

Spot Safety Project Evaluation

Order # 41000022970

Spot Safety Project # 12-07-211

**Spot Safety Project Evaluation of the Signal Changes
(Doghouse Heads Replaced with Flashing Yellow Arrow)
US-70 (Conover Blvd) at SR 1709 / 1713
Catawba 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

1-24-2013

Date

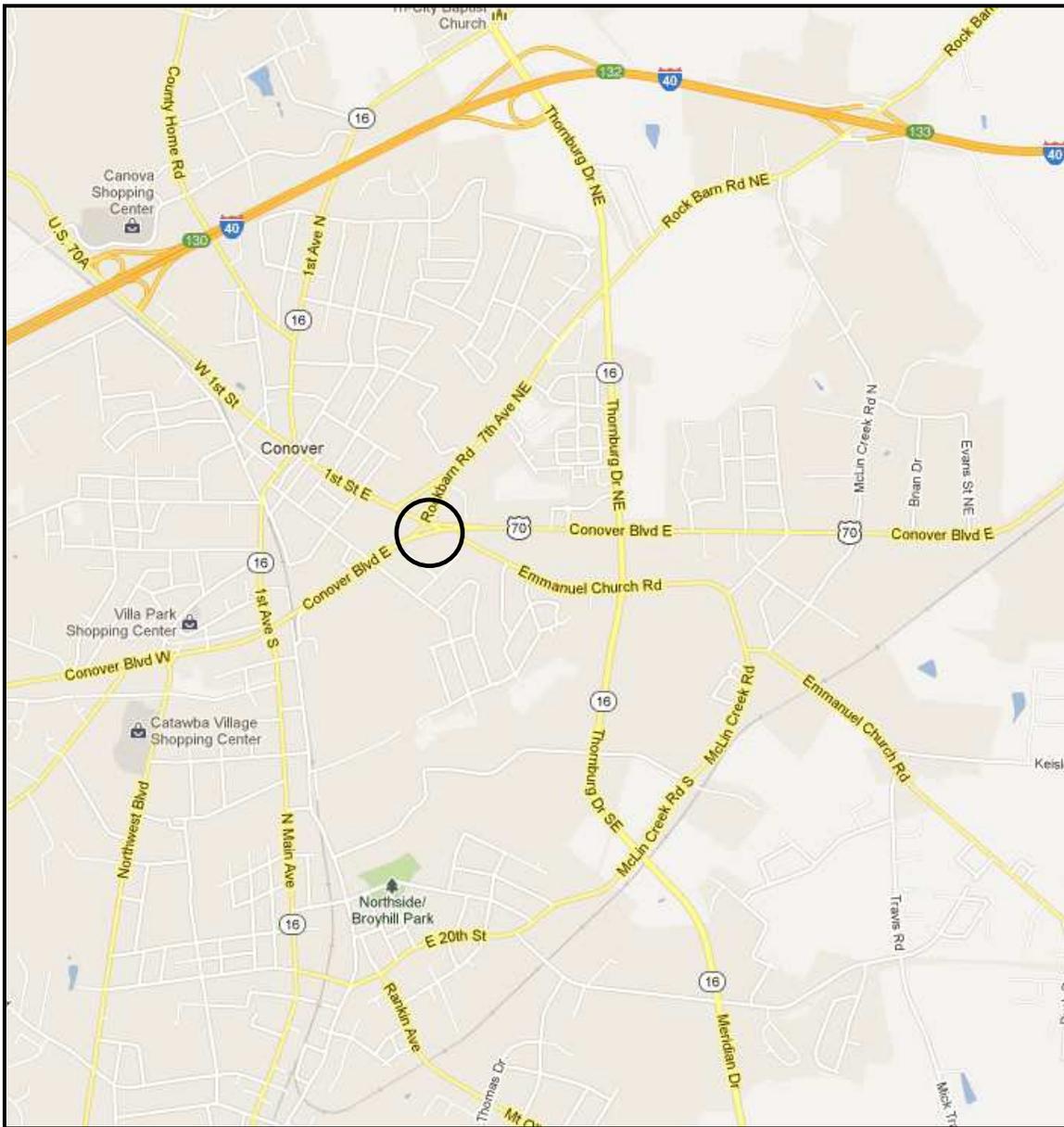
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 12-07-211 located at the Intersection of US-70 (Conover Boulevard) at SR 1709 (Rock Barn Road) / SR 1713 (1st Street East) in Catawba County, City of Conover.

The Sig ID is 12-0728 for this modified 6-Phase Actuated Traffic Signal.





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 the replacement of the pre-existing 5-section (doghouse) signal heads with the new Flashing Yellow Arrow design for northbound and westbound US-70 approaches. Also, the signal was modified to add a Flashing Yellow Arrow protected/permissive phase to the eastbound SR 1713 approach.

US-70 and SR 1709 (Rock Barn Road) are both 2-lane facilities that widen for left turn lanes at the intersection. SR 1713 (1st St E) is a four-lane non-divided facility with access to I-40. Speed limits around the intersection range from 35-mph to 45-mph. The subject location is a four-leg crossroads intersection, which is controlled by an existing traffic signal and a yield controlled slip ramp for north/eastbound US-70 motorists.

The original statement of problem was the existence of left turn crash patterns for the US-70 approaches. The initial crash analysis was completed from January 1, 2002 to December 31, 2006 with seventy-five (75) reported crashes. The final completion date for the improvement at the subject intersection was on October 29, 2008 with a total cost of \$30,000.00.

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 October through November 2008. The before period consisted of reported crashes from October 1, 2004 through September 30, 2008 (4 years); and the after period consisted of reported crashes from December 1, 2008 through November 30, 2012 (4 years). 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 for the SR 1709 and SR 1713 approaches and included the slip ramp of northbound/eastbound US-70. *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 location. Please note that Left Turn Same Roadway (LTSR) Crashes were the target crashes for the applied countermeasure. The target crashes were only on the approaches where the Flashing Yellow Arrow was installed in the after period; which include the intersection approaches westbound US-70, northbound/eastbound US-70, and eastbound SR 1713 (1st St E).

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	76	57	- 25.0 %
Total Severity Index	4.43	2.56	- 42.2 %
Target Crashes	25	19	- 24.0 %
Target Crash Severity Index	4.26	3.34	- 21.6 %
Volume (2006, 2010)	22,600	19,500	- 13.7 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	1	0	- 100.0 %
Class B injury Crashes	5	3	- 40.0 %
Class C Injury Crashes	20	9	- 55.0 %
Property Damage Only	50	45	- 10.0 %

The naive before and after analysis at the treatment location resulted in a 25 percent reduction in Total Crashes, a 24 percent reduction in Target Left Turn Crashes, and a 42 percent reduction in the Total Severity Index. The before period ADT year was 2006 and the after period ADT year was 2010.

To further analyze the intersection crash patterns, the following chart shows different traffic movements and the change in crash totals through the study:

<u>Additional Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Westbound US-70 LTSR (Target)	12	11	- 8.3 %
North/East US-70 LTSR (Target)	13	7	- 46.2 %
Eastbound SR 1713 LTSR (Target)	0	1	100.0 %
Intersection Red Light Run Crashes	8	0	- 100.0 %
Southbound SR 1709 LTSR (Permissive)	2	6	200.0 %
Rear-End Crashes @ Yield / Slip Ramp	15	11	- 26.7 %
Sideswipe Crashes @ Yield Movement	2	4	100.0 %

Results and Discussion

Referencing the *Collision Diagrams*, the target crashes (approaches with Flashing Yellow Arrow heads) experienced a 24 percent reduction in left turn same roadway collisions. From the additional information chart above, the westbound US-70 pattern stayed nearly the same. While the benefit was noticed in the northbound US-70 approach left turns; which experienced a reduction of 46 percent in this pattern. The new protected/permissive installation for eastbound SR 1713 only saw one (1) after period collision.

The overall after period intersection experienced elimination of red light run angle crashes from eight (8) in the before period. This could have been a side benefit from the three (3) additional 3-bulb traffic signal heads included for the US-70 and SR 1713 approaches in the after period signal design.

However, the left turn same roadway crashes for southbound SR 1709 increased from two (2) to six (6) throughout the evaluation period. Also, the rear-end and sideswipe crash pattern on the US-70 slip ramp and yield movement stayed consistent throughout the analysis.

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 – Looking East on SR 1713 Approach



Google Maps – Looking West on US-70 Approach



Google Maps – Looking South from SR 1709 Approach



Google Maps – US-70 Eastbound Merge Location

