

# **Spot Safety Project Evaluation**

Project Log # 200512222

Spot Safety Project # 07-00-201

**Spot Safety Project Evaluation of the Construction of Dual  
Right Turn Lanes on the I-40 Westbound/I-85 Southbound Exit Ramp  
To SR 1158 (Huffman Mill Rd)  
Alamance County**

Documents Prepared By:

Safety Evaluation Group  
Traffic Safety Systems Management Section  
Traffic Engineering and Safety Systems Branch  
North Carolina Department of Transportation

**Principal Investigator**

\_\_\_\_\_  
Brad Robinson, EI

9/12/2006  
Date

Traffic Safety Project Engineer

# ***Spot Safety Project Evaluation Documentation***

## **Subject Location**

Evaluation of Spot Safety Project Number 07-00-201 – SR 1158 (Huffman Mill Road) at I-40 Westbound/I-85 Southbound Exit Ramp in Alamance County.

## **Project Information and Background from the Project File Folder**

The spot safety project improvement countermeasure chosen for the subject location was the construction of dual right turn lanes on the I-40 Westbound/I-85 Southbound Exit Ramp to SR 1158 (Huffman Mill Rd). Prior to the project, the exit ramp had one through-left and one through-right lane.

SR 1158 (Huffman Mill Rd) northbound has two through lanes and one left turn lane and SR 1158 southbound has two through lanes and a right turn lane at the interchange. The intersection is controlled by a traffic signal and the speed limit is 35 mph for both directions of travel on SR 1158. Just before the exit, I-40 Westbound/I-85 Southbound has four lanes and the speed limit is 65 mph.

The initial statement of problem was that due to high traffic volumes, vehicles on the ramp were queuing onto I-40 Westbound/I-85 Southbound lanes.

The initial crash analysis was conducted from September 1, 1996 through August 30, 1999 and included 29 crashes. Eleven of these crashes were considered correctable by the countermeasure. Of the correctable crashes, nine were Rear-End Crashes, one was a Ran Off Road-Right Crash, and one was a Right Turn-Same Road Crash.

The final completion date for the improvement at the subject intersection was on March 14, 2001 with a total cost of \$225,000.00.

## **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 was from January 1, 2001 through May 31, 2001. The before period consisted of reported crashes from July 1, 1996 through December 31, 2000 (4 years, 6 months) and the after period consisted of reported crashes from June 1, 2001 through November 30, 2005 (4 years, 6 months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The treatment data includes all crashes within 150 feet of the subject intersection, all crashes on the subject exit ramp, and all crashes on a .65 miles strip of I-40 Westbound starting from the subject exit (Exit 141) and continuing east to MP 2.95. *Please see attached location map and photos for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Rear End Crashes on Westbound I-40/ Southbound I-85 and the exit ramp were the target crashes for the applied countermeasure. One Before Period Ran Off Road Crash was included in the target crashes (crash #74) because it was explicitly stated in the crash report that the driver ran off the roadway to avoid stopped traffic.

<b>Treatment Information</b>			
	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total crashes	75	52	-30.7
Total Severity Index	5.27	3.42	-35.1
Target Crashes	21	23	9.5
Target Crashes Severity Index	4.17	2.93	-29.7
Volume	59,000	62,000	5.1

<b>Injury Summary</b>			
	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Fatal Injuries	0	0	N/A
Class A Injuries	1	0	-100.0
Class B Injuries	11	1	-90.9
Class C Injuries	42	30	-28.6
Total Injuries	54	31	-42.6

The naive before and after analysis at the treatment location resulted in a 31 percent decrease in Total Crashes, a 10 percent increase in Target Crashes, and a 5 percent increase in Average Daily Traffic (ADT). The before period ADT year was 1998 and the after period ADT year was 2003. Volumes are not actual ramp counts, as they were unavailable. Instead, volumes of I-40 and SR 1158 at the subject location were used. It was assumed that the ramp ADT would increase proportionally.

## **Results and Discussion**

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 31 percent decrease in Total Crashes and a 10 percent increase in Target Crashes. The total severity index decreased 35 percent, the Target Crash Severity decreased 30 percent, and injuries of all types decreased. The summary results above demonstrate that the treatment location appears to have had a decrease in Total Crashes but an increase in Target Crashes from the before to the after period.

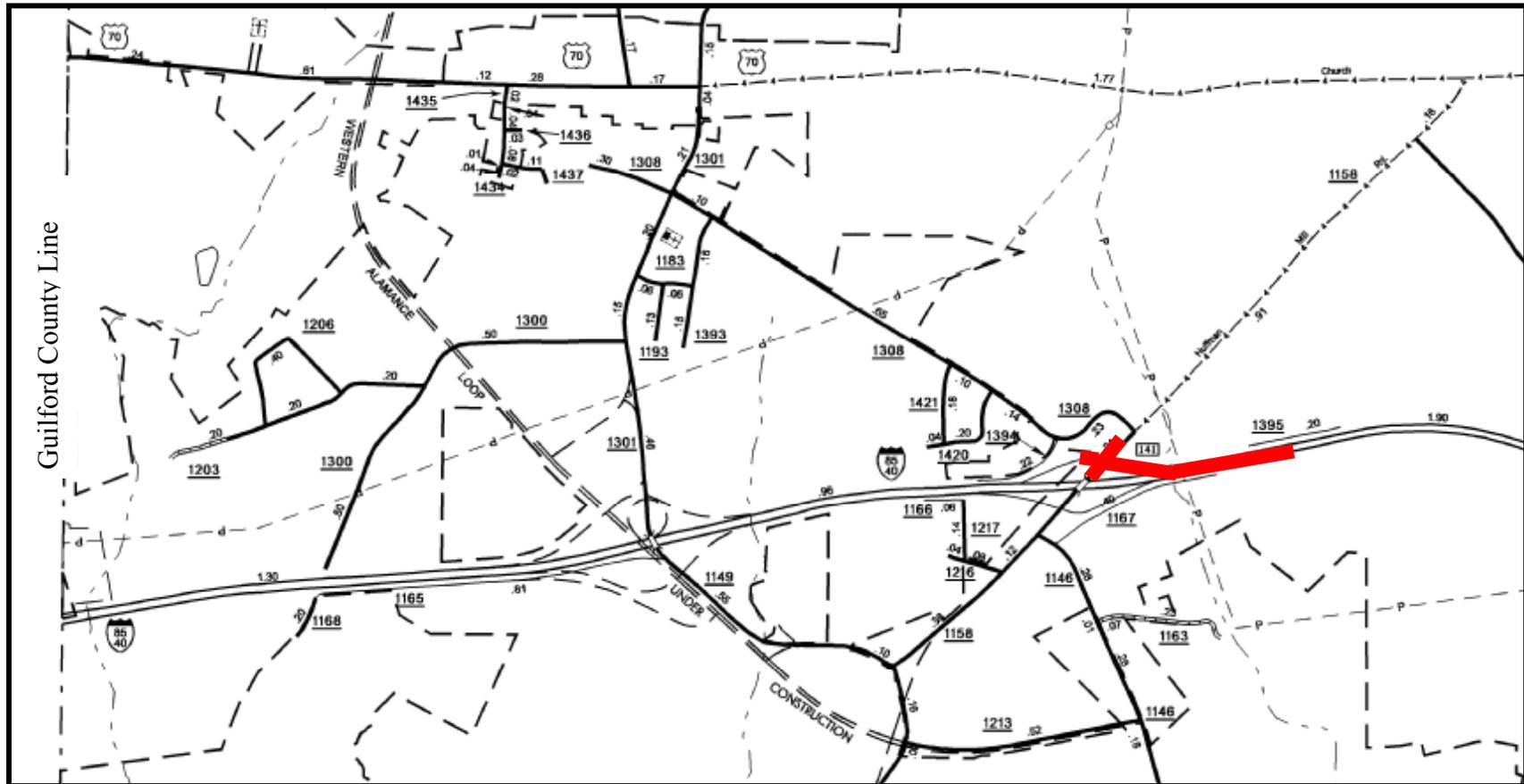
After reviewing the crash reports, two After Period Target Crashes had unusual contributing factors. Crash #30 occurred while traffic was stopped for road construction on I-40. Crash #34 occurred after a vehicle suddenly slammed on its breaks when a wheel barrel fell off a trailer in front of it. Subtracting these two Target Crashes from the After Period, there is no change in Target Crashes from the before to the after period.

Referencing the *Collision Diagram, Before Period*, there was a crash pattern at the intersection involving left turning vehicles from the exit ramp being hit by northbound SR 1158 vehicles that ran the signal (11 crashes, including 3 crashes which the officer was unable to determine which vehicle ran the signal). This pattern appears to have disappeared in the after period. There was also a pattern of Rear-End Crashes on SR 1158 which has virtually disappeared from the before to the after period (from 11 to 1). It is unsure of why either of these patterns decreased from the before to the after period. The signal might have been re-timed when the project was completed, therefore changing traffic patterns on SR 1158.

Please see the attached *Treatment Site Photos*. Photos are provided for all three approaches to the intersection and along I-40.

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.

Location Map  
Alamance County  
Evaluation of Spot Safety Project #07-00-201



Treatment Site Location: From Milepost 2.95 on Westbound I-40 to Exit 141 (SR 1158/Huffman Mill Rd),  
Continuing on off-ramp to the intersection with SR 1158

**Treatment Photos Taken July 27, 2006**



**Traveling on I-40 Westbound Before Exit**



**Traveling on I-40 Westbound at Exit Ramp for SR 1158**



**At Beginning of Ramp from I-40 West to SR 1158**



**Traveling on ramp from I-40 West to SR 1158**



**Traveling North on SR 1158 (Huffman Mill)**



**Traveling North on SR 1158 (Huffman Mill)  
At Intersection**



**Traveling South on SR 1158 (Huffman Mill)**



**Traveling South on SR 1158 (Huffman Mill)  
Just Before Intersection**

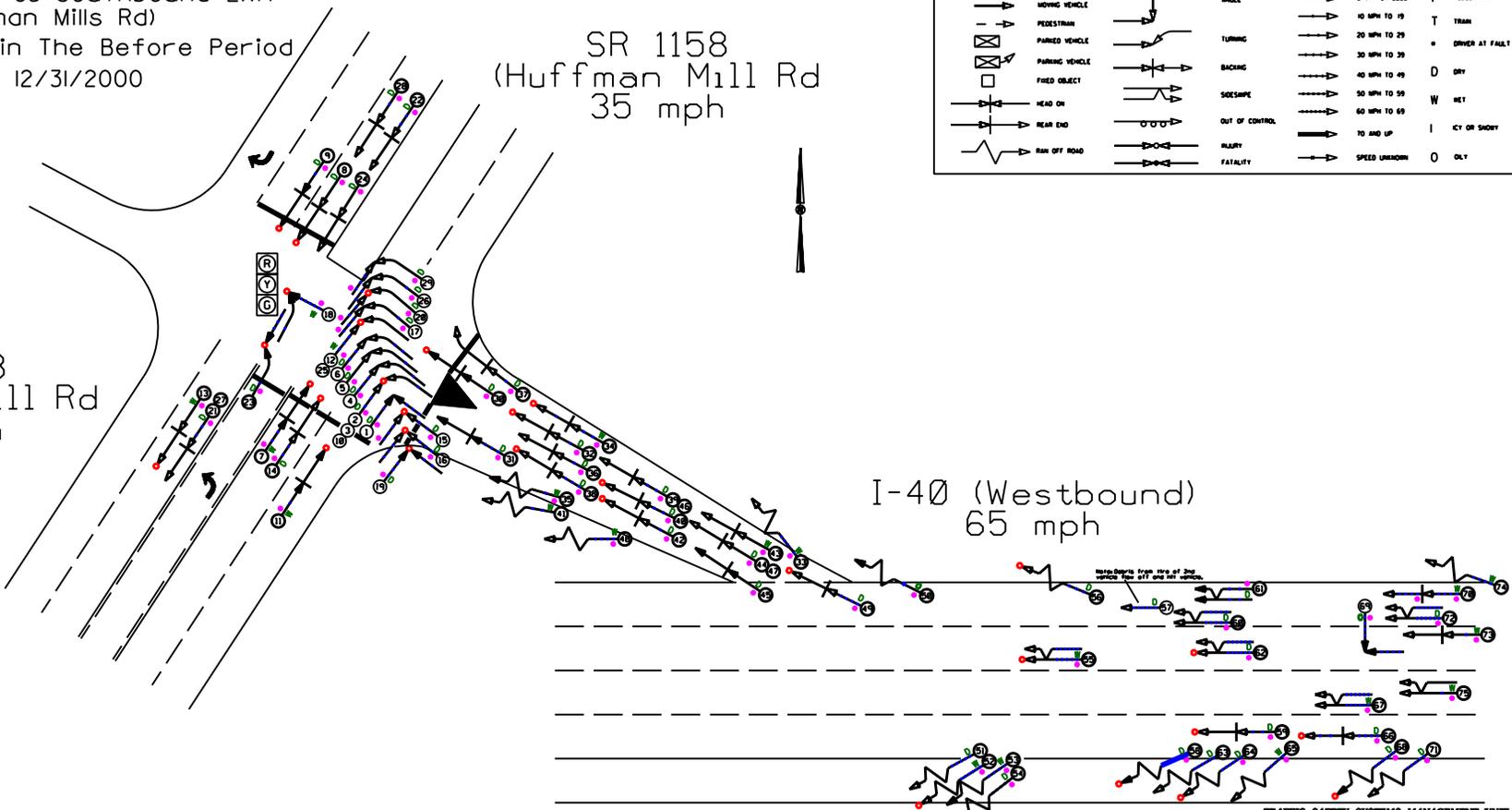
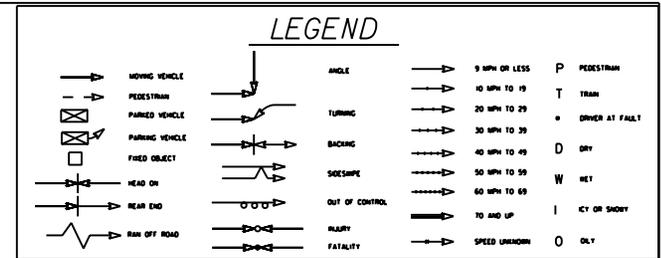
Alamance County  
 I-40 Westbound/I-85 Southbound Exit  
 at SR 1158 (Huffman Mills Rd)  
 Treatment Site in The Before Period  
 From 7/1/1996 To 12/31/2000

SR 1158  
 (Huffman Mill Rd)  
 35 mph

SR 1158  
 (Huffman Mill Rd)  
 35 mph

I-40 (Westbound)  
 65 mph

Concrete Barrier



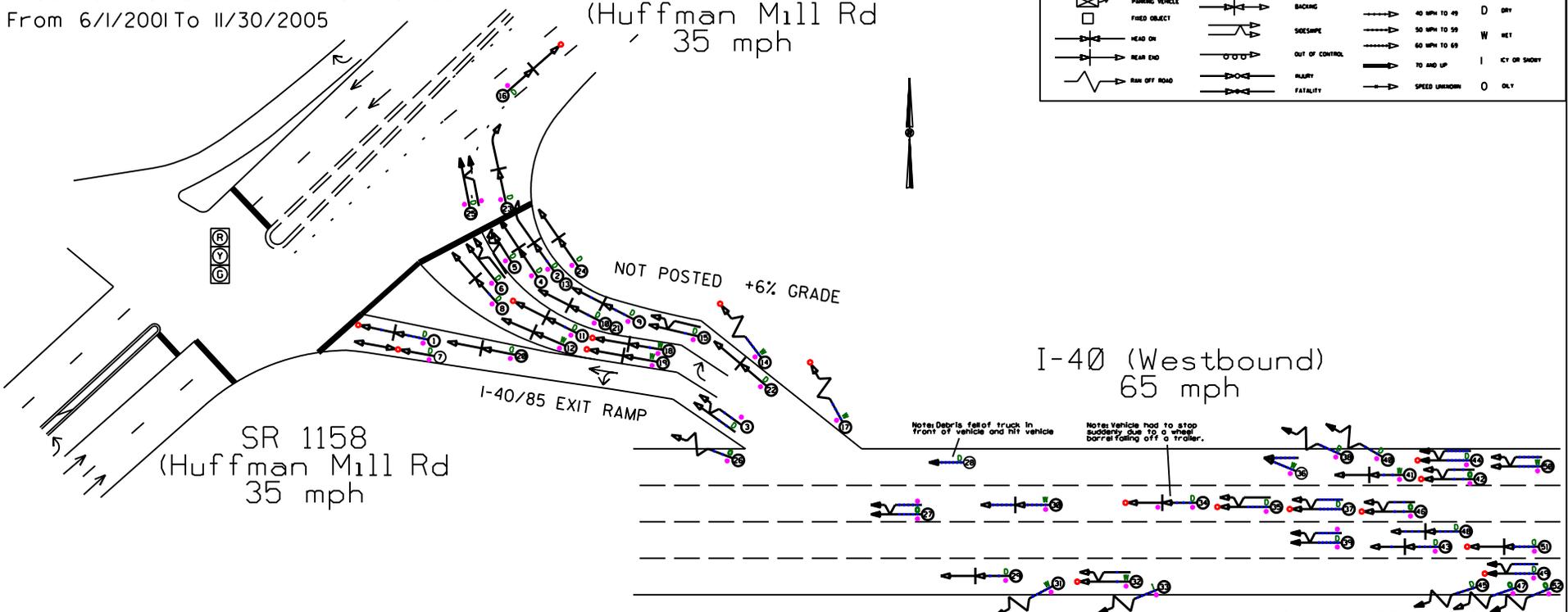
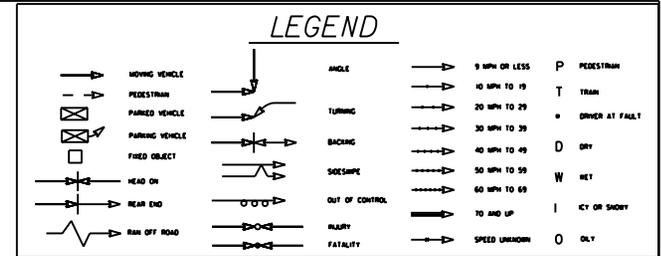
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM
	DIVISION: 7 AREA: STUDY PERIOD: 7/1/96-12/31/2000 DATE: 7-1-01 ANALYSIS PREPARED BY: S. Robinson ANALYSIS CHECKED BY: DESIGN PREPARED BY: S. Robinson DESIGN REVIEWED BY:
SCALE: NOT TO SCALE DATE: July 2001 LOG NUMBER: 20000277	

N.C. DEPARTMENT of TRANSPORTATION  
 DIVISION of HIGHWAYS  
 TRAFFIC ENGINEERING AND SAFETY  
 SYSTEMS BRANCH

Alamance County  
 I-40 Westbound/I-85 Southbound Exit  
 at SR 1158 (Huffman Mills Rd)  
 Treatment Site in The After Period  
 From 6/1/2001 To 11/30/2005

SR 1158  
 (Huffman Mill Rd)  
 35 mph



**TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT**

	<b>COLLISION DIAGRAM</b>	
	DIVISION 7	AREA 4
STUDY PERIOD: 6/1/2001-11/30/2005		
DISTANCE: T-1/ME + 80 FT		
ANALYSIS PREPARED BY: B. Robinson		
ANALYSIS CHECKED BY:		
DIAGRAM PREPARED BY: B. Robinson		
DIAGRAM REVIEWED BY:		
SCALE: NOT TO SCALE		
DATE: July 2006		
LOG NUMBER: 20050222		

**N.C. DEPARTMENT of TRANSPORTATION**  
**DIVISION of HIGHWAYS**  
**TRAFFIC ENGINEERING AND SAFETY**  
**SYSTEMS BRANCH**