

Spot Safety Project Evaluation

Order # 41000005643

Spot Safety Project # 07-98-201

**Spot Safety Project Evaluation of the
Pedestrian Signal Heads and Crosswalk Installation
SR 1010 (E. Main Street) at Rosemary Street
City of Carrboro, Orange 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

4-20-2010

Date

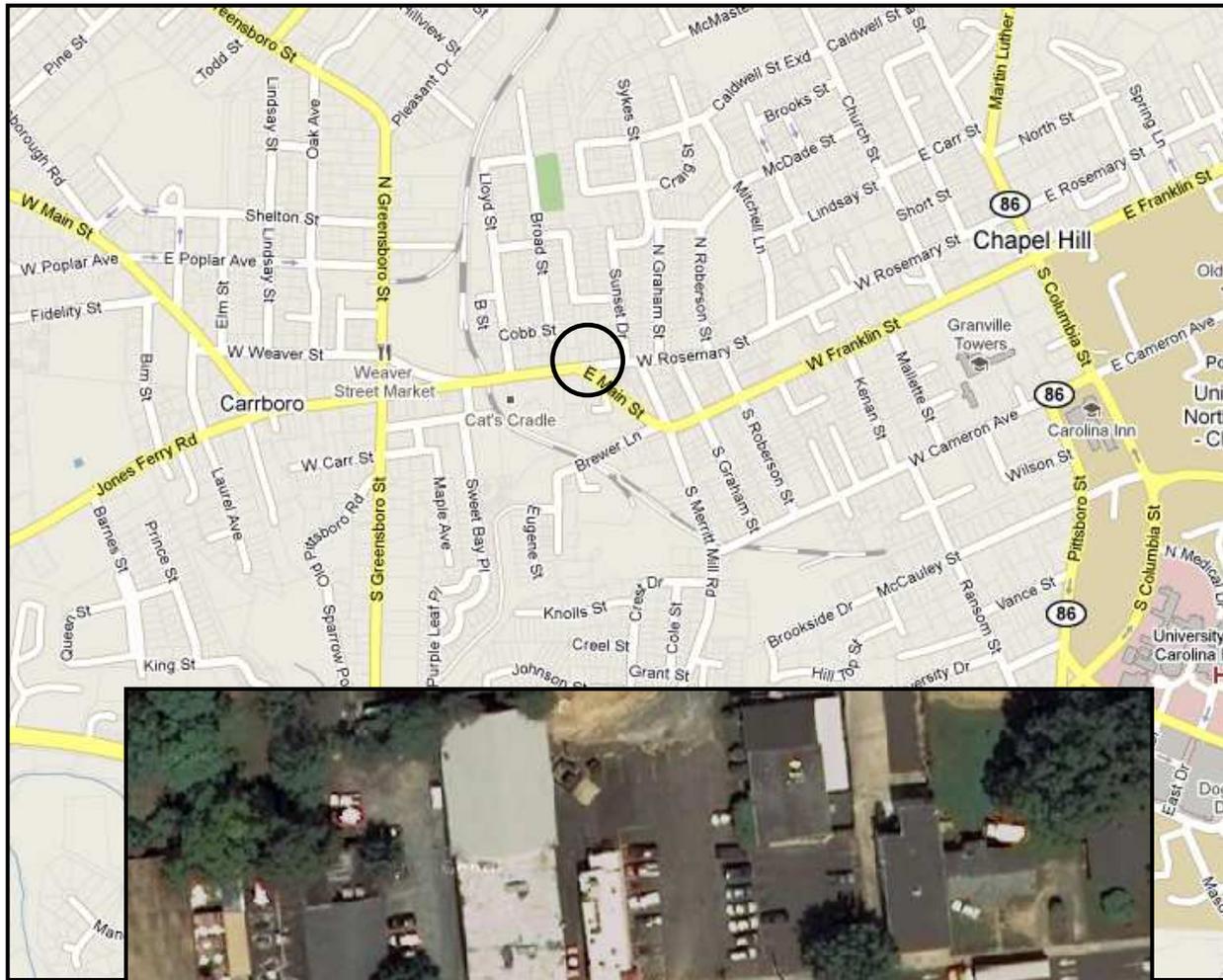
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 07-98-201 located at the Intersection of SR 1010 (East Main Street) and Rosemary Street in Orange County, in the City of Carrboro.

The Sig ID is 07-0500 for this updated intersection traffic signal.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasures chosen for the subject location were the installation of two roadway crosswalks, pedestrian heads for crossing, and traffic signal revisions. The signal revisions include revising the span wire to improve signal visibility and the removal of the free-flow right turn vehicle movement to stay on East Main Street. The eastbound approach of SR 1010 (E. Main Street) is a four lane roadway with a speed limit of 20 mph. Rosemary Street and westbound SR 1010 are both three lane roadways with two lanes each approaching the intersection and speed limits of 20 mph. The subject location is a three-leg intersection that does not allow right turns from eastbound SR 1010 onto Rosemary Street and was controlled by a traffic signal during the before period.

The original statement of problem was the increased concern for collisions with pedestrians. Counts taken on January 22, 1997 indicated that 321 pedestrians used the intersection daily. The area surrounding the intersection has multiple driveways and many local commercial interests.

The initial crash analysis was completed from October 1, 1994 to September 30, 1997 with eleven (11) reported crashes, one (1) of which was deemed correctable pedestrian crash. The final completion date for the improvement at the subject intersection was on January 7, 2004 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 2003 through January 2004. The before period consisted of reported crashes from November 1, 1997 through November 30, 2003 (6 years and 1 month); and the after period consisted of reported crashes from February 1, 2004 through February 28, 2010 (6 years and 1 month). 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 Pedestrian and Bicycle (Pedalcyclist) Crashes were the target crashes for the applied countermeasure.

Treatment Information	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	24	12	- 50.0 %
Total Severity Index	3.16	9.17	190.2 %
Target Crashes	3	2	- 33.3 %
Target Crash Severity Index	8.40	8.40	0.0 %
Volume (2000, 2007)	19,000	21,800	14.7 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	1	100.0 %
Class B injury Crashes	2	1	- 50.0 %
Class C Injury Crashes	4	2	- 50.0 %
Total Injury Crashes	6	4	- 33.3 %

The naive before and after analysis at the treatment location resulted in a 50 percent decrease in Total Crashes, a 33 percent decrease in Target Crashes, but over 100 percent increase in the Total Severity Index. The before period ADT year was 2000 and the after period ADT year was 2007.

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 50 percent decrease in Total Crashes and an 33 percent decrease in Target Crashes. The summary results above demonstrate that both Total and Target Crashes appear to have decreased at the treatment location from the before to the after period.

Referencing the *Collision Diagrams*, the intersection experienced three bicycle (pedalcyclist) crashes during the before period. Crash 10 occurred when a vehicle was turning into a PVA; crash 16 resulted when a vehicle backed-up before looking to verify the lane was clear; and crash 23 occurred in the through movement lane accessing Rosemary Street. After the intersection improvements, two target crashes occurred. The after period bicycle crash happened when a vehicle ran off the roadway and struck the pedalcyclist on the sidewalk. The after period pedestrian crash occurred outside of the indicated crosswalk and resulted in a C-injury for the pedestrian.

There was one A-injury collision during the after period within the limits of this study. This crash is the reason behind the 190 percent increase in the total severity index and negative b-c ratio shown below. This crash involved a motorcycle and a vehicle attempting to access one of the local PVA driveways.

The calculated benefit to cost ratio for this project is **(-7.83) considering total crashes**. The benefit to cost ratio **considering only target crashes is 0.35**. 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 three 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



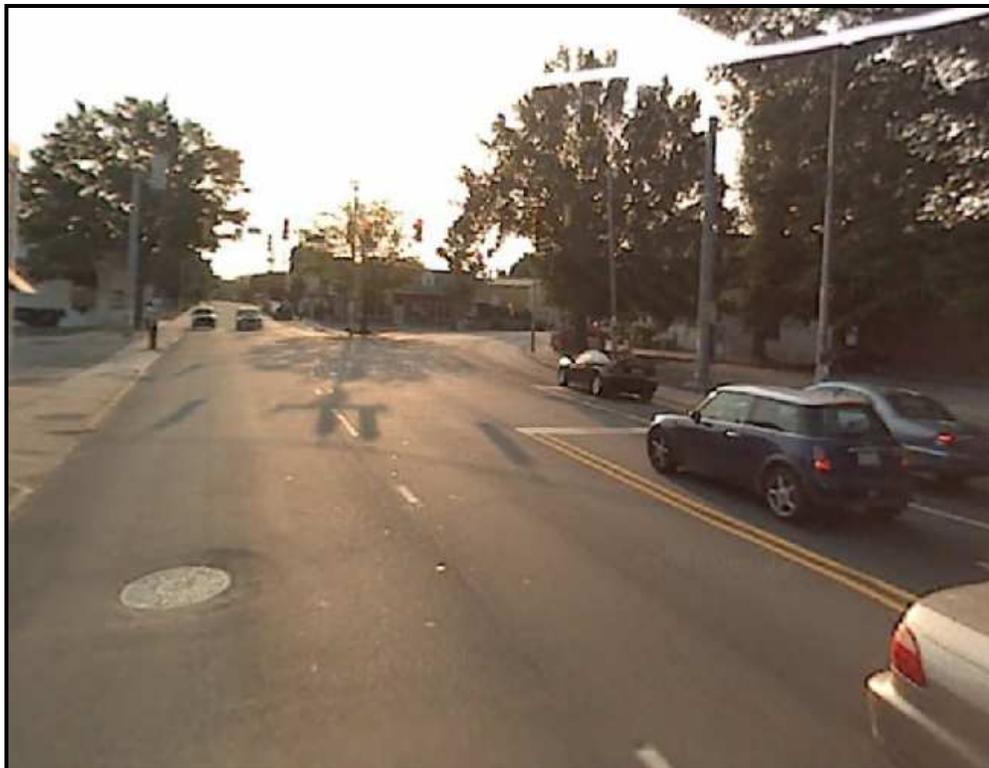
Traveling West on Rosemary Street approaching intersection



Intersection Countermeasures: Crosswalks and Ped Heads



Traveling North / Northwest on SR 1010 (East Main Street)
Vehicles can only make a left turn / stay straight onto East Main Street



Traveling East on SR 1010 (East Main Street) approaching Rosemary Street

BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes

LOCATION: SR 1010 at Rosemary		BY: JBS						
COUNTY: Orange		DATE: 4/19/2010						
FILE NO.: SS 07-98-201		NOTES: Total Crashes						
DETAILED COST:	TYPE IMPROVEMENT - Crosswalks, Ped Heads, Signal Revision							
ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
Construction	\$55,000	10	0.149	\$8,197				
	\$0	0	0.000	\$0				
Right-of-Way	\$0	0	0.000	\$0				
TOTALS	\$55,000	10	0.149	\$8,197				
ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$200				
ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$150				
TOTAL ANNUAL COST=				\$8,547				
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	6.08	0	0.00	6	0.99	18	2.96	\$29,309
AFTER	6.08	1	0.16	3	0.49	8	1.32	\$96,250
Annual Benefits from Crash Cost Savings								(\$66,941)
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	(\$75,487)		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	-7.83		
TOTAL COST OF PROJECT		-	\$55,000	COMPREHENSIVE B/C RATIO		-	-7.83	

BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes

LOCATION: Main at Rosemary		BY: JBS						
COUNTY: Orange		DATE: 4/19/2010						
FILE NO.: SS 07-98-201		NOTES: Target Crashes - Ped & Bike						
DETAILED COST:	TYPE IMPROVEMENT - Crosswalks, Ped Heads, Signal Revision							
ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
Construction	\$55,000	10	0.149	\$8,197				
	\$0	0	0.000	\$0				
Right-of-Way	\$0	0	0.000	\$0				
TOTALS	\$55,000	10	0.149	\$8,197				
ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$200				
ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$150				
TOTAL ANNUAL COST=				\$8,547				
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	6.08	0	0.00	3	0.49	0	0.00	\$8,882
AFTER	6.08	0	0.00	2	0.33	0	0.00	\$5,921
Annual Benefits from Crash Cost Savings								\$2,961
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	(\$5,586)		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	0.35		
TOTAL COST OF PROJECT		-	\$55,000	COMPREHENSIVE B/C RATIO		-	0.35	

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		OILY
	RAN OFF ROAD		SPEED UNKNOWN		70 AND UP		



SR 1010
Main Street
20 MPH

Rosemary Street
20 MPH

SR 1010
Main Street
20 MPH

SS# 07-98-201
Orange County
City of Carrboro
BEFORE Period
11/1/97 - 11/30/03



Existing Signalized
Intersection
Sig ID 07-0500



Ped / Bike
Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

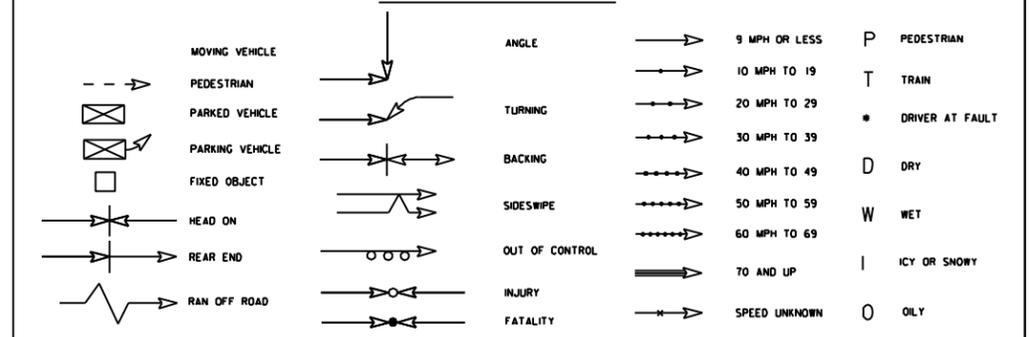
	COLLISION DIAGRAM	
	DIVISION: 7	AREA:
	STUDY PERIOD: 11/1/1997 - 11/30/03	
	DISTANCE: Y-LINE = 150 FT	
ANALYSIS PREPARED BY: JBS		
ANALYSIS CHECKED BY: BR		
DIAGRAM PREPARED BY: JBS		
DIAGRAM REVIEWED BY: ST		
SCALE: NOT TO SCALE		
DATE: 4-16-2010		
LOG NUMBER: SS* 07-98-201 BEFORE		

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



Countermeasures:
 1- Install 2 Crosswalks
 2 - Install Ped Signal Heads
 3 - Remove Freeflow Right Turn Lane

LEGEND



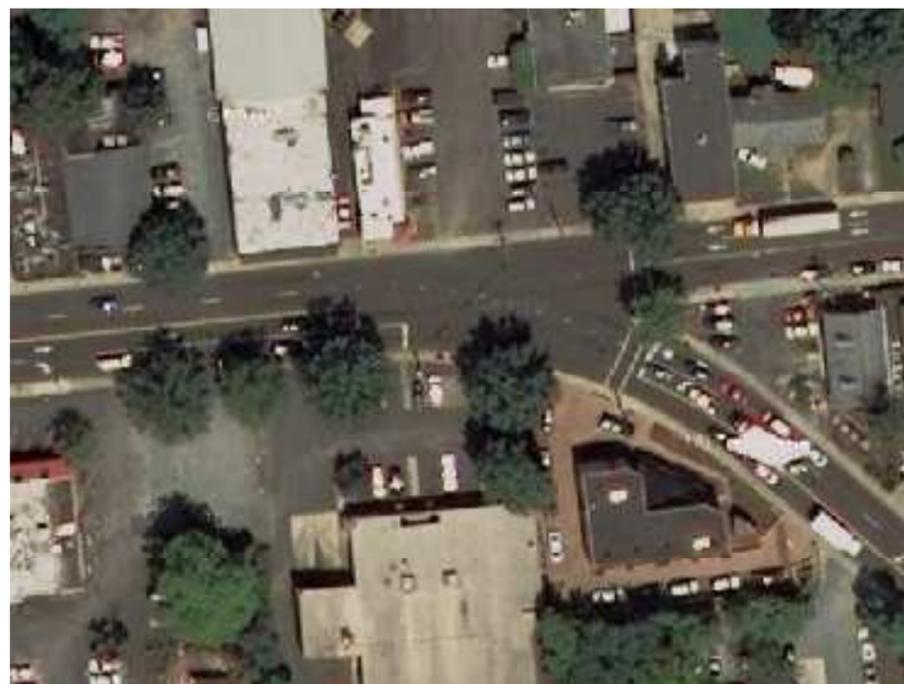
SR 1010
Main Street
20 MPH

Rosemary Street
20 MPH

SS# 07-98-201
Orange County
City of Carrboro
AFTER Period
2/1/04 - 2/28/10



Upgraded
Intersection Signal
Sig ID 07-0500



SR 1010
Main Street
20 MPH

Ped / Bike
Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 7	AREA:
	STUDY PERIOD: 2/1/2004 - 2/28/2010	
	DISTANCE: Y-LINE = 150FT	
ANALYSIS PREPARED BY: JBS		
ANALYSIS CHECKED BY: BR		
DIAGRAM PREPARED BY: JBS		
DIAGRAM REVIEWED BY: ST		
SCALE: NOT TO SCALE		
DATE: 4-16-2010		
LOC NUMBER: SS* 07-98-201 AFTER		

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