

# Spot Safety Project Evaluation

Work Order #41000016661

Spot Safety Project # 14-05-204

**Spot Safety Project Evaluation of the Removal of Concrete Islands and the Construction of  
Right Turn Lanes on SR 1153 (Sloan Rd)/SR 1175 (Marshburn-White Rd) at  
Its Intersection with US 64  
Macon 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

1/6/2012

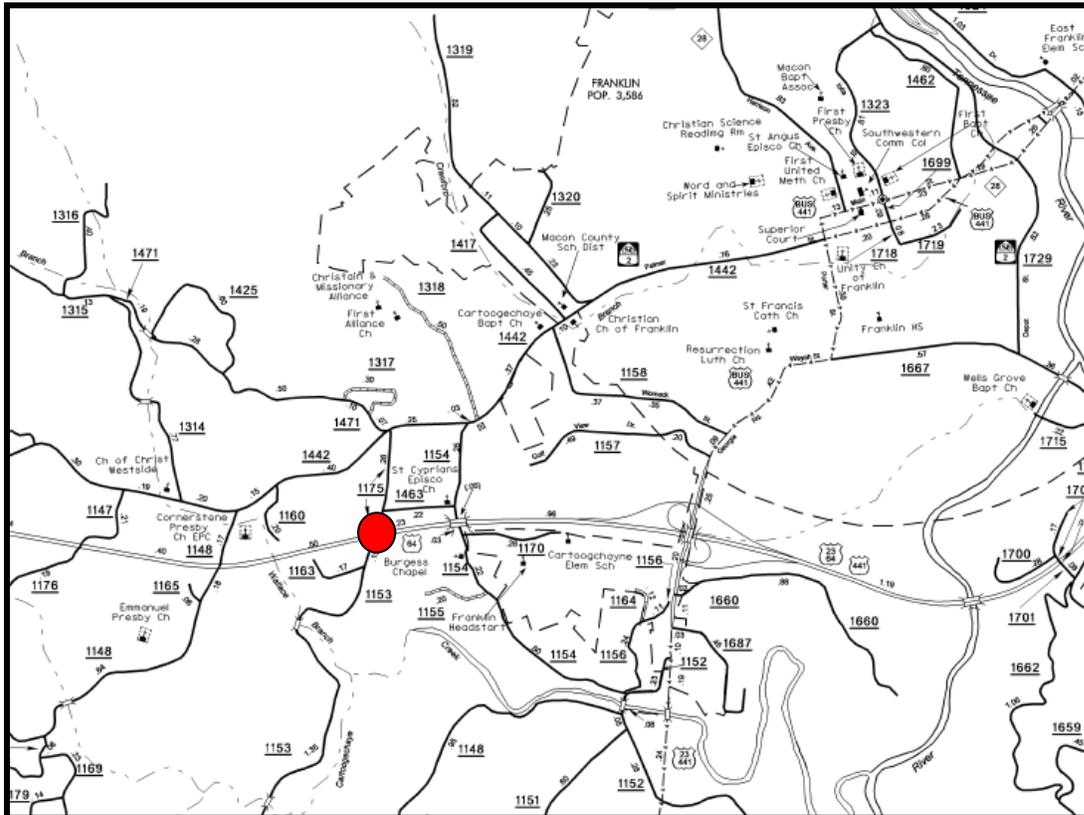
Date

Traffic Safety Project Engineer

# Spot Safety Project Evaluation Documentation

## Subject Location

Evaluation of Spot Safety Project Number 14-05-204 – US 64 at SR 1153/1175 (Sloan/Mashburn-White) in Macon County. Sig ID 14-1070.



## Project Information and Background from the Project File Folder

The spot safety project improvement countermeasures chosen for the subject location were to remove the concrete islands, construct right turn lanes on the side streets (SR 1153/1175), and to modify the traffic signal.

The subject location is a four leg intersection controlled by a signal. US 64 has a grass median and both right and left turn lanes on each approach. SR 1153/1175 were two-lane roads with concrete center islands prior to the project. The speed limits are 55 mph for US 64 and 35 mph for the side streets.

The original statement of problem was that vehicles waiting to turn right from the side streets were impeding through traffic at the intersection. The final completion date for the improvements at the subject intersection was on September 21, 2007 with a total cost of \$65,000.

