Spot Safety Project Evaluation

Order # 41000015653

Spot Safety Project # 12-06-207

Spot Safety Project Evaluation of the Construction of Left Turn Lanes on SR 1610 (Millersville Rd) at its Intersection with US 64 (Kernersville Rd) Alexander 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

Brad Robinson, PE

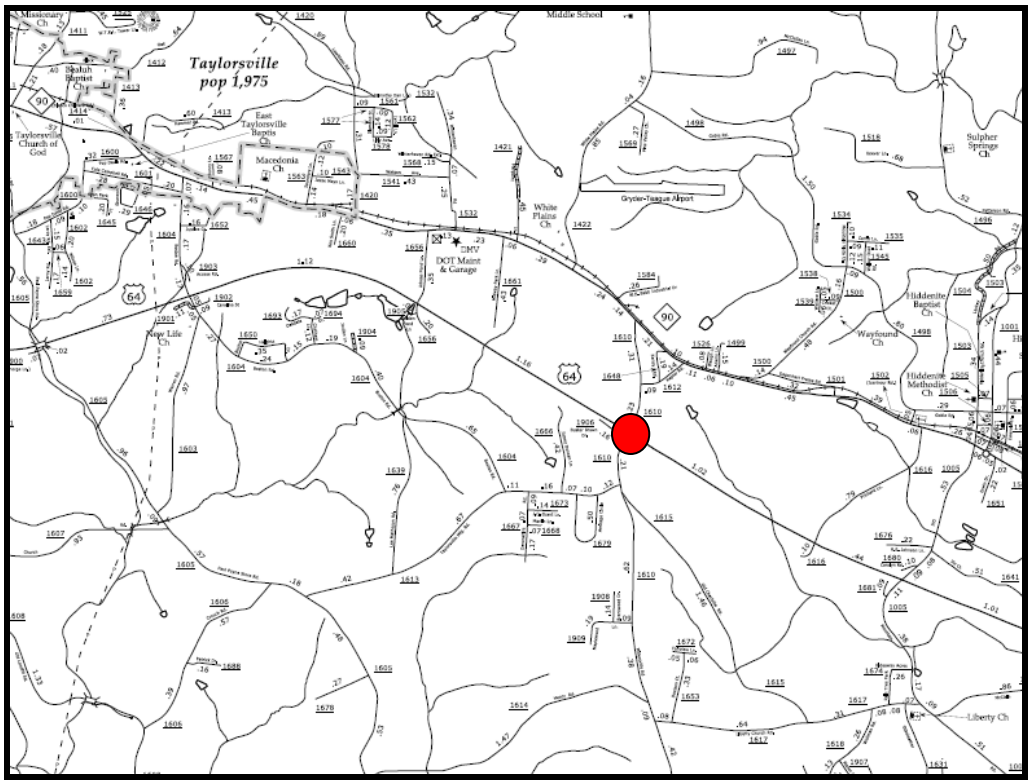
11/16/2011
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 12-06-207 – US 64 (Kernersville Rd) at SR 1610 (Millersville Rd) in Alexander County.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was to construct left turn lanes on SR 1610 (Millersville Rd).

The subject location is a four-leg, signal controlled intersection. Prior to the project SR 1610 had single lane approaches. US 64 has both an exclusive left and an exclusive right turn lane on each approach. The speed limits are 45 mph for SR 1610 and 55 mph for US 64.

The original statement of problem was that left turning vehicles on the side streets (SR 1610) were having difficulty making left turns due to offset lanes and visibility.

The final completion date for the improvements at the subject intersection was on December 5, 2007 with a total cost of $65,000.00.

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 October 1, 2007 to December 31, 2007. The before period consisted of reported crashes from February 1, 2004 through September 30, 2007 (3 years and 8 months) and the after period consisted of reported crashes from January 1, 2008 through August 31, 2011 (3 years and 8 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 both rear-end crashes on SR 1610 (Millersville Rd) and left turn-same roadway crashes involving vehicles on SR 1610 were the target crashes for the applied countermeasure.

