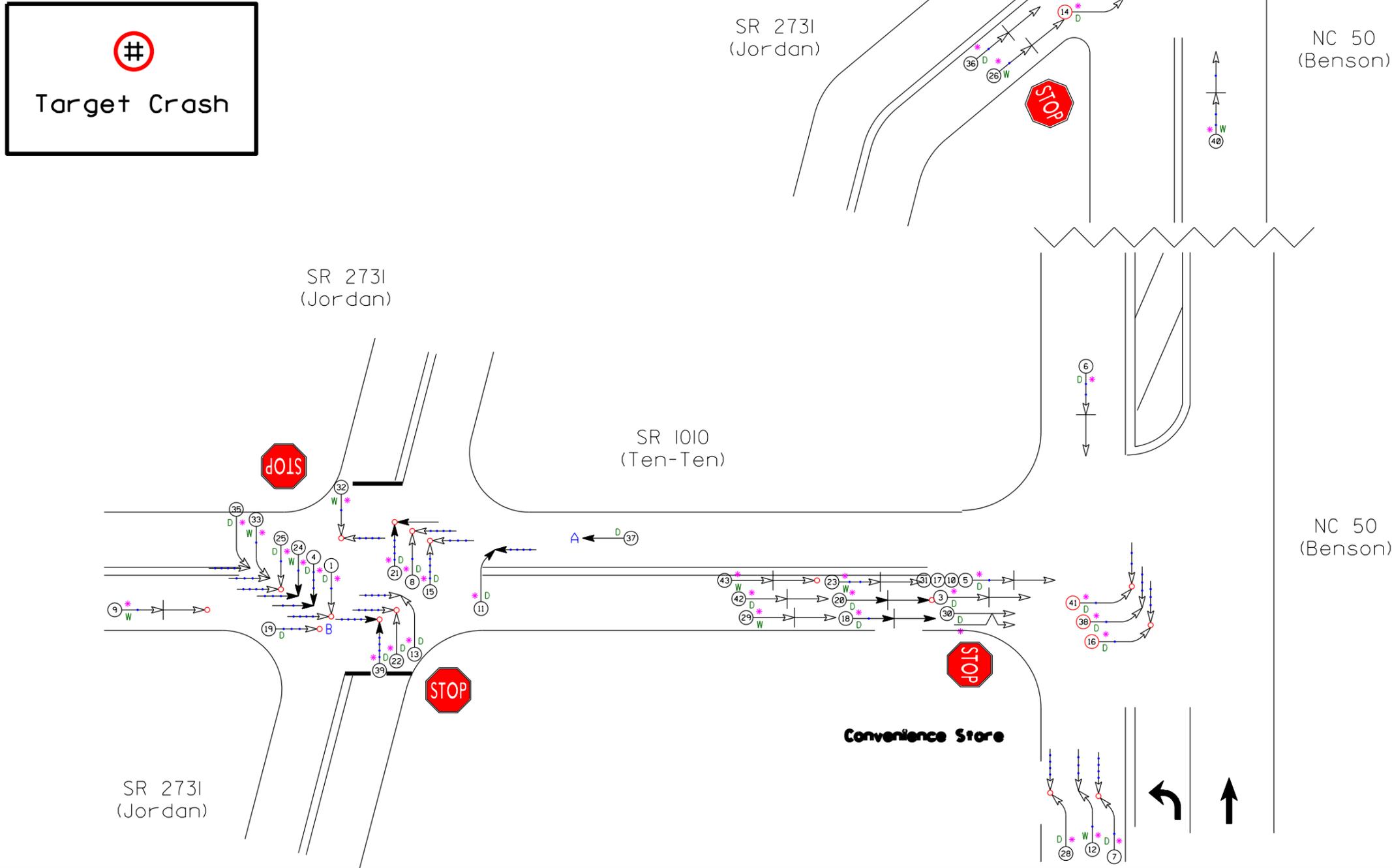
**Looking north on SR 2731 (Jordan Rd) at location where the road now ends**

Wake County  
 NC 50 at SR 1010 and  
 SR 2731 (Jordan Rd)  
 BEFORE PERIOD  
 6/1/2000-8/31/2004

#  
 Target Crash

**LEGEND**

	MOVING VEHICLE		ANGLE		9 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		60 MPH TO 69		ICY OR SNOWY
	REAR END		FATALITY		70 AND UP		ONLY
	SPEED UNKNOWN						



**TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT**

	<b>COLLISION DIAGRAM</b>	
	DIVISION: 5	AREA:
	STUDY PERIOD: 4/1/99-7/31/04	
	DISTANCE: Y-LINE = 150FT	
	ANALYSIS PREPARED BY: BDR	
ANALYSIS CHECKED BY:		
DIAGRAM PREPARED BY: BDR		
DIAGRAM REVIEWED BY:		
SCALE: NOT TO SCALE		
DATE: Apr 9 2010		
LOG NUMBER: 41000005649		