## 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 August 1, 2007 to October 31, 2007. The before period consisted of reported crashes from August 1, 2003 through July 31, 2007 (4 years) and the after period consisted of reported crashes from November 1, 2007 through October 31, 2011 (4 year). 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 Rear-End Crashes involving vehicles approaching the intersection from the side streets are the Target Crashes for the applied countermeasure.

<b>Treatment Information</b>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total Crashes	13	8	-38.5
Total Severity Index	8.54	3.77	-55.9
Target Crashes	3	2	-33.3
Target Severity Index	1	8.4	740.0
Volume	14,100	15,600	10.6
<b>Target Crash Severity Summary</b>			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	0	0	N/A
Class C Crashes	0	2	N/A
PDO Crashes	3	0	-100.0

The naive before and after analysis at the treatment location resulted in a 39 percent decrease in Total Crashes, a 33 percent decrease in Target Crashes, and an 11 percent increase in Average Daily Traffic (ADT). The before period ADT year was 2005 and the after period ADT year was 2009.

## Results and Discussion

Target crashes decreased by only one crash (from 3 to 2) from the before to the after period. As explained in the *Project Background* section, the countermeasure was constructed for operation benefits and not due to safety issues. The naive before and after analysis does not measure any potential operational benefits gained by the countermeasures.

There was a large increase in the Target Crash Severity (740%), although upon closer inspection of the crash reports it appears that this increase has little to do with the right turn lane and more to do with random chance and the small number of Target Crashes in both periods. Both of the after period target crashes involved vehicles attempting to make right turns.

The calculated benefit to cost ratio for this project is 24.44 considering total crashes. The benefit to cost ratio considering only target crashes is -1.02. 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 1153		BY: bdr						
COUNTY: Macon		DATE: 1/9/2012						
FILE NO.: SS 14-05-204								
DETAILED COST:	TYPE IMPROVEMENT - Remove concrete islands and install right turn lanes							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$0	0	0.000	\$0			
		\$65,000	20	0.102	\$6,620			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$65,000	20	0.102	\$6,620			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$0			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$6,620			
	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	4.00	1	0.25	3	0.75	9	2.25	\$182,175
AFTER	4.00	0	0.00	3	0.75	5	1.25	\$20,375
							Annual Benefits from Crash Cost Savings	\$161,800
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST						=	\$155,180	
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST						=	24.44	
TOTAL COST OF PROJECT		-	\$65,000	COMPREHENSIVE B/C RATIO		-	24.44	

**BENEFIT-COST ANALYSIS WORKSHEET - TARGET**

LOCATION: US 64 at SR 1153		BY: bdr						
COUNTY: Macon		DATE: 1/9/2012						
FILE NO.: SS 14-05-204								
DETAILED COST:	TYPE IMPROVEMENT - Remove concrete islands and install right turn lanes							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$0	0	0.000	\$0			
		\$65,000	20	0.102	\$6,620			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$65,000	20	0.102	\$6,620			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$0			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$6,620			
	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	4.00	0	0.00	0	0.00	3	0.75	\$3,225
AFTER	4.00	0	0.00	2	0.50	0	0.00	\$10,000
							Annual Benefits from Crash Cost Savings	(\$6,775)
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST						=	(\$13,395)	
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST						=	-1.02	
TOTAL COST OF PROJECT		-	\$65,000	COMPREHENSIVE B/C RATIO		-	-1.02	

**Treatment Site Photos Taken December 13, 2011**



**Traveling south on SR 1175 (Sloan)**



**Traveling north on SR 1153 (Mashburn White Rd)**



Traveling west on US 64



Traveling west on US 64



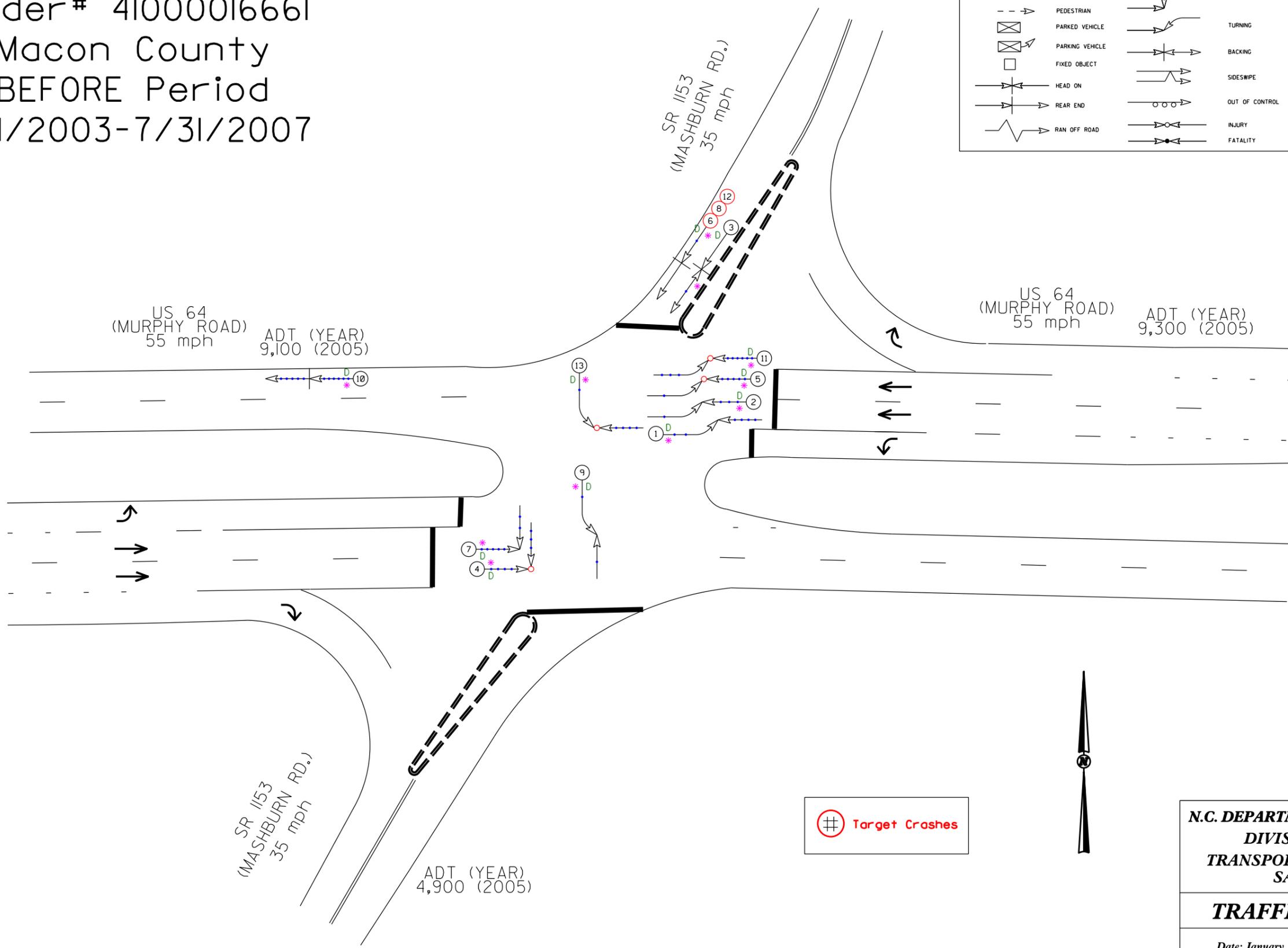
Traveling east on US 64

SS# 14-05-204  
 Order# 41000016661  
 Macon County  
 BEFORE Period  
 8/1/2003-7/31/2007

ADT (YEAR)  
 4,900 (2005)

### 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		D DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		W WET
	HEAD ON		INJURY		50 MPH TO 59		I ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		X SPEED UNKNOWN
	RAN OFF ROAD				70 AND UP		O ONLY



### SIGNAL FACE I.D.

Denotes L.E.D.

			12"				12"
21, 22	41, 42, 43	61, 62	81, 82, 83	11	51		

Target Crashes

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

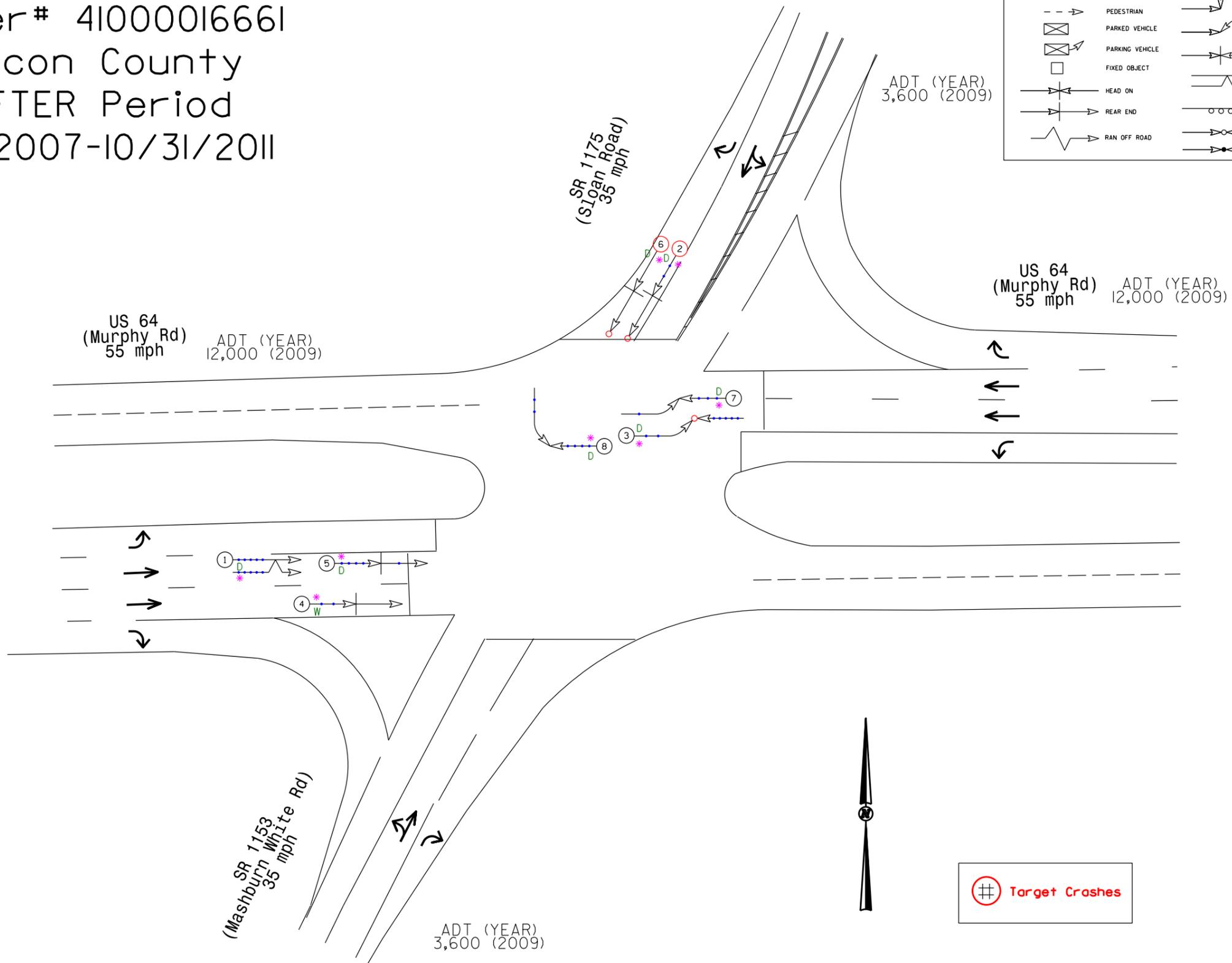
**TRAFFIC SAFETY UNIT**

Date: January 2012 Prepared By: bdr

SS# 14-05-204  
 Order# 41000016661  
 Macon County  
 AFTER Period  
 11/1/2007-10/31/2011

### 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		D DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		W WET
	HEAD ON		INJURY		50 MPH TO 59		I ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		70 AND UP
	RAN OFF ROAD		SPEED UNKNOWN		O OILY		



### SIGNAL FACE I.D.

⊙ Denotes L.E.D.

12"	12"	12"
21, 22 41, 43 61, 62 81, 83	11 51	42 82



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

**TRAFFIC SAFETY UNIT**

Date: January 2012 Prepared By: bdr