Treatment Information			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Total Crashes	22	10	-54.5
Total Severity Index	8.15	3.22	-60.5
Target Crashes	9	3	-66.7
Target Crash Severity Index	5.11	1	-80.4
Volume	11,600	10,500	-9.5
Target Crash Severity Summary			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	2	0	-100.0
Class C Crashes	3	0	-100.0
PDO Crashes	4	3	-25.0

The naive before and after analysis at the treatment location resulted in a 55 percent decrease in total crashes, a 67 percent decrease in target crashes, and a 10 percent decrease in average daily traffic (ADT). The before period ADT year was 2005 and the after period ADT year was 2009.

Results and Discussion

The construction of left turns lanes on SR 1610 appears to have been effective in reducing target crashes at the intersection. In the before period there were a total of 9 target crashes, including seven left turn-same roadway crashes involving northbound vehicles turning left, one left turn-same roadway crash involving a southbound vehicle running left, and one rear-end crash on the southbound approach. In the after period there were only three target crashes, including two left turn-same roadway crashes involving northbound vehicles turning left and one rear-end crash on the northbound approach.

There was a non-target fatal crash in the before period. A westbound US 64 vehicle failed to stop for a red signal and collided with a truck heading south on SR 1610.

The calculated benefit to cost ratio for this project is 21.75 considering total crashes. The benefit to cost ratio considering only target crashes is 2.83. 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 - TOTAL

LOCATION: US 64 at SR 1610
COUNTY: Alexander
FILE NO.: SS 12-06-207

BY: bdr
DATE: 10/13/2011

DETAILED COST: TYPE IMPROVEMENT - left turn lanes

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$0	0	0.000	$0
	$65,000	10	0.149	$9,687
Right-of-Way	$0	0	0.000	$0
TOTALS	$65,000	10	0.149	$9,687

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $400
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $0

TOTAL ANNUAL COST= $10,087
TOTAL COST OF PROJECT= $65,000

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	3.66	1	0.27	11	3.01	10	2.73	$243,989
AFTER	3.66	0	0.00	3	0.82	7	1.91	$24,617

Annual Benefits from Crash Cost Savings $219,372

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = $209,285

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 21.75

TOTAL COST OF PROJECT - $65,000 COMPREHENSIVE B/C RATIO - 21.75

BENEFIT-COST ANALYSIS WORKSHEET - TARGET

LOCATION: US 64 at SR 1610
COUNTY: Alexander
FILE NO.: SS 12-06-207

BY: bdr
DATE: 10/13/2011

DETAILED COST: TYPE IMPROVEMENT - left turn lanes

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$0	0	0.000	$0
	$65,000	10	0.149	$9,687
Right-of-Way	$0	0	0.000	$0
TOTALS	$65,000	10	0.149	$9,687

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $400
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $0

TOTAL ANNUAL COST= $10,087
TOTAL COST OF PROJECT= $65,000

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	3.66	0	0.00	5	1.37	4	1.09	$32,022
AFTER	3.66	0	0.00	0	0.00	3	0.82	$3,525

Annual Benefits from Crash Cost Savings $28,497

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = $18,410

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 2.83

TOTAL COST OF PROJECT - $65,000 COMPREHENSIVE B/C RATIO - 2.83

Treatment Site Photos Taken October 31, 2011

Traveling northeast on SR 1610 (Millersville)

Traveling southwest on SR 1610 (Millersville)