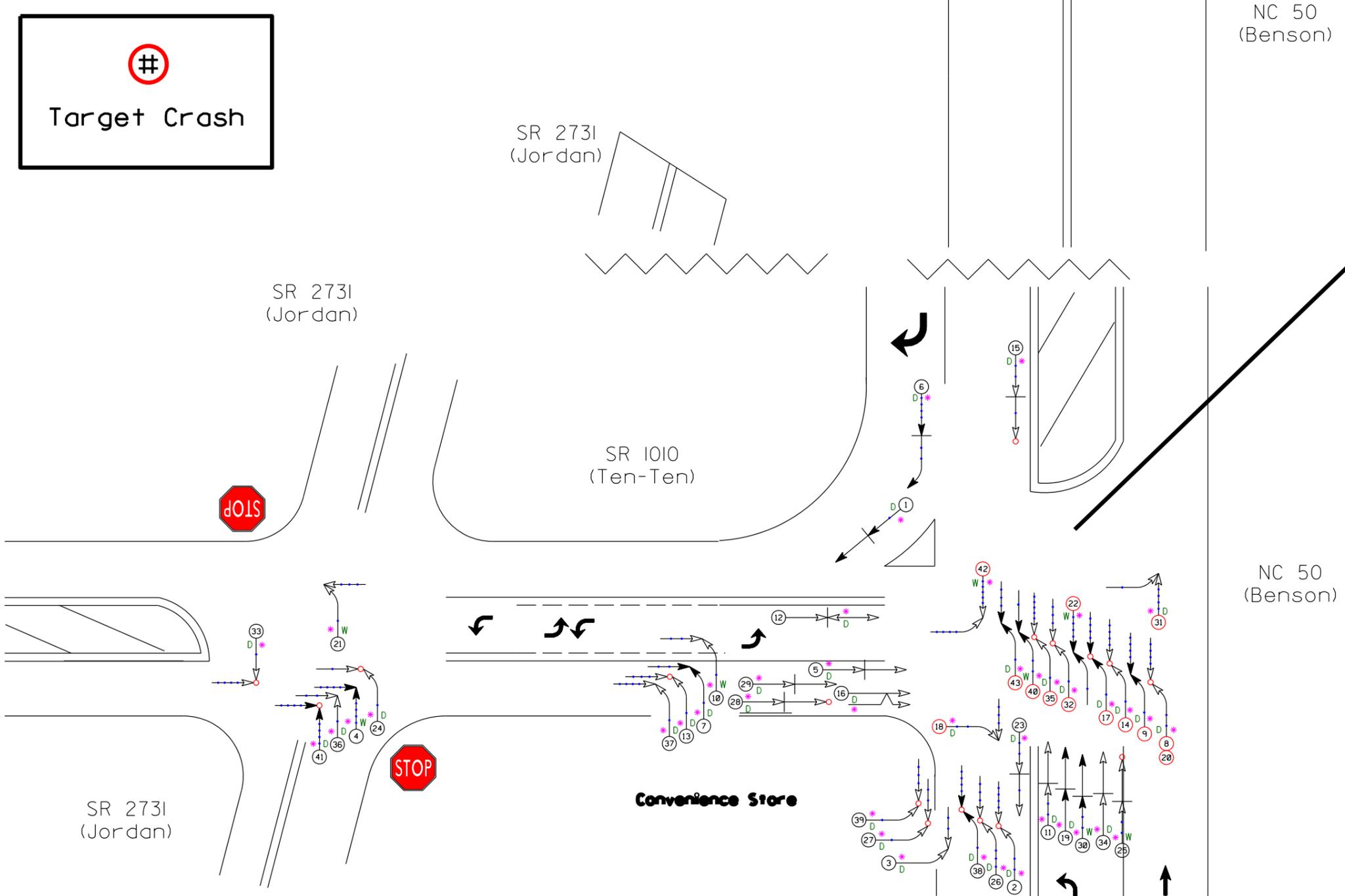
**N.C. DEPARTMENT of TRANSPORTATION**  
**DIVISION of HIGHWAYS**  
**TRANSPORTATION MOBILITY AND SAFETY DIVISION**

Wake County  
 NC 50 at SR 1010 and  
 SR 2731 (Jordan Rd)  
 AFTER PERIOD  
 1/1/2006-3/31/2010

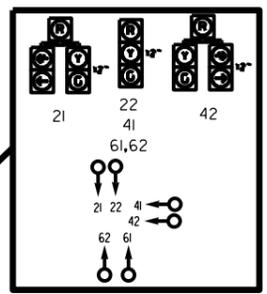
#  
 Target Crash

**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		70 AND UP
	RAN OFF ROAD		SPEED UNKNOWN		PEDESTRIAN		ONLY



NC 50  
 (Benson)



NC 50  
 (Benson)

**TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT**

	COLLISION DIAGRAM	
	DIVISION: 5	AREA:
	STUDY PERIOD: 11/04-2/28/10	
	DISTANCE: Y-LINE = 150FT	
	ANALYSIS PREPARED BY: BDR	
	ANALYSIS CHECKED BY:	
	DIAGRAM PREPARED BY: BDR	
	DIAGRAM REVIEWED BY:	
SCALE: NOT TO SCALE		
DATE: April 2010		
LOG NUMBER: 4100005649		

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