

Spot Safety Project Evaluation

Order # 41000006307

Spot Safety Project # 10-04-200

**Spot Safety Project Evaluation of the Traffic Signal Installation
SR 2004 (Mt. Holly-Huntersville Rd) at SR 2117 (Hambright Rd)
Mecklenburg County**

Documents Prepared By:

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

Principal Investigator



Jason B. Schronce

6-18-2010

Date

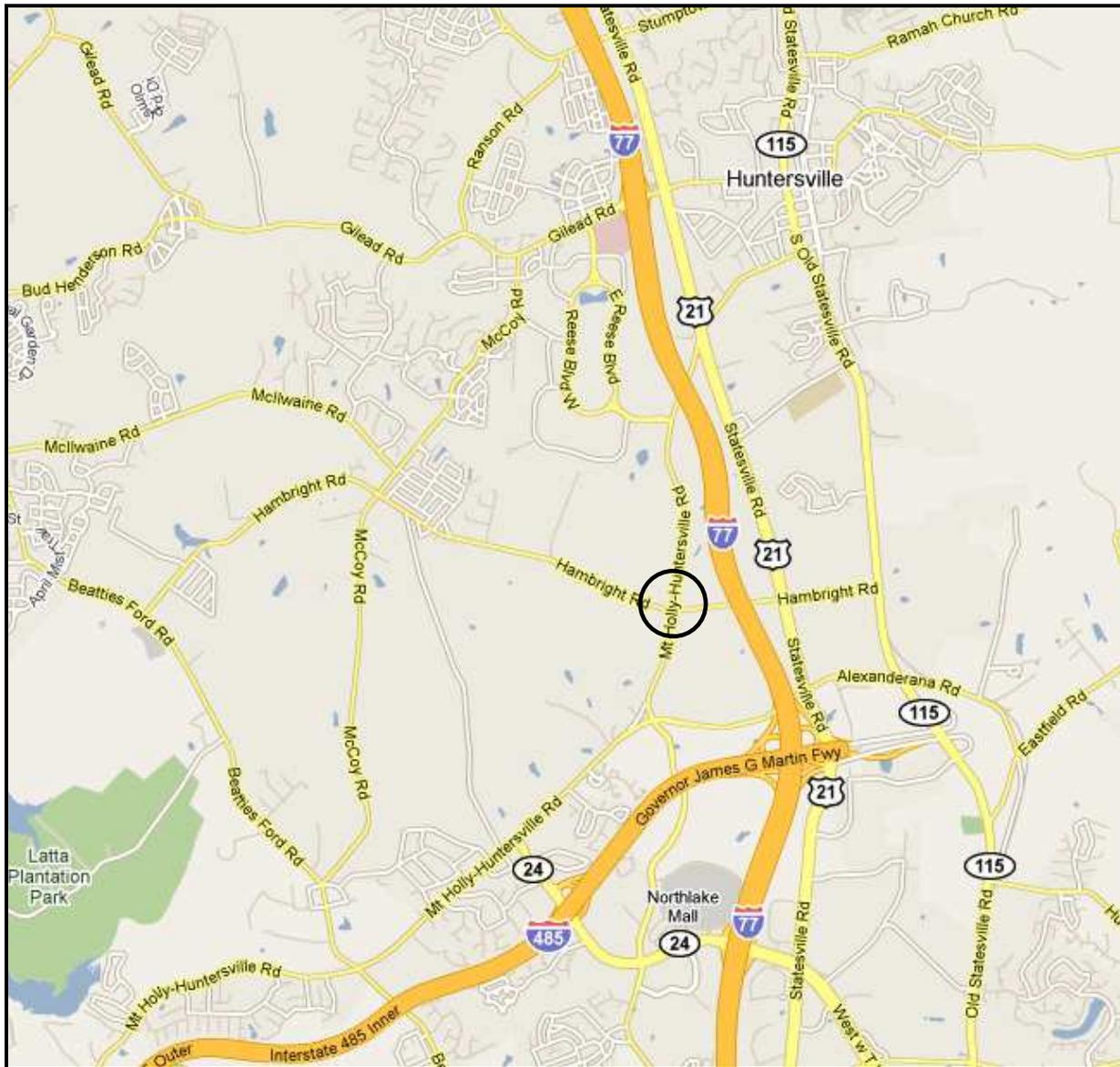
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 10-04-200 located at the Intersection of SR 2004 (Mt. Holly-Huntersville Road) and SR 2117 (Hambright Road) in Mecklenburg County, near the City of Huntersville.

The Sig ID is 10-1898 for this newly installed traffic signal.





Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of an intersection 2-phase traffic signal. SR 2004 (Mt. Holly-Huntersville Road) and SR 2117 (Hambright Road) are both two-lane facilities at the subject intersection with speed limits of 45 mph on all approaches. The subject location is a four-leg crossroads intersection, which was controlled by dual posted stop signs on SR 2117 during the before period. Also, raised concrete barrier is present on both Hambright Road approaches; as well as in the southeast quadrant for separating the intersection from the gas station parking lot.

The original statement of problem was the occurrence of angle collisions due to vehicles improperly crossing SR 2004. Traffic volumes have increased at this location to the point that motorists can not maneuver the intersection safely. The intended purpose of the traffic signal is to assign travel right-of-way and alleviate collisions.

The initial crash analysis was completed from September 30, 2000 to September 30, 2003 with fifteen (15) reported crashes, thirteen (13) of which were deemed correctable angle collisions. The final completion date for the improvement at the subject intersection was on May 23, 2005 with a total cost of \$55,000.

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 were the months of December 2004 through May 2005. The before period consisted of reported crashes from June 1, 2001 through November 30, 2004 (3 years and 6 months); and the after period consisted of reported crashes from June 1, 2005 through November 30, 2008 (3 years and 6 months). The ending date for this analysis was limited by crash reporting issues with the City of Charlotte.

The treatment data consisted of all crashes within 150 feet of the subject intersection. *Please see attached location map, aerial map, and photos for further details.*

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. The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	25	17	-32.0 %
Total Severity Index	6.03	5.79	- 4.0 %
Target Crashes – Frontal Impact	24	9	- 62.5 %
Target Crash Severity Index	6.24	5.93	- 5.0 %
Volume (2003, 2007)	10,300	14,300	38.8 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	0	N/A
Class B injury Crashes	2	6	200.0 %
Class C Injury Crashes	15	5	- 66.7 %
Total Injury Crashes	17	11	- 35.3 %

The naive before and after analysis at the treatment location resulted in a 32 percent decrease in Total Crashes, a 62.5 percent decrease in Target Crashes, and a 4 percent decrease in the Total Severity Index. The before period ADT year was 2003 and the after period ADT year was 2007.

Results and Discussion

Referencing the *Collision Diagrams*, the before period showed a significant pattern of nineteen (19) angle collisions from eastbound SR 2117 vehicles colliding with northbound SR 2004 motorists. These collisions mainly occurred after the eastbound driver obeyed the intersection stop condition. In total, twenty-four (24) of the twenty-five (25) before period intersection collisions were frontal impact in nature.

After the signal installation, angle collisions at the location were reduced to just one (1) crash. This crash involved a police officer with lights and siren activated. However, left turn – same roadway crashes did increase from one (1) in the before period to eight (8) collisions during the after period. Also, rear-end collisions at the intersection increased slightly from zero (0) to four (4) through the evaluation period.

The calculated benefit to cost ratio for this project is **3.31 considering total crashes**. The benefit to cost ratio **considering only target crashes is 6.11**. 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*. Photos are provided from Google Street View for all four approaches to the treatment intersection. 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.

TREATMENT SITE PHOTOS



Traveling North on SR 2004 (Mt. Holly-Huntersville Rd)



Looking South on SR 2004 (Mt. Holly-Huntersville Rd)



Traveling West on SR 2117 (Hambright Road)



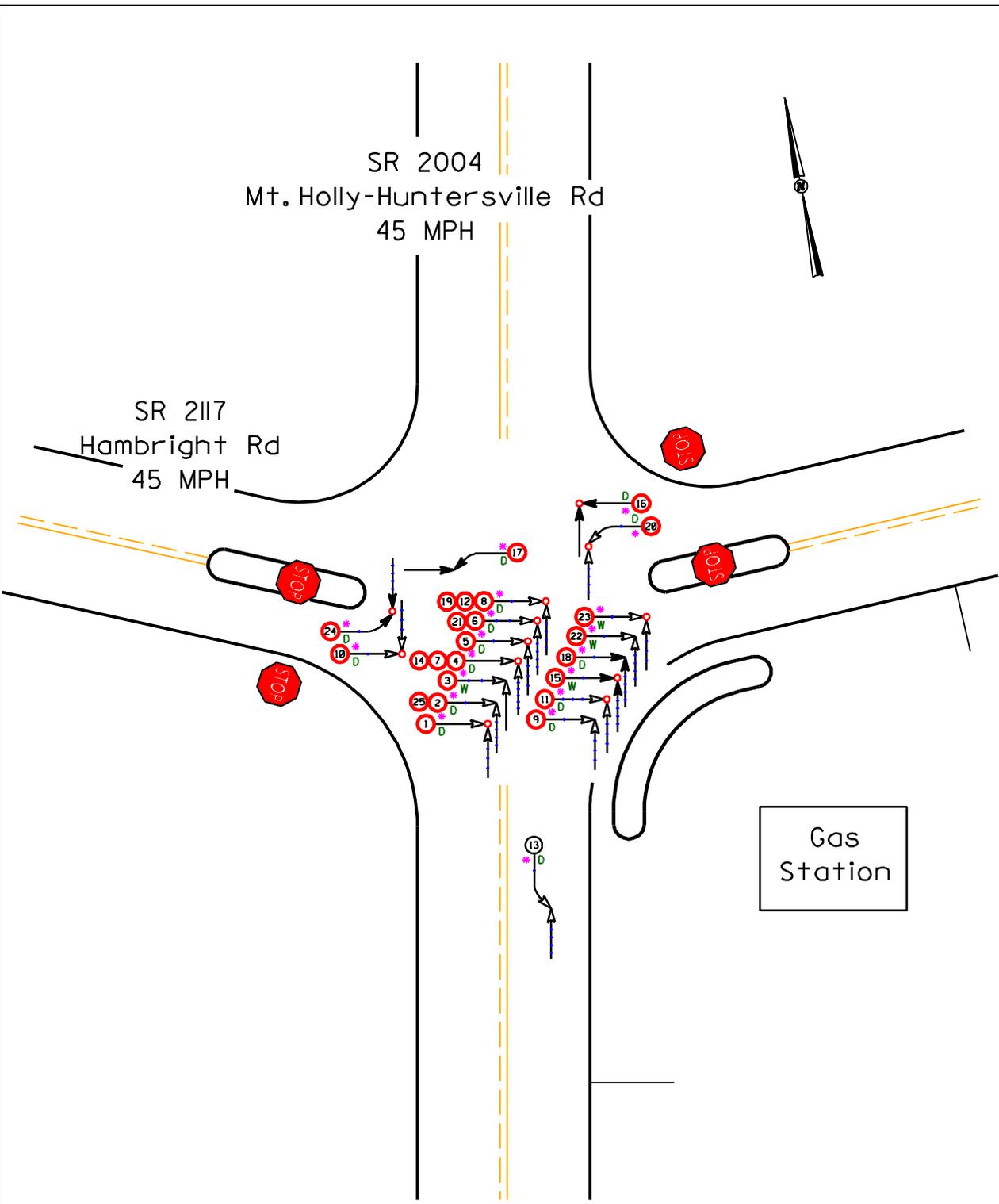
Traveling East on SR 2117 (Hambright Road)

BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes

LOCATION: SR 2004 at SR 2117		BY: JBS						
COUNTY: Mecklenburg		DATE: 6/16/2010						
FILE NO.: SS 10-04-200								
DETAILED COST:	TYPE IMPROVEMENT - New Traffic Signal							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$55,000	10	0.149	\$8,197			
	Right-of-Way	\$0	0	0.000	\$0			
		\$0	0	0.000	\$0			
	TOTALS	\$55,000	10	0.149	\$8,197			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,000			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900			
	TOTAL ANNUAL COST=				\$11,097			
	TOTAL COST OF PROJECT=				\$55,000			
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	3.50	0	0.00	17	4.86	8	2.29	\$106,971
AFTER	3.50	0	0.00	11	3.14	6	1.71	\$70,229
						Annual Benefits from Crash Cost Savings		\$36,743
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$25,646		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	3.31		
TOTAL COST OF PROJECT		-	\$55,000	COMPREHENSIVE B/C RATIO		-	3.31	

BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes

LOCATION: SR 2004 at SR 2117		BY: JBS						
COUNTY: Mecklenburg		DATE: 6/16/2010						
FILE NO.: SS 10-04-200								
DETAILED COST:	TYPE IMPROVEMENT - New Traffic Signal							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$55,000	10	0.149	\$8,197			
	Right-of-Way	\$0	0	0.000	\$0			
		\$0	0	0.000	\$0			
	TOTALS	\$55,000	10	0.149	\$8,197			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,000			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900			
	TOTAL ANNUAL COST=				\$11,097			
	TOTAL COST OF PROJECT=				\$55,000			
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	3.50	0	0.00	17	4.86	7	2.00	\$105,743
AFTER	3.50	0	0.00	6	1.71	3	0.86	\$37,971
						Annual Benefits from Crash Cost Savings		\$67,771
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$56,675		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	6.11		
TOTAL COST OF PROJECT		-	\$55,000	COMPREHENSIVE B/C RATIO		-	6.11	



LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAM
	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		TO AND UP		50 MPH TO 59		ICY OR SNOW
	REAR END		HURRY		60 MPH TO 69		FATALITY
	RAN OFF ROAD		SPEED UNKNOWN		FATALITY		ONLY

SS# 10-04-200
 Order# 41000006307
 Mecklenburg County
 City of Huntersville
 BEFORE Period
 6/1/01 - 11/30/04

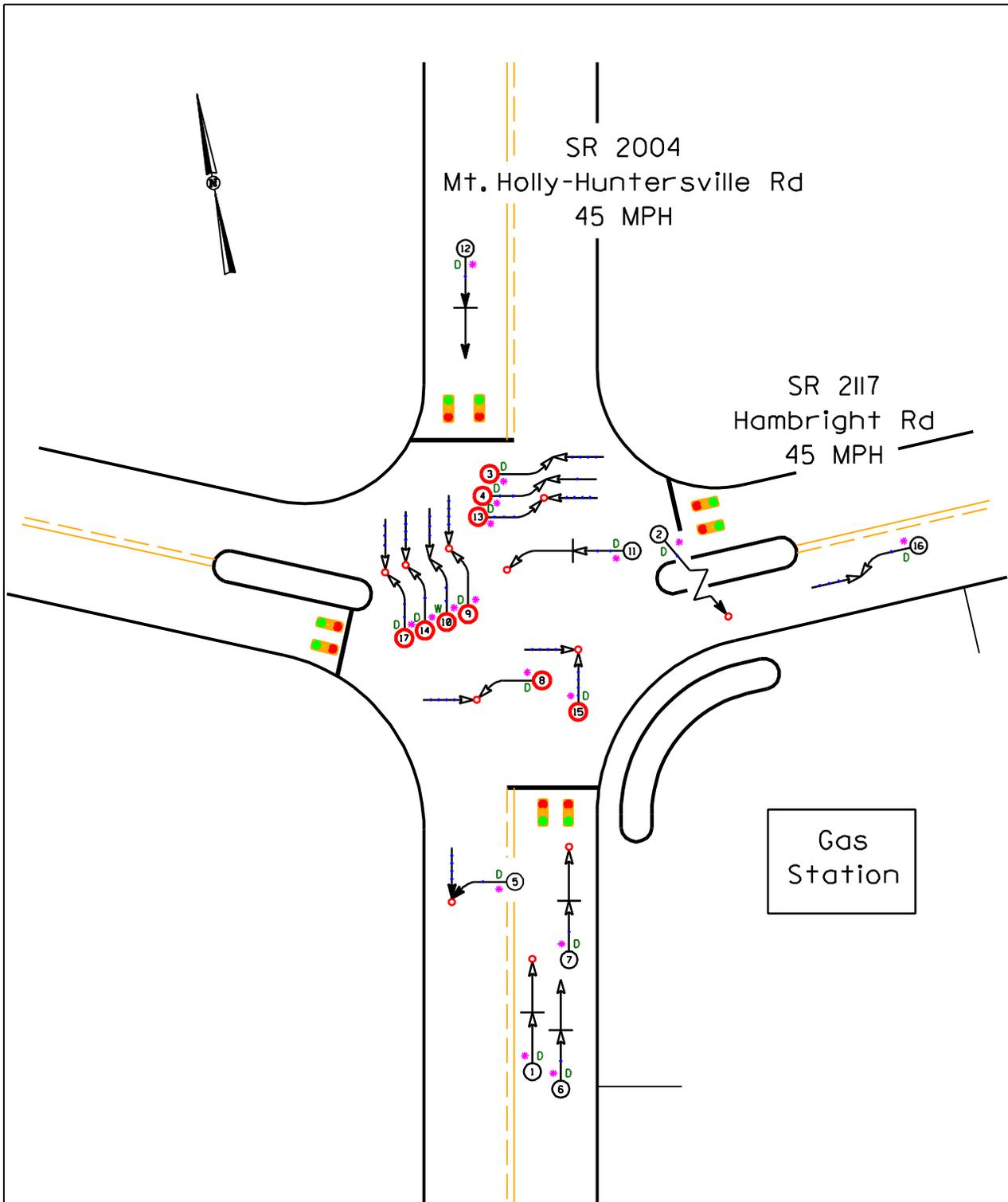
Gas Station

Frontal Impact
Target Crashes

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

TRAFFIC SAFETY UNIT

Date: 6-16-2010
Prepared By: J. Schronce



LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAM
	PAKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PAKED VEHICLE		SHOULDER		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		INJURY		50 MPH TO 59		ICY OR SNOW
	REAR END		FATALITY		TO AND UP		ONLY
	RAN OFF ROAD				SPEED UNKNOWN		

SS# 10-04-200
 Order# 41000006307
 Mecklenburg County
 City of Huntersville
 AFTER Period
 6/1/05 - 11/30/08



New Signalized
 Intersection
 Sig ID 10-1898

Gas
 Station

Frontal Impact
 Target Crashes

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

TRAFFIC SAFETY UNIT

Date: 6-17-2010	Prepared By: J. Schronce
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