Traveling northwest on US 64

Traveling southeast on US 64

SS# 12-06-207
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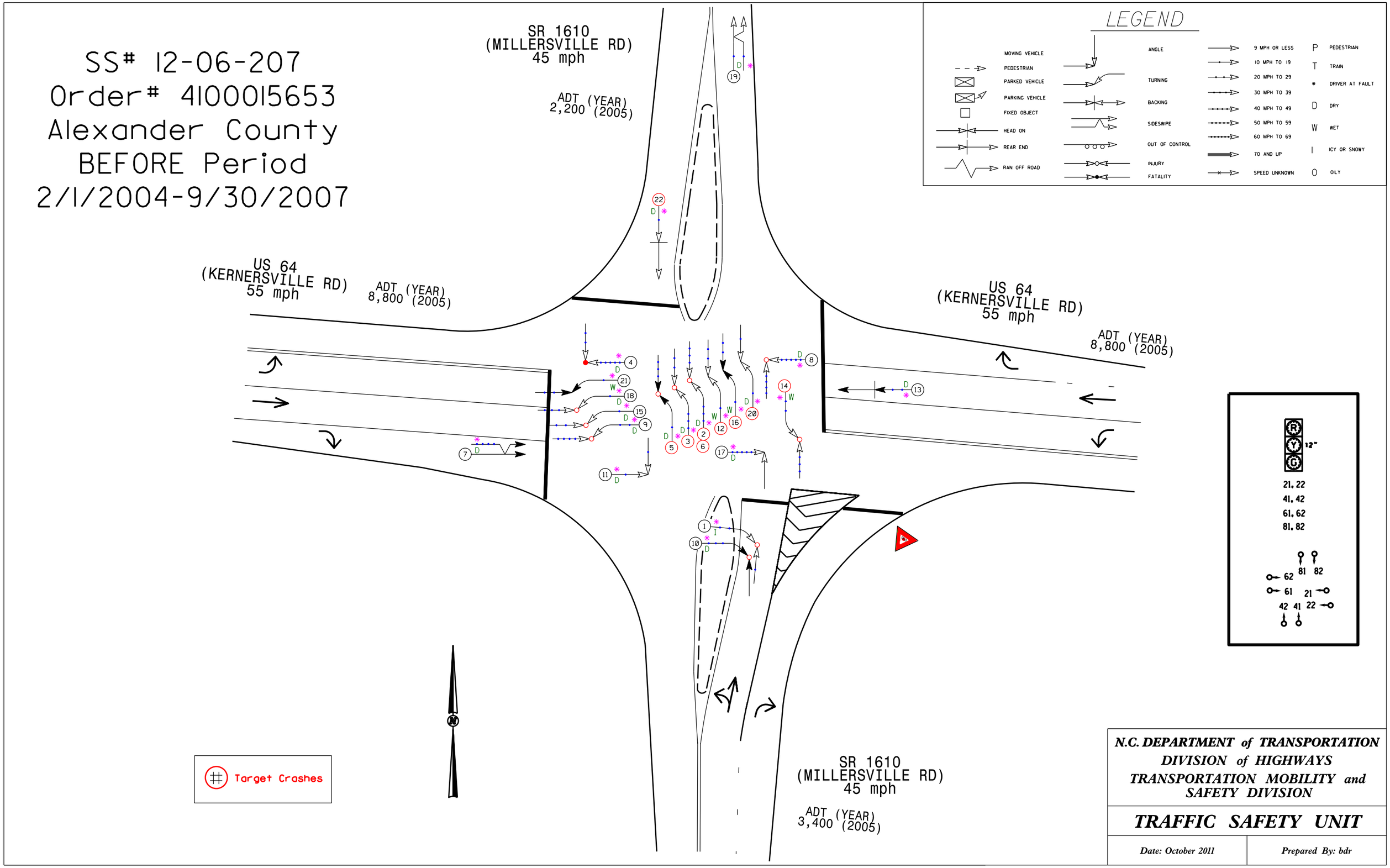
Alexander County
BEFORE Period
2/1/2004-9/30/2007



LEGEND

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

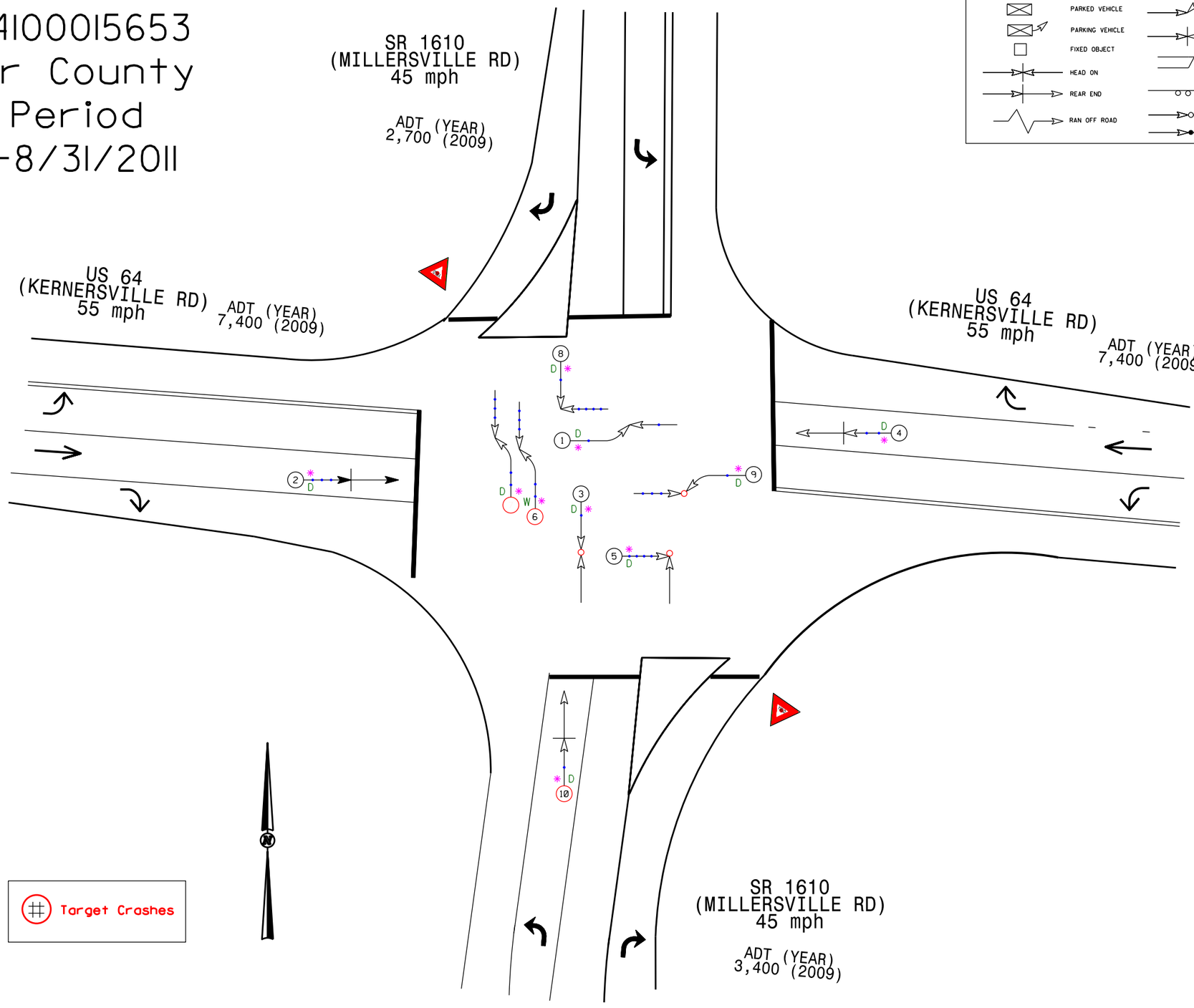
R Y G 12"

21, 22
41, 42
61, 62
81, 82

81 82
62
61 21
42 41 22

N.C. DEPARTMENT of TRANSPORTATION DIVISION of HIGHWAYS TRANSPORTATION MOBILITY and SAFETY DIVISION	
TRAFFIC SAFETY UNIT	
Date: October 2011	Prepared By: bdr

SS# 12-06-207
Order# 4100015653
Alexander County
AFTER Period
1/1/2008-8/31/2011



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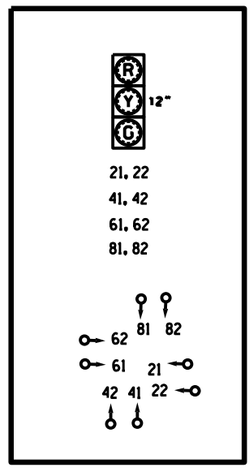

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