

Spot Safety Project Evaluation

Work Order #41000017802

Spot Safety Project # 09-05-208

**Spot Safety Project Evaluation of the Traffic Signal Installation at the Intersection of SR 1147
(Old Salisbury Rd) and SR 1232 (Odell Owen Rd)/ US 52 Southbound On/Off Ramp
Davidson 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

3/2/2012

Date

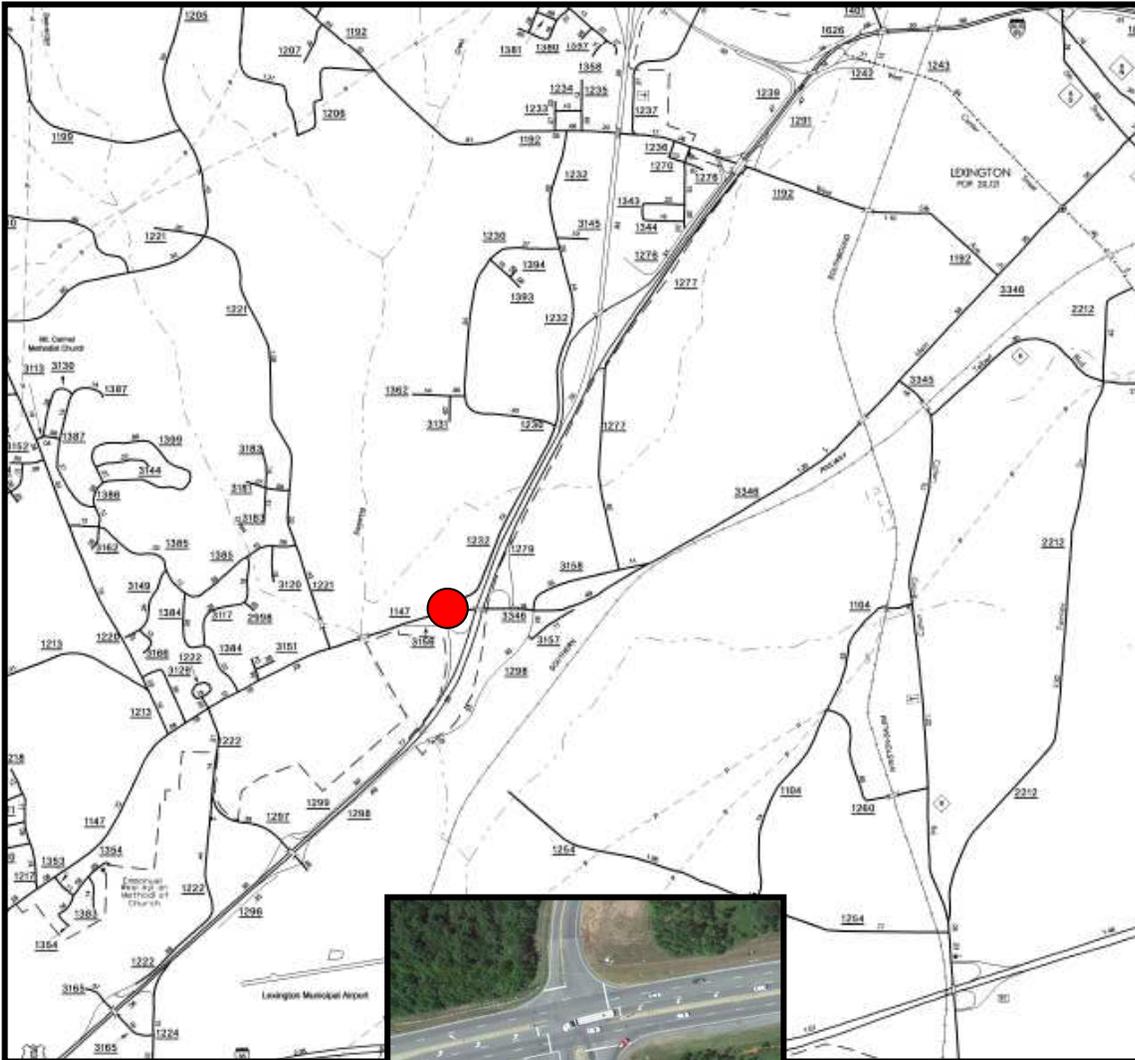
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 09-05-208 – The intersection of SR 1147 (Old Salisbury Rd) and SR 1232 (Odell Owen Rd)/ I-85Bus/ US 29-52-70 ramps in Davidson County.

The signal number for this location is 09-1315.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was to install a traffic signal.

SR 1147 (Old Salisbury Rd) is a four lane divided roadway with left turn lanes on both approaches to the intersection. The speed limit is 45 mph. SR 1232 (Odell Owen Rd) is a two lane roadway with a 35 mph speed limit. The off ramp has one thru-left lane and one right turn lane.

The original statement of problem was that there was a high volume of traffic from the ramp attempting to enter or cross SR 1147, resulting in a high number of angle and left turn different roadway crashes.

The final completion date for the improvements at the subject intersection was on June 17, 2007 with a total cost of \$38,500.00.

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 July 31, 2007. The before period consisted of reported crashes from December 1, 2002 through April 30, 2007 (4 years and 5 months) and the after period consisted of reported crashes from August 1, 2007 through December 31, 2011 (4 years and 5 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 Frontal Impact Crashes 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, different roadway; Head On and Angle. The target crashes are clearly identified in the before and after period collision diagrams.

Treatment Information			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	31	16	-48.4
Total Severity Index	7.5	9.9	32.0
Target Crashes	20	12	-40.0
Target Severity Index	9.6	11.63	21.1
Volume	13,500	14,000	3.7
Target Crash Severity Summary			
Fatal Crashes	0	0	N/A
Class A Crashes	1	1	0.0
Class B Crashes	3	4	33.3
Class C Crashes	10	3	-70.0
PDO Crashes	6	4	-33.3

The naive before and after analysis at the treatment location resulted in a 48 percent decrease in total crashes, a 40 percent decrease in target crashes, and a 4 percent increase in average daily traffic (ADT). The before period ADT year was 2004 and the after period ADT year was 2008.

Results and Discussion

The signal installation appears to have decreased target crashes at the subject intersection. In the before period there was a large crash pattern between vehicles entering the intersection from the ramp and vehicles traveling east on SR 1147. This pattern had a 70 percent decrease from the before to the after period (from 10 to 3).

There was a pattern of target crashes that experienced an increase from the before to the after period. In the before period there were three left turn-same roadway crashes involving westbound vehicles on SR 1147 turning left onto the ramps. In the after period there were six crashes of this type, an increase of 100 percent.

The calculated benefit to cost ratio for this project is 4.99 considering total crashes. The benefit to cost ratio considering only target crashes is 3.38. 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: SR 1147 at SR 1232/US 52 ramps		BY: bdr						
COUNTY: Davidson		DATE: 3/2/2012						
FILE NO.: SS 09-05-208								
DETAILED COST:	TYPE IMPROVEMENT -	Signal						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$0	0	0.000	\$0			
		\$38,500	10	0.149	\$5,738			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$38,500	10	0.149	\$5,738			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,000			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900			
	TOTAL ANNUAL COST=				\$8,638			
	TOTAL COST OF PROJECT=				\$38,500			
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	4.41	1	0.23	17	3.85	13	2.95	\$232,630
AFTER	4.41	1	0.23	9	2.04	6	1.36	\$189,524
							Annual Benefits from Crash Cost Savings	\$43,107
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$34,469		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	4.99		
TOTAL COST OF PROJECT		-	\$38,500	COMPREHENSIVE B/C RATIO		-	4.99	

BENEFIT-COST ANALYSIS WORKSHEET - TARGET

LOCATION: SR 1147 at SR 1232/US 52 ramps		BY: bdr						
COUNTY: Davidson		DATE: 3/2/2012						
FILE NO.: SS 09-05-208								
DETAILED COST:	TYPE IMPROVEMENT -	Signal						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$0	0	0.000	\$0			
		\$38,500	10	0.149	\$5,738			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$38,500	10	0.149	\$5,738			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,000			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900			
	TOTAL ANNUAL COST=				\$8,638			
	TOTAL COST OF PROJECT=				\$38,500			
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	4.41	1	0.23	13	2.95	6	1.36	\$207,664
AFTER	4.41	1	0.23	7	1.59	4	0.91	\$178,503
							Annual Benefits from Crash Cost Savings	\$29,161
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$20,523		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	3.38		
TOTAL COST OF PROJECT		-	\$38,500	COMPREHENSIVE B/C RATIO		-	3.38	

Treatment Site Photos from Google Street-View



Looking east on SR 1147 (Old Salisbury Rd)



Looking west on SR 1147 (Old Salisbury Rd)



Looking south on SR 1232 (Odell Owen Rd)

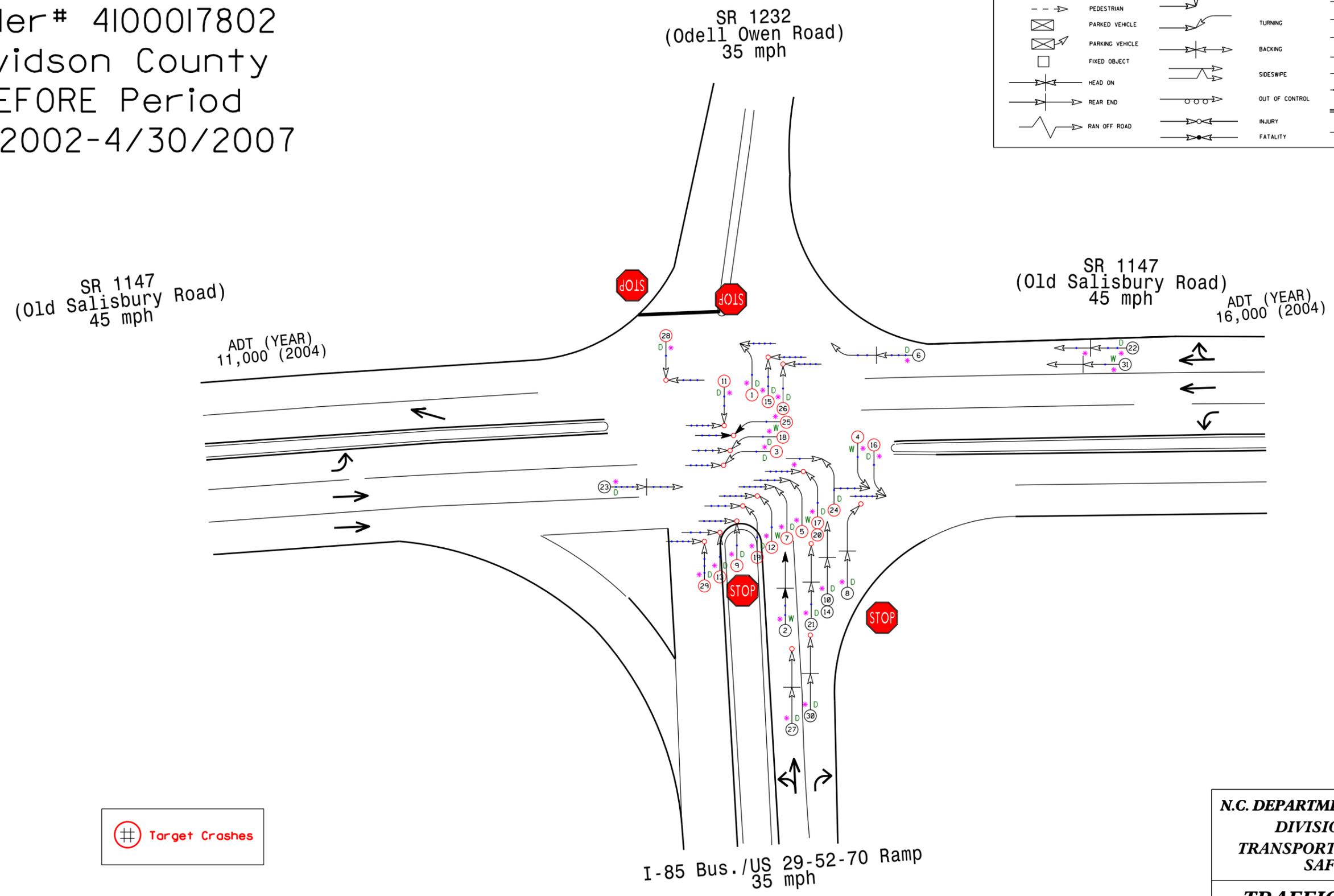


Looking north from I-85 Bus/US 29-52-70 Ramp

SS# 09-05-208
 Order# 4100017802
 Davidson County
 BEFORE Period
 12/1/2002-4/30/2007

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		SPEED UNKNOWN
	RAN OFF ROAD				70 AND UP		ONLY



Target Crashes

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

TRAFFIC SAFETY UNIT

Date: February 2012 Prepared By: bdr

SS# 09-05-208
 Order# 4100017802
 Davidson County
 AFTER Period
 8/1/2007-12/31/2011

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
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	REAR END		FATALITY		60 MPH TO 69		70 AND UP
	RAN OFF ROAD		SPEED UNKNOWN		70 AND UP		ONLY

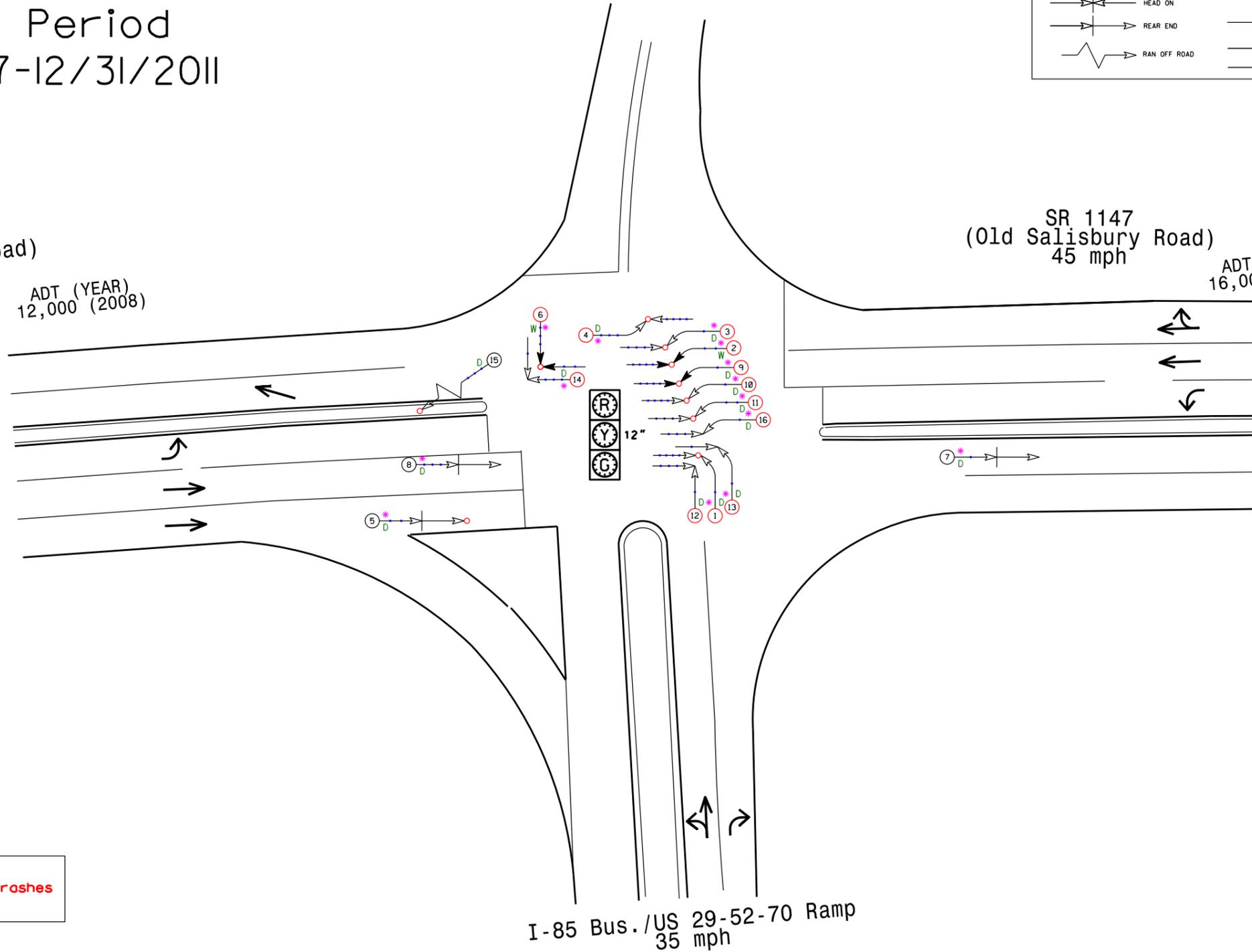
SR 1147
 (Old Salisbury Road)
 45 mph

ADT (YEAR)
 12,000 (2008)

SR 1232
 (Ode11 Owen Road)
 35 mph

SR 1147
 (Old Salisbury Road)
 45 mph

ADT (YEAR)
 16,000 (2008)



Target Crashes

I-85 Bus./US 29-52-70 Ramp
 35 mph

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

TRAFFIC SAFETY UNIT

Date: February 2012

Prepared By: bdr