

Spot Safety Project Evaluation

Project Log # 200704276

Spot Safety Project # 01-02-224

**Spot Safety Project Evaluation of obstruction removal to improve sight distance along old US
64 in Tyrrell 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

Samuel D. Coleman, EI

3/4/2008
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 01-02-224 – Obstruction removal to improve sight distances along old US 64 in Tyrrell County.

Project Information and Background from the Project File Folder

US 64* is a two lane roadway with a speed limit of 55 mph. There are residences along this corridor whose driveways are hidden behind a combination of trees and sharp curves.

The original problem statement shows there were motorists entering US 64 from the driveways creating a hazard to those traveling on US 64. The original crash analysis yielded 19 total crashes from 12/1/1998 through 11/30/2001. There were 3 correctable crashes that yielded one Class B and one Class C injury. The improvement chosen for the subject location was to remove obstructions from the roadside for better visibility. The final completion date for the improvement at the subject location was on October 2, 2002 at a total cost of \$10,000.

*Please note that the subject roadway is now called NC 94 due to the addition of the new US 64 corridor from Travis to Columbia, NC.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes along the subject road, the crash data omitted from this analysis to consider for an adequate construction period was from September 2002 through November 2002. The before period consisted of reported crashes from May 1, 1998 through August 31, 2002 (4 years, 4 months) and the after period consisted of reported crashes from December 1, 2002 through March 31, 2007 (4 years, 4 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 consisted of all crashes from MP 4.828 to MP 5.602 with a 0' y-line. The following data table depicts the Naive Before and After Analysis for the above information. Please note that Run off Road crash types were the target crashes for the applied countermeasures. These crash types considered are as follows: Ran off Road-right, left, or straight, Overturn/Rollover, Fixed Object, Head On, and Sideswipe, same direction.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	18	13	-27.8
Total Severity Index	6.9	8.0	16.2
Target Crashes	6	2	-66.7
Target Severity Index	14.9	42.6	186.5
Volume	5900	670	-88.6
<u>Treatment Injury Crashes</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal	0	0	N/A
Class A	1	1	0.0
Class B	3	1	-66.7
Class C	1	1	0.0
Property Damage Only	13	10	-23.1
<u>Target Injury Crashes</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal	0	0	N/A
Class A	1	1	0.0
Class B	1	0	-100.0
Class C	0	1	N/A
Property Damage Only	4	0	-100.0

Table 1.

The naive before and after analysis at the treatment location resulted in a 28 percent decrease in Total Crashes, a 66 percent decrease in Run off Road type Crashes and an 89 percent decrease in ADT. The before period ADT year was 2000 and the after period ADT year was 2006.

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 28 percent decrease in Total Crashes and a 66 percent decrease in Run off Road type Crashes. The summary results above demonstrate that the treatment location appears to have had a decrease in the number of Total Crashes and a decrease in the number of Run off Road type Crashes from the before to the after period.

Photos taken during the field investigation show numerous warning signs indicating limited sight distance, curve ahead, and recommended reduced speeds. Visually the curves did not show significant superelevation for a 55 mph roadway. The sight distance seemed to be adequate when traveling through the curves at or below the recommended speeds.

The Benefit-Cost analysis worksheets and Table 1 both show a decrease in crashes. Table 2 and 3 are included to show other information noticed in the collision diagrams and report summaries.

Treatment Crashes				
		Before	After	% change
Day	non animal	8	4	-50.0
	wet	3	1	-66.7
	animal	2	3	50.0
 				
Night	non animal	2	0	-100.0
	wet	2	1	-50.0
	animal	6	6	0.0
 				
Total	non animal	10	4	-60.0
	wet	5	2	-60.0
	animal	8	9	12.5

Table 2

Target Crashes				
		Before	After	% change
Day	non animal	5	2	-60.0
	wet	2	1	-50.0
 				
Night	non animal	1	0	-100.0
	wet	1	0	-100.0
 				
Total	non animal	6	2	-66.7
	wet	3	1	-66.7

Table 3

The calculated benefit to cost ratio for this project is 2.85 considering total crashes. The benefit to cost ratio considering only target crashes is 0.93. 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.

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 road.



Location Map: US 64 from SR 1112 to SR 1228.

TREATMENT BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: Old US 64/NC 94
 COUNTY: Tyrrell
 FILE NO.: SS 01-02-224

BY: SDC
 DATE: 10/24/2007

DETAILED COST: TYPE IMPROVEMENT - Obstruction Removal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$9,500	20	0.102	\$968
	\$0	0	0.000	\$0
Right-of-Way	\$500	0	0.000	\$0
TOTALS	\$10,000	23	0.097	\$968

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$2,000
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$900
 TOTAL ANNUAL COST= \$3,868
 TOTAL COST OF PROJECT= \$10,000

COMPREHENSIVE COST REDUCTION:

TIME PERIOD	YEARS	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES						ANNUAL COSTS
		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	
BEFORE	4.33	1	0.23	4	0.92	13	3.00	\$143,811
AFTER	4.33	1	0.23	2	0.46	10	2.31	\$132,794

Annual Benefits from Crash Cost Savings \$11,016

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$7,149
 BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 2.85

TOTAL COST OF PROJECT - \$10,000 COMPREHENSIVE B/C RATIO - 2.85

TARGET BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: Old US 64/NC 94
 COUNTY: Tyrrell
 FILE NO.: SS 01-02-224

BY: SDC
 DATE: 10/24/2007

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		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	
BEFORE	4.33	1	0.23	1	0.23	4	0.92	\$123,233
AFTER	4.33	1	0.23	1	0.23	0	0.00	\$119,630

Annual Benefits from Crash Cost Savings \$3,603

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$265)
 BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 0.93

TOTAL COST OF PROJECT - \$10,000 COMPREHENSIVE B/C RATIO - 0.93

Treatment Site Photos taken October 24, 2007



Driving west on NC 94



Driving west on NC 94



Driving west on NC 94



Driving east on NC 94



Driving east on NC 94



Driving east on NC 94

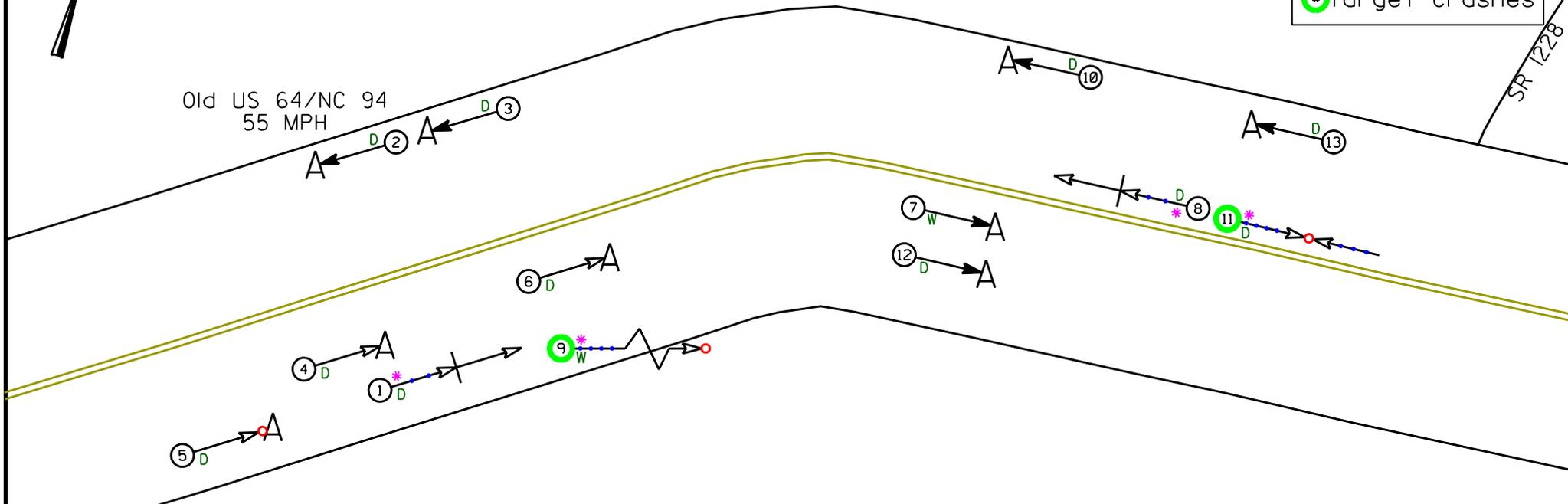
Tyrrell County
 Treatment Site - Total Crashes
 After Period
 December 1, 2002 - March 31, 2007
 (4 years, 4 months)



LEGEND			
	vehicle		pedestrian
	bicycle		truck
	other at fault		driver
	speed violation		wet
	other driver		ice
	out of control		
	night		
	fatigue		

Target Crashes

Old US 64/NC 94
 55 MPH



	TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT HIGHWAY SAFETY IMPROVEMENT PROGRAM	COLLISION DIAGRAM DIVISION: _____ AREA: _____ STUDY PERIOD: 12/2002 TO 3/31/2007 DISTANCE: _____ T-LENGTH: 150 FT ANALYSIS PREPARED BY: S. COLEMAN DIAGRAM PREPARED BY: S. COLEMAN DIAGRAM REVIEWED BY: _____
	SAFETY EVALUATION: BEETLE OBSTRUCTION REMOVAL	TRAFFIC SAFETY: _____ SCALE: NOT TO SCALE DATE: MARCH 2007 LOG NUMBER: _____
	N.C. DEPARTMENT of TRANSPORTATION DIVISION of HIGHWAYS TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH	