

Spot Safety Project Evaluation

Spot Safety Project # 10-01-202

**Spot Safety Project Evaluation of the Intersection Realignment and Traffic Signal Installation
NC 27 (Mount Holly Road) at SR 1666 (Mount Holly-Huntersville Road)
Mecklenburg County**

Documents Prepared By:

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

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11/08/2013

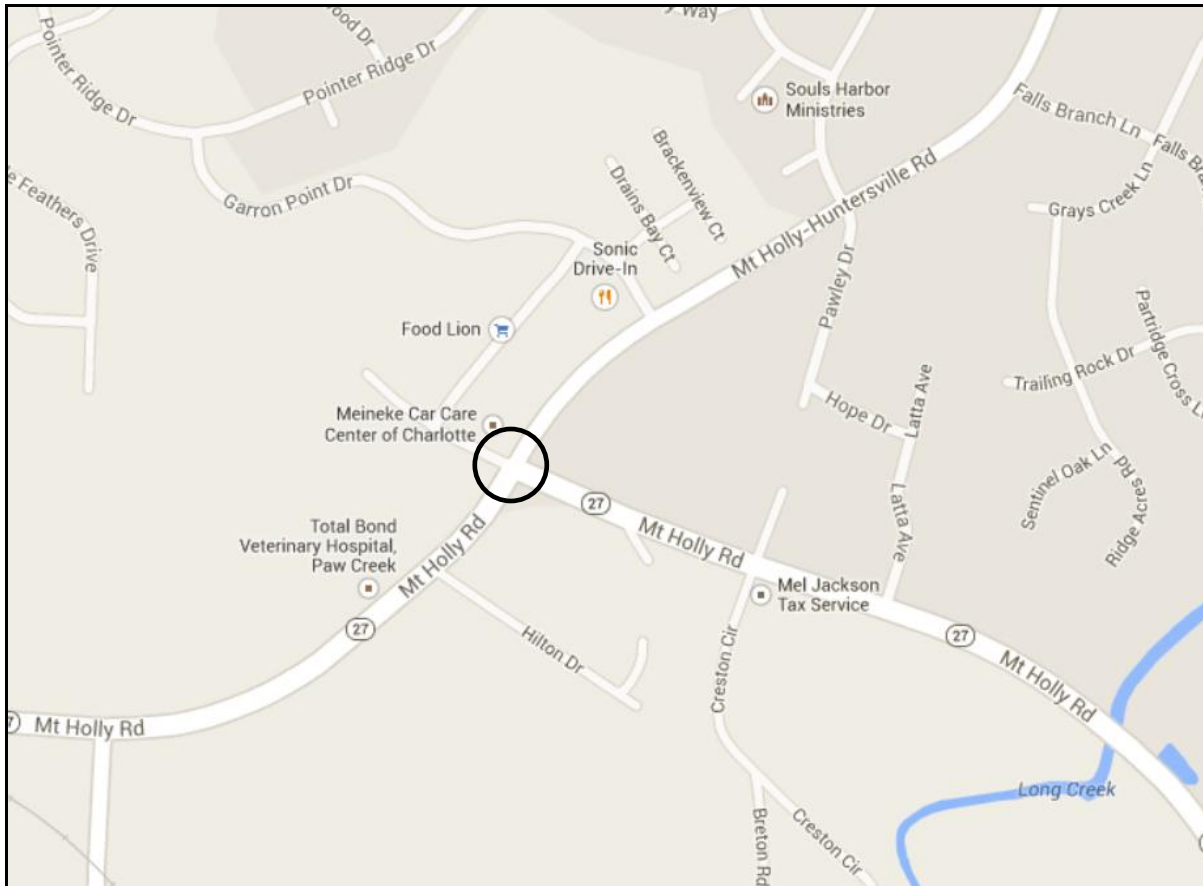
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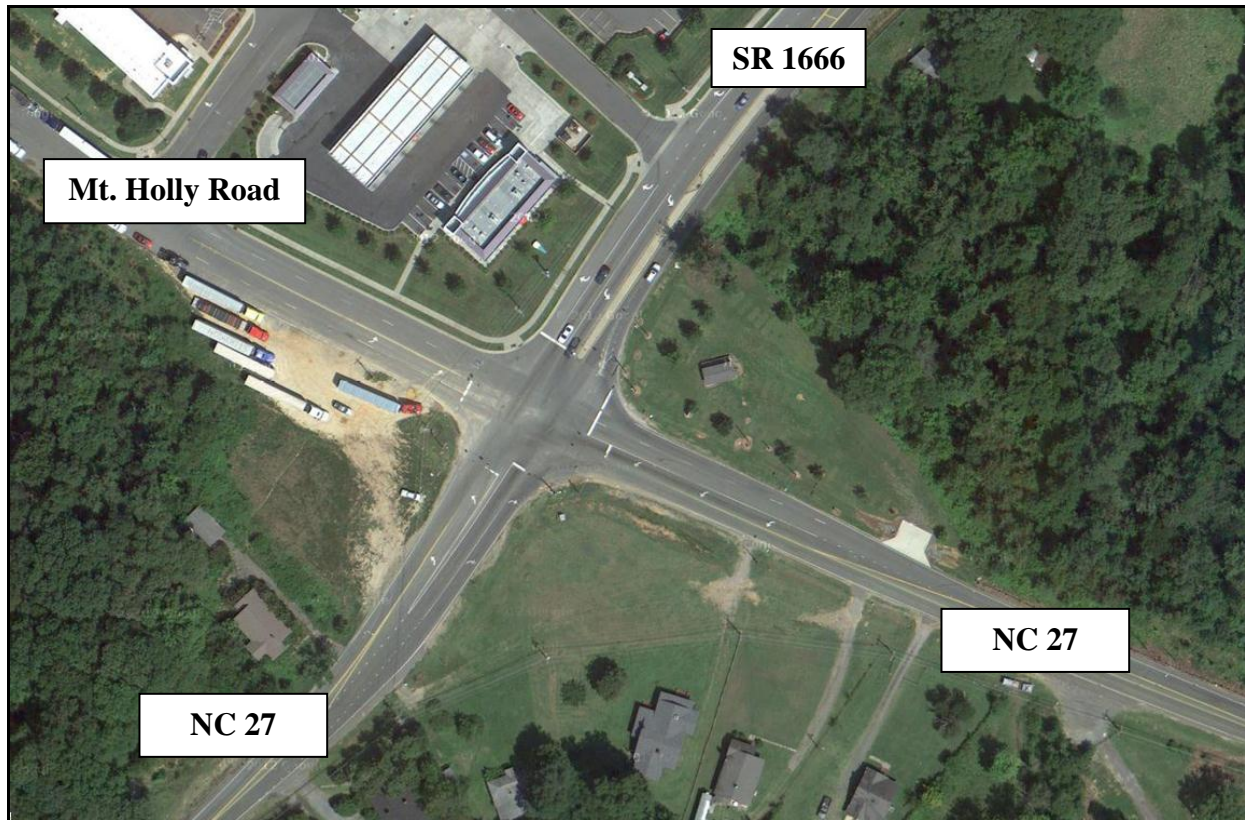
Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 10-01-202 located at the intersection of NC 27 (Mount Holly Road) at SR 1666 (Mount Holly-Huntersville Road) in Mecklenburg County.

The signal ID for the newly installed signal is 10-1883.





Aerial Provided from Google Maps

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was to realign the intersection of NC 27 (Mount Holly Road) and SR 1666 (Mount Holly-Huntersville Road) and install a traffic signal. Also, a fourth leg was provided on the western side of the intersection.

NC 27 (Mount Holly Road) and SR 1666 (Mount Holly-Huntersville Road) are 2-lane facilities that widen to provide exclusive left and right-turn lanes at the intersection. The additional fourth leg of the intersection is a 4-lane undivided facility that dead ends approximately 700 feet from the intersection. Speed limits around the intersection are 45 mph. The subject location was a three-leg intersection in the before period that was stop controlled on the SR 1666 approach. In the after period, the intersection operates as a four-leg intersection under signal control.

The original statement of problem was the pattern of rear-end and left-turning collisions related to the skewed three-leg intersection. The initial crash analysis was completed from May 1, 2000 to April 30, 2003 with nineteen (41) reported crashes. The final completion date for the improvement at the subject intersection was on September 15, 2004 with a total cost of \$1,200,000.00.

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 were the months of June 2004 through September 2004. The before period consisted of reported crashes from June 1, 2001 through May 31, 2004 (3 years); and the after period consisted of reported crashes from October 1, 2004 through August 31, 2013 (8 years, 11 months). Within the After period, the traffic signal was modified to provide protected/permitted phasing for the westbound NC 27 left-turn movement. According to the signal plans, this modification occurred on October 23, 2006. Based on this date, approximately the first 2 years of data in the After period are before the signal modification and approximately 6 years and 11 months of data are after the signal modification. The ending date for this analysis was determined by the date of available crash data at the time of analysis.

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

The following data table depicts the Naive Before and After Analysis for the treatment locations. Please note that the target crashes for the applied countermeasure are as follows:

- Target 1 – Frontal Impact Crashes (left-turn same roadway, left-turn different roadway, right-turn same roadway, right-turn different roadway, head-on and angle type crashes)
- Target 2 – Rear End Crashes on the southbound SR 1666 approach

<u>Treatment Information</u>	Before 3 yrs.	After 8 yrs., 11 mos.
Total Crashes	44	59
Total Crashes Per Year	14.67	6.61
Total Severity Index	4.20	4.51
Target 1 Crashes (Frontal Impact)	21	27
Target 1 Crashes Per Year	7.00	3.03
Target 1 Crash Severity Index	4.88	5.66
Target 2 Crashes (Southbound SR 1666 Rear End)	19	8
Target 2 Crashes Per Year	6.33	0.90
Target 2 Crash Severity Index	3.34	2.85
Volume (2002, 2009)	15,200	20,000

<u>Injury Crash Summary</u>	Before 3 yrs.	After 8 yrs., 11 mos.
Fatal Injury Crashes	0	0
Class A Injury Crashes	0	0
Class B Injury Crashes	5	9
Class C Injury Crashes	14	19
Property Damage Only	25	31

The naive before and after analysis at the treatment location shows a decrease in total crashes per year (cpy) from 14.67 cpy in the Before period to 6.61 cpy in the After period. The number of Frontal Impact Crashes (Target 1) decreased from 7.00 cpy in the Before period to 3.03 cpy in the After period. However, the Target 2 crash severity index increased from 4.88 in the Before period to 5.66 in the After period. The analysis also shows a reduction in southbound SR 1666 Rear End Crashes (Target 2), with 6.33 cpy in the Before period and 0.90 cpy in the After period.

Due to the signal modification for the westbound NC 27 left-turning movement, the After period data was analyzed further. The following table shows crashes involving vehicles in the westbound left-turn lane or making the westbound left-turning movement:

<u>Additional Information (After Period Only)</u>	Before Signal Modification	After Signal Modification
Total Crashes	8	51
Westbound NC 27 Rear End Crashes (occurring in WB left-turn lane only)	0	4
Westbound NC 27 Left-Turning Crashes	0	7

Results and Discussion

Referencing the *Collision Diagrams* and the above tables, the Total Crashes per year decreased from the Before period to the After period; however, the Total Severity Index increased slightly from 4.20 in the Before period to 4.51 in the After period.

Target 1 crashes per year decreased from 7.00 cpy in the Before period to 3.03 cpy in the After period. The Severity Index increased from 4.88 to 5.66 for these crashes, respectively. The Target 2 crashes also showed a decrease, with 6.33 cpy in the Before period and 0.90 in the After period. The Severity Index for Target 2 crashes also decreased from 3.34 in the Before period to 2.85 in the After period.

The Additional Information Table above shows that all crashes involving westbound left-turning vehicles on NC 27 occurred after the traffic signal modification. However, the table also shows that of the total crashes in the After period, only 8 occurred prior to the signal modification.

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 from Google Street View



Google Maps (April 2013) – Looking East on Mount Holly Road Approach



Google Maps (April 2013) – Looking West on NC 27 Approach



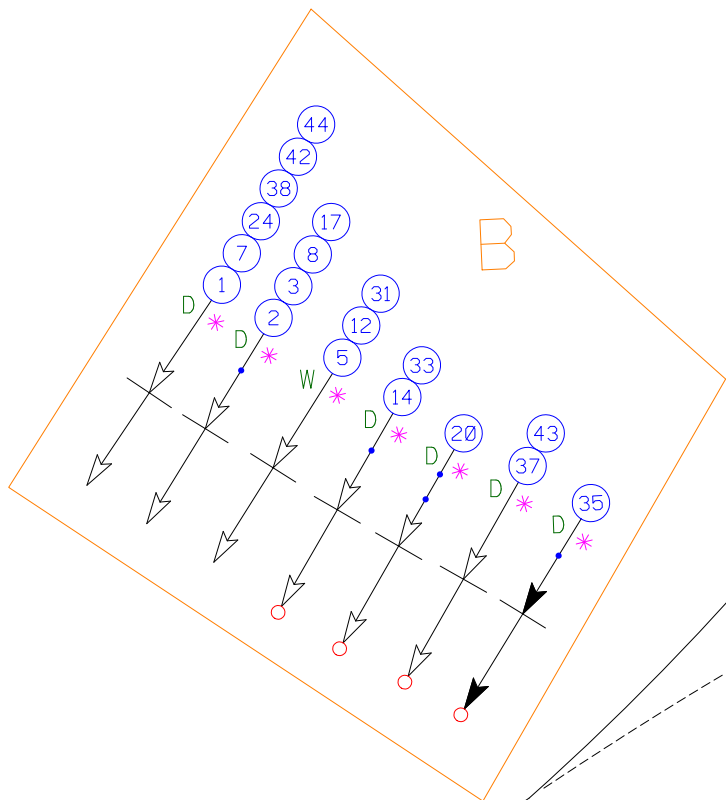
Google Maps (April 2013) – Looking North on NC 27 Approach



Google Maps (April 2013) – Looking South on SR 1666 Approach

SS# 10-02-202
 Mecklenburg County
 BEFORE Period
 6/1/01 - 5/31/04

Note: The before and after time periods are not equal



Mt. Holly-Huntersville Road
 (SR 1666)
 45 mph

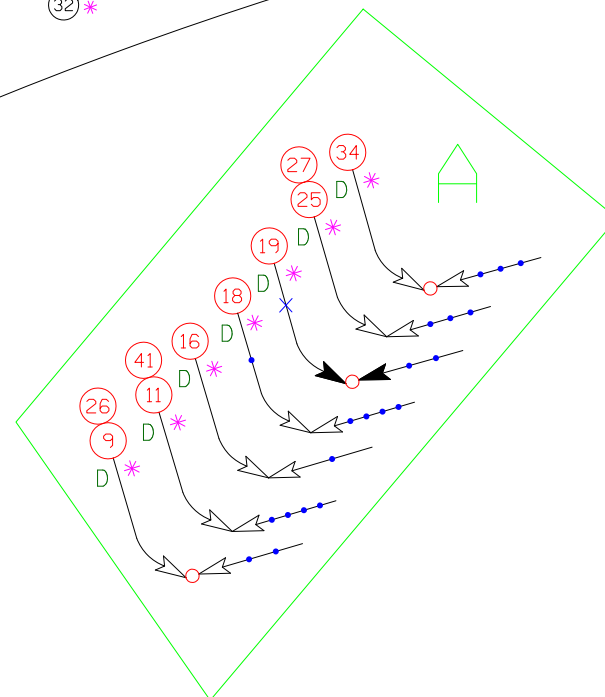
AADT (Year)
 9,600 (2002)

LEGEND			
	MOVING VEHICLE		ANGLE
	PARKED VEHICLE		TURNING
	PARKING VEHICLE		BACKING
	MOVABLE OBJECT		SIDESWIPE
	HEAD ON		INJURY
	REAR END		FATALITY
	RAN OFF ROAD		9 MPH OR LESS
	DAYLIGHT CRASH		10 MPH TO 19
	NIGHT CRASH		20 MPH TO 29
			30 MPH TO 39
			40 MPH TO 49
			50 MPH TO 59
			60 MPH TO 69
			70 AND UP
			SPEED UNKNOWN
	STOP SIGN		ANIMAL
	PEDESTRIAN		BICYCLE
	TRAIN		DRIVER AT FAULT
	DRY		WET
	ICY OR SNOWY		Other

AADT (Year)
 8,700 (2002)

Mt. Holly Road (NC 27)
 45 mph

AADT (Year)
 12,000 (2002)



Target 1 -
 Frontal Impact Crashes

Target 2 -
 Southbound SR 1666
 Rear End Crashes



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

TRAFFIC SAFETY UNIT

Date: 11-5-13

Prepared By: T. Braswell



SS# 10-02-202
 Mecklenburg County
 AFTER Period
 10/1/04 - 8/31/13

Note: The before and after time periods are not equal

AAADT (Year)
 1,000 (2009 est.)

AAADT (Year)
 12,000 (2009)

LEGEND

	MOVING VEHICLE		9 MPH OR LESS		ANIMAL
	PARKED VEHICLE		10 MPH TO 19		PEDESTRIAN
	PARKING VEHICLE		20 MPH TO 29		BICYCLE
	MOVABLE OBJECT		30 MPH TO 39		TRAIN
	HEAD ON		40 MPH TO 49		DRIVER AT FAULT
	REAR END		50 MPH TO 59		DRY
	RAN OFF ROAD		60 MPH TO 69		WET
	DAYLIGHT CRASH		70 AND UP		ICY OR SNOWY
	NIGHT CRASH		SPEED UNKNOWN		Other
	ANGLE		TURNING		
	BACKING		SIDESWIPE		
	INJURY		FATALITY		

Mt. Holly Road
 45 mph

Mt. Holly- Huntersville Road
 (SR 1666)
 45 mph

Mt. Holly Road (NC 27)
 45 mph

Mt. Holly Road (NC 27)
 45 mph

AAADT (Year)
 13,500 (2009)

AAADT (Year)
 13,500 (2009)

SIGNAL FACE I.D.
 City of Charlotte ID: 00954
 NCDOT Signal ID: 10-1883

Target 1 -
 Frontal Impact Crashes

Target 2 -
 Southbound SR 1666
 Rear End Crashes



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