

Spot Safety Project Evaluation

Project Log # 200704273

Spot Safety Project # 01-01-207

Spot Safety Project Evaluation of the Traffic Signal Installation at NC 12 and SR 1493 in Dare County

Documents Prepared By:

Safety Evaluation Group
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Principal Investigator

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2/29/2008
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 01-01-207 – Traffic Signal Installation at NC 12 and SR 1493 in Dare County.

Project Information and Background from the Project File Folder

NC 12, Ocean Blvd, and Virginia Dare Trail all connect to form a four-leg intersection. NC 12 makes a 90-degree turn at the intersection with Virginia Dare Trail. NC 12, along with Ocean Blvd., makes up the northern leg of the intersection and then continues on to form the east leg. Virginia Dare Trail shares the east leg with NC 12 and continues on the west leg. The southern leg is a connector between US 158 and NC 12 / Ocean Blvd. / Virginia Dare Trail. The speed limit at all approaches is 35 mph.

The original problem statement shows there was congestion during the tourist season. The congestion along with some sight distance issues were catalysts for an improvement. The countermeasure chosen to alleviate the problems was a full phase traffic signal. The traffic signal installation was completed on 5/30/2002 at a cost of \$40,000.

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 April 2002 through June 2002. The before period consisted of reported crashes from July 1, 1997 through March 31, 2002 (4 years, 9 months) and the after period consisted of reported crashes from July 1, 2002 through March 31, 2007 (4 years, 9 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 within 150 feet of the subject intersection. The following data