

# **Spot Safety Project Evaluation**

Project Log # 200712094

Spot Safety Project # 07-99-208

**Spot Safety Project Evaluation of the Traffic Signal Installation  
At the Intersection of NC 62 (Rauhut St) and Hatch Street  
Alamance County, City of Burlington**

Documents Prepared By:

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

**Principal Investigator**

\_\_\_\_\_  
Jason B. Schronce

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Date

Traffic Safety Project Engineer

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

## **Subject Location**

Evaluation of Spot Safety Project Number 07-99-208 – The Intersection of NC 62 (Rauhut Street) and Hatch Street within the City Limits of Burlington 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 installation of a 2-phase, actuated traffic signal. NC 62 (Rauhut St) is a four-lane undivided facility at the subject intersection with two lane approaches and no dedicated turn lanes. Hatch Street is a downtown residential road with single lane approaches. The subject location is a crossroads intersection, which was controlled by a stop signs on Hatch Street in the before period. All approaches have a 35-mph speed limit. In 2001, a spot speed study showed the 85<sup>th</sup> percentile speed on NC 62 at 45 mph.

The original statement of problem was the insufficient gaps on NC 62 for vehicles from Hatch Street to enter the roadway in a safe manner. The result was a developing pattern of angle collisions. The intersection met intersection signal warrants 6, 9, and 11.

The initial crash analysis was completed from January 1, 1996 to December 31, 1998 with fifteen (15) reported crashes, ten (10) of which were deemed correctable. The final completion date for the improvement at the subject intersection was on November 4, 2002 with a total cost of \$45,000.00.

## **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 the months of October and November in 2002. The before period consisted of reported crashes from December 1, 1997 through September 30, 2002 (4 years and 10 months); and the after period consisted of reported crashes from December 1, 2002 through September 30, 2007 (4 years and 10 months). 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, 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.

<b>Treatment Information</b>			
	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total crashes	27	23	- 14.81 %
Total Severity Index	10.18	11.13	9.33 %
Target Crashes – Frontal Impact	24	14	- 41.67 %
Target Crash Severity Index	10.71	5.23	- 51.17 %
Volume	10,650	9,600	- 9.86 %
<b><u>Injury Crash Summary</u></b>			
Fatal injury Crashes	0	1	100.00 %
Class A injury Crashes	2	1	- 50.00 %
Class B injury Crashes	2	2	0.00 %
Class C Injury Crashes	11	9	- 18.18 %
Total Injury Crashes	15	13	- 13.33 %

The naive before and after analysis at the treatment location resulted in a 15 percent decrease in Total Crashes, a 42 percent decrease in Target Crashes, and a 51 percent decrease in the Target Severity Index. The before period ADT year was 2000 and the after period ADT year was 2005.

## **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 15 percent decrease in Total Crashes and a 42 percent decrease in Target Crashes. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have decreased at the treatment location from the before to the after period.

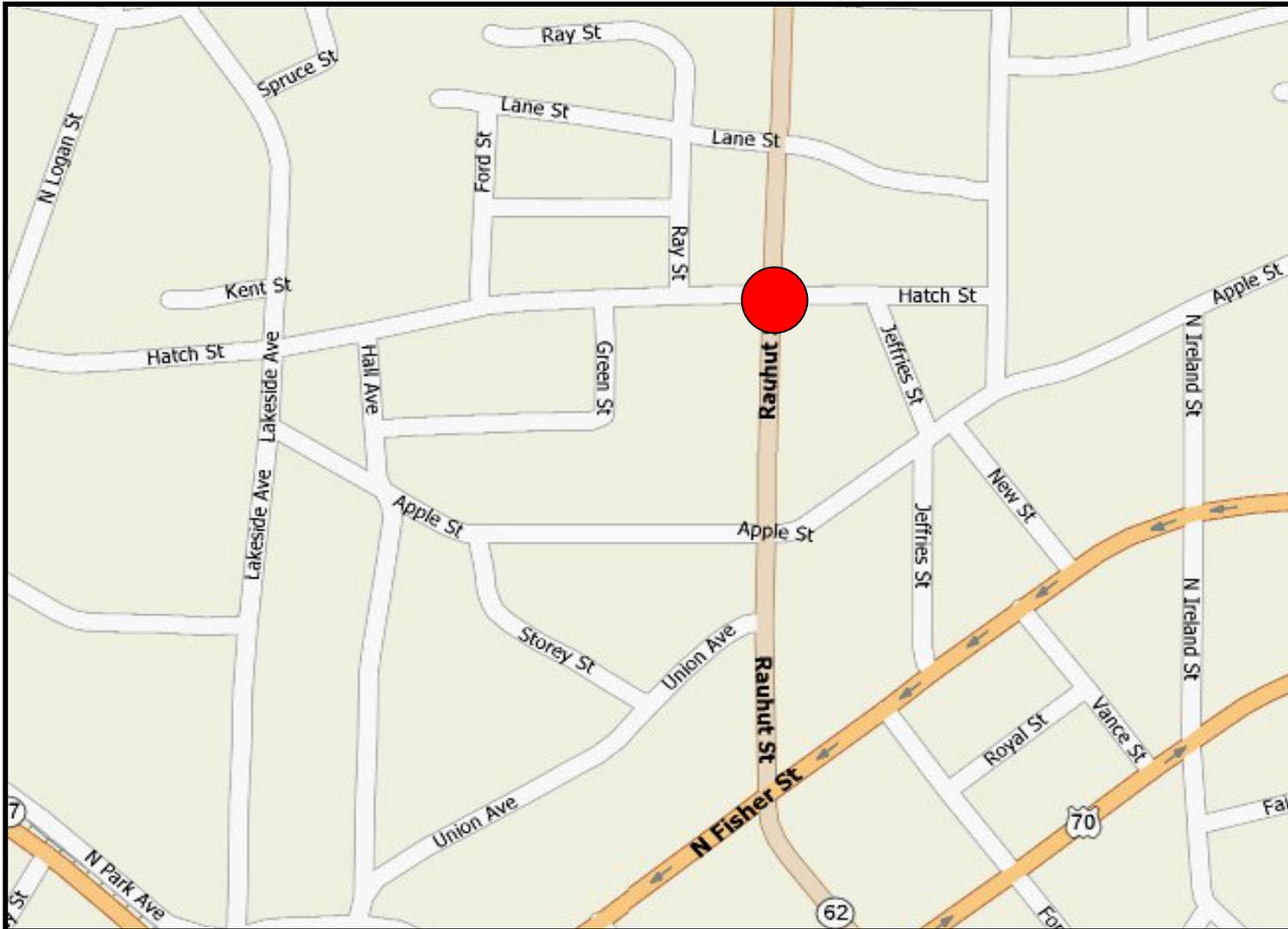
Referencing the *Collision Diagrams*, a large portion of crashes at the intersection in the before period (15 of 27) were the result of a vehicle unsuccessfully attempting to cross over NC 62 resulting in an angle collision. After the signal installation, this pattern was reduced to seven (7). Left Turn crashes on NC 62 remained steady from eight (8) in the before to seven (7) with the signal. Also, rear-end crashes did see a slight increase from one (1) to five (5) collisions approaching the intersection.

The two high severity crashes at this intersection in the after period involved pedestrians and resulted in a fatality and an A-class injury. Since the City of Burlington manages this signal, the NCDOT did not receive a fatal slip from this fatality and a fatal investigation was never conducted. These two high severity crashes explain the low overall, but high target benefit-cost for this signal.

The calculated benefit to cost ratio for this project is 0.94 considering total crashes. The benefit to cost ratio considering only target crashes is 23.14. 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 for all 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.

**Location Map**  
**Alamance County, City of Burlington**  
**Evaluation of Spot Safety Project # 07-99-208**



**Treatment Location: NC 62 (Rauhut Street) at Hatch Street**

**SS# 07-99-208 Aerial Map**



**TREATMENT SITE PHOTOS TAKEN 5/6/2008**



Traveling South on NC 62 (Rauhut Rd)



Traveling North on NC 62



Traveling North on NC 62 (Rauhut St)



Traveling West on Hatch Street



Traveling East on Hatch Street



Traveling East on Hatch Street

**BENEFIT-COST ANALYSIS WORKSHEET**

LOCATION: NC 62 at Hatch  
 COUNTY: Alamance  
 FILE NO.: SS 07-99-208

BY: JBS  
 DATE: 5/7/2008  
 NOTES: Total Crashes

DETAILED COST: TYPE IMPROVEMENT - New Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$45,000	10	0.149	\$6,706
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$45,000	10	0.149	\$6,706

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$2,000  
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$900  
 TOTAL ANNUAL COST= \$9,606  
 TOTAL COST OF PROJECT= \$45,000

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	4.83	2	0.41	13	2.69	12	2.48	\$265,176
AFTER	4.83	2	0.41	11	2.28	10	2.07	\$256,108

Annual Benefits from Crash Cost Savings \$9,068

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$538)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 0.94

TOTAL COST OF PROJECT - \$45,000 COMPREHENSIVE B/C RATIO - 0.94

**BENEFIT-COST ANALYSIS WORKSHEET**

LOCATION: NC-62 at Hatch  
 COUNTY: Alamance  
 FILE NO.: SS 07-99-208

BY: JBS  
 DATE: 5/7/2008  
 NOTES: Target Crashes - Frontal Impact

DETAILED COST: TYPE IMPROVEMENT - New Signal

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BEFORE	4.83	2	0.41	11	2.28	11	2.28	\$256,915
AFTER	4.83	0	0.00	8	1.66	6	1.24	\$34,658

Annual Benefits from Crash Cost Savings \$222,257

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$212,650

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 23.14

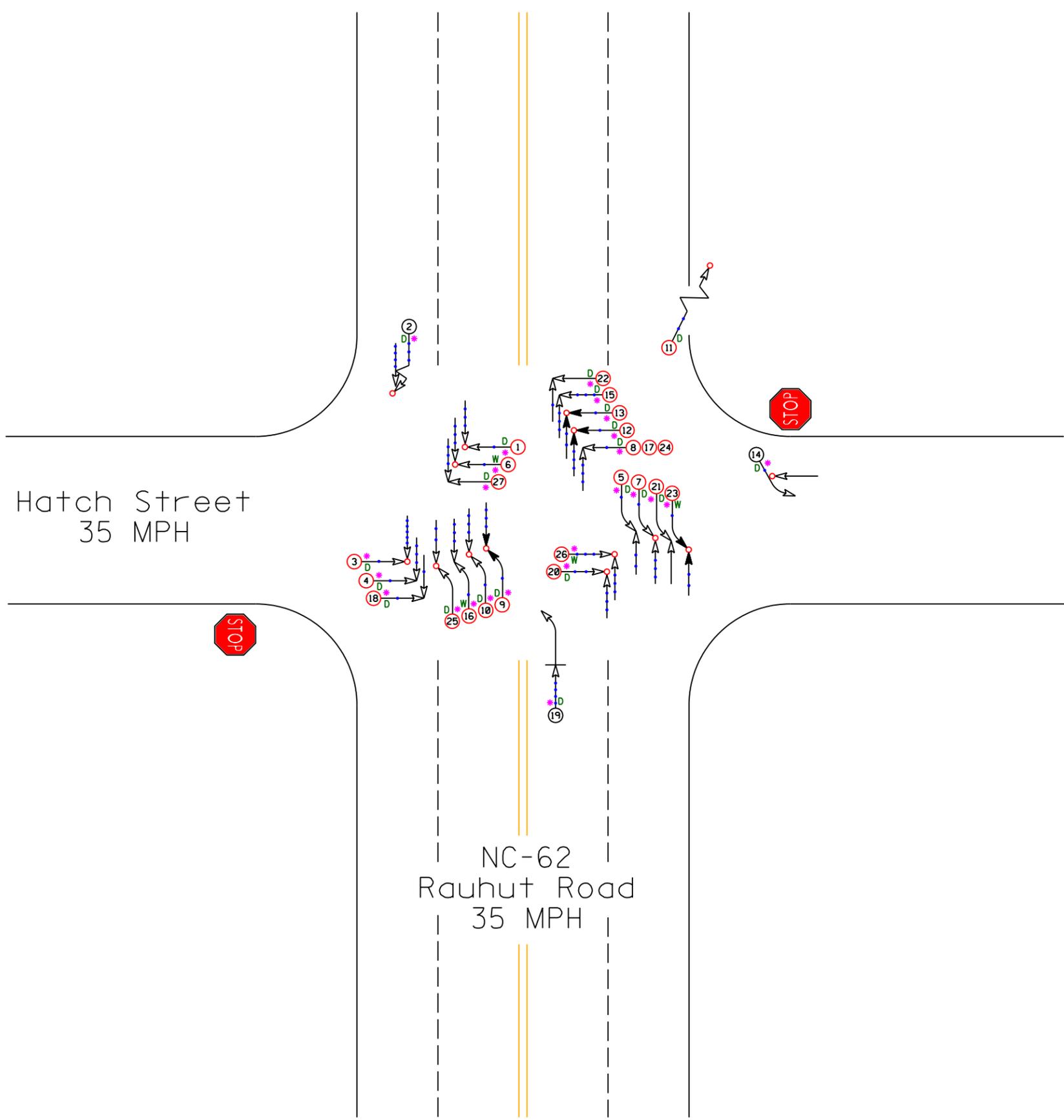
TOTAL COST OF PROJECT - \$45,000 COMPREHENSIVE B/C RATIO - 23.14

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



SS# 07-99-208  
 Alamance County  
 City of Burlington  
 BEFORE Period  
 12/1/97 - 9/30/02  
 NC-62 at Hatch

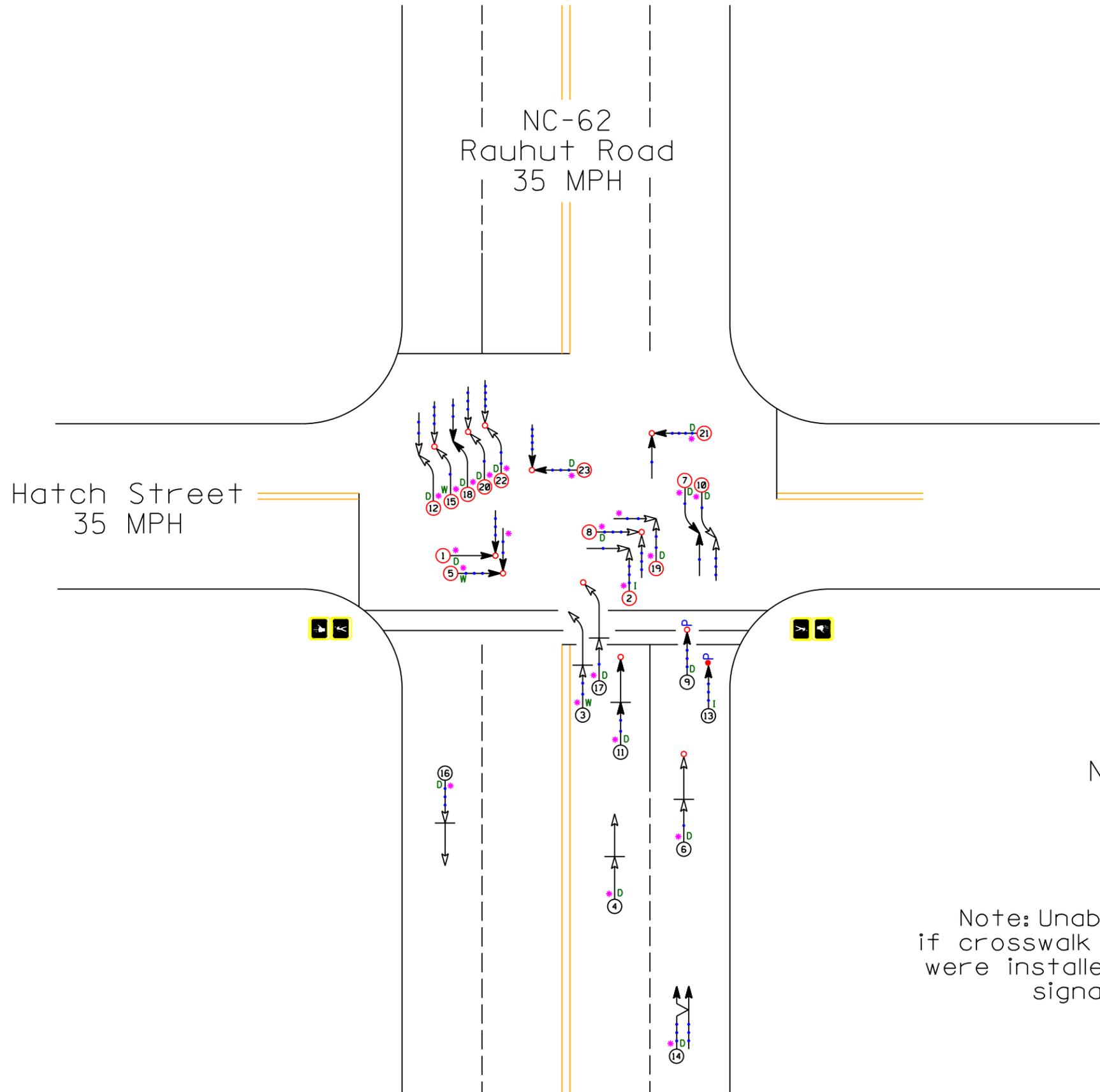


# Target Crashes:  
 Front Impact &  
 Avoidance

**TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT**

	<b>COLLISION DIAGRAM</b>	
	DIVISION: 7	AREA: 4
STUDY PERIOD: 12/1/1997 to 9/30/2002		
DISTANCE: Y-LINE = 150 FT		
ANALYSIS PREPARED BY: JBS		
ANALYSIS CHECKED BY: BR		
DIAGRAM PREPARED BY: JBS		
DIAGRAM REVIEWED BY: ST		
SCALE: NOT TO SCALE		
DATE: 2-19-2008		
LOG NUMBER: SS* 07-99-208		

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



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	RAN OFF ROAD				70 AND UP		OILY

SS# 07-99-208  
 Alamance County  
 City of Burlington  
 AFTER Period  
 12/1/03 - 9/30/07  
 NC-62 at Hatch



New Signalized Intersection

Note: Unable to verify if crosswalk and ped heads were installed with original signal plans.

Target Crashes:  
 Front Impact &  
 Avoidance

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