

Spot Safety Project Evaluation

Project Log # 200702029

Spot Safety Project # 08-02-200

Spot Safety Project Evaluation of the Traffic Signal Phasing Revisions at the Intersection of NC 62 and SR 1547 (Finch Farm Rd / Unity Street) Randolph 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

Jason B. Schronce

11-5-2007
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 08-02-200 – The Intersection of NC 62 at SR 1547 (Finch Farm Rd / Unity Street) in Randolph County.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the addition of left turn protected-permitted phasing on the NC 62 approaches of the existing signal at the intersection. NC 62 and SR 1547 (Unity Street) are both 2-lane roads that widen at the intersection to include left turning lanes with speed limits of 45 mph. The westbound approach of NC 62 also contains a right turn lane onto Unity Street. SR 1547 (Finch Farm Road) is a 4-lane roadway segment with a 45 mph speed limit that acts as a connector between I-85 and NC 62. The subject intersection is a 4-leg intersection which was controlled by a traffic signal in the before period with permissive left turns on all approaches.

The signal phasing revisions were recommended to alleviate the pattern of left turn same roadway type collisions on NC 62. From the field investigation, sight distance was observed to be a factor travelling both approaches of NC 62 due to rolling terrain.

The initial crash analysis was completed from September 30, 1998 to September 30, 2001 with 19 reported crashes; 7 of which are considered correctable by the countermeasure in review. The seven correctable crashes resulted in 2 “B” and 10 “C” type injuries. The final completion date for the improvement at the subject intersection was on December 20, 2002 with a total cost of \$5,000.00.

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 November 1, 2002 to January 31, 2003. The before period consisted of reported crashes from January 1, 1999 through October 31, 2002 (3 years and 10 months) and the after period consisted of reported crashes from February 1, 1999 through November 30, 2006 (3 years and 10 months). The ending date for this analysis was determined by the available crash data at the time the analysis was completed.

The treatment data consisted of all reported crashes within 150 feet of the intersection. Please see attached *Location 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 crashes involving vehicles traveling on NC 62 were the target crashes for the applied countermeasure.

Treatment Information			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	21	19	- 9.52
Total Severity Index	9.54	9.66	1.26
Target Crash Severity Summary			
Target Crashes	7	2	- 71.43
Target Crash Severity Index	7.34	4.70	- 35.97
Volume	14,400	14,500	0.69
Target Crash Severity Summary			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	2	0	- 200.00
Class C Crashes	4	1	- 75.00
PDO Crashes	1	1	N/A

The naive before and after analysis at the treatment location resulted in a 9.5 percent decrease in Total Crashes, a 71 percent decrease in Target Crashes, a 36 percent decrease in the Target Severity Index, and a slight percent increase in Average Daily Traffic (ADT). The before period ADT year was 2000 and the after period ADT year was 2004.

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 9.5 percent decrease in Total Crashes and a 71 percent decrease in Target Crashes, with a slight percent increase in ADT. The Total Severity Index increased by 1.26 percent and the Target Crash Severity Index decreased by 36 percent. 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*, the protected-permitted phasing accomplished the desired goal as target crashes have reduced by 71 percent. Other crash patterns have remained consistent at the intersection from the before to the after period. Also, no new patterns have appeared to develop in the after period since the phasing additions.

The calculated benefit to cost ratio for this project is 7.26 considering total crashes. The benefit to cost ratio considering only target crashes is 18.14. 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.

TREATMENT SITE PHOTOS TAKEN 4/25/2007



Traveling North on SR 1547 (Finch Farm Rd)



Traveling South on SR 1547 (Unity Street)



Traveling East on NC 62 (Notice Sight Distance issues of the Intersection)



Traveling East on NC 62 (at the crest of the hill)



Traveling West on NC 62

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: NC 62 at SR 1547

BY: JBS

COUNTY: Randolph

DATE: 5/1/2007

FILE NO.: SS 08-02-200

NOTES: Total Crashes

DETAILED COST: TYPE IMPROVEMENT - **New Signal Phasing**

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$5,000	10	0.149	\$745
Right-of-Way	\$0	0	0.000	\$0
	\$0	0	0.000	\$0
TOTALS	\$5,000	10	0.149	\$745

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$400
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$150
 TOTAL ANNUAL COST= \$1,295
 TOTAL COST OF PROJECT= \$5,000

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	3.83	1	0.26	14	3.66	6	1.57	\$202,454
AFTER	3.83	1	0.26	12	3.13	6	1.57	\$193,055

Annual Benefits from Crash Cost Savings \$9,399

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$8,104

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 7.26

TOTAL COST OF PROJECT - \$5,000 COMPREHENSIVE B/C RATIO - 7.26

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: NC 62 at SR 1547

BY: JBS

COUNTY: Randolph

DATE: 5/1/2007

FILE NO.: SS 08-02-200

NOTES: Target Crashes

DETAILED COST: TYPE IMPROVEMENT - Shoulder Guardrail

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$5,000	10	0.149	\$745
	\$0	0	0.000	\$0
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$5,000	10	0.149	\$745

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$400
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$150
 TOTAL ANNUAL COST= \$1,295
 TOTAL COST OF PROJECT= \$5,000

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	3.83	0	0.00	6	1.57	1	0.26	\$29,217
AFTER	3.83	0	0.00	1	0.26	1	0.26	\$5,718

Annual Benefits from Crash Cost Savings \$23,499

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$22,204

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 18.14

TOTAL COST OF PROJECT - \$5,000 COMPREHENSIVE B/C RATIO - 18.14

SR 1547
Unity Street

Circle J
Mart

NC-62

45 MPH

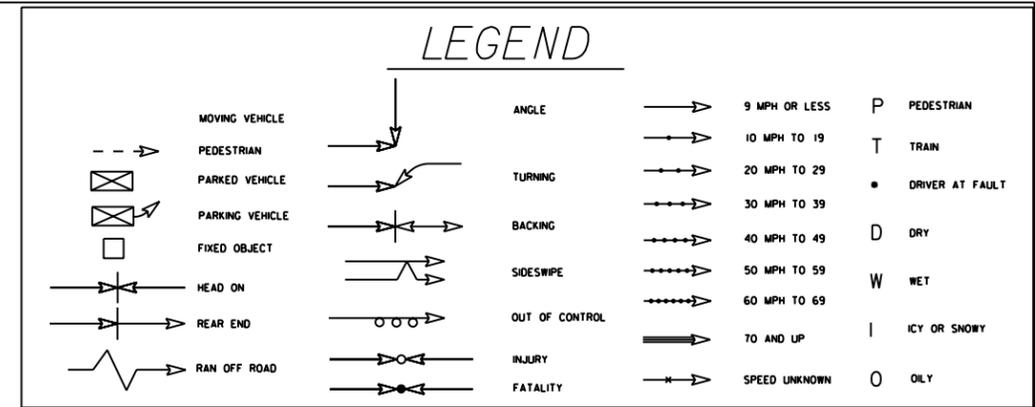
45 MPH

45 MPH to 55 MPH

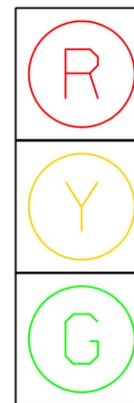
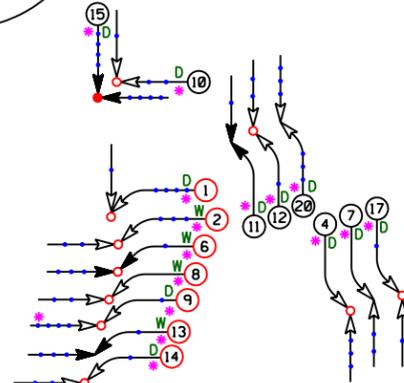
NC-62

45 MPH

SR 1547
Finch Farm Rd



SS# 08-02-200
Randolph County
Before Period
1/1/99 - 10/31/02
NC-62 at SR 1547



Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 8	AREA: 1
	STUDY PERIOD: 1/1/1999 TO 10/31/2002	
	DISTANCE: Y-LINE = 150FT	
ANALYSIS PREPARED BY: JBS		
ANALYSIS CHECKED BY: SDC		
DIAGRAM PREPARED BY: JBS		
DIAGRAM REVIEWED BY: ST		
SCALE: Not To Scale		
DATE: 3-26-2007		
LOG NUMBER: SS* 08-02-200		

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



SR 1547
Unity Street

Circle J
Mart

NC-62

45 MPH to 55 MPH

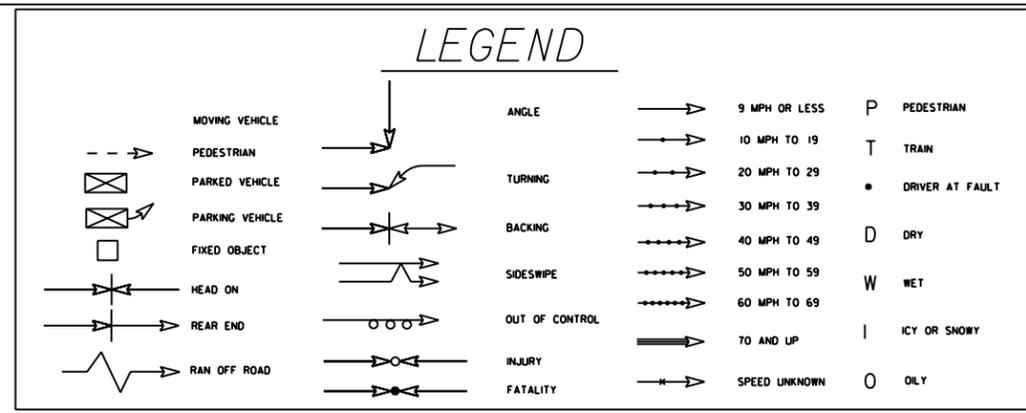
NC-62

45 MPH

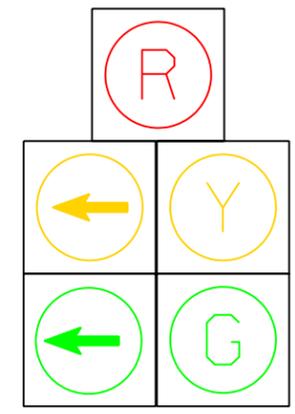
45 MPH

45 MPH

SR 1547
Finch Farm Rd



SS# 08-02-200
 Randolph County
 After Period
 2/1/03 - 11/30/06
 NC-62 at SR 1547



New Phasing on NC-62
 Left Turn Protected

Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 8	AREA:
	STUDY PERIOD: 2/1/2003 TO 11/30/2006	
	DISTANCE: Y-LINE = 150FT	
ANALYSIS PREPARED BY: JBS		
ANALYSIS CHECKED BY: SDC		
DIAGRAM PREPARED BY: JBS		
DIAGRAM REVIEWED BY: ST		
SCALE: Not To Scale		
DATE: 3-26-2007		
LOG NUMBER: SS* 08-02-200		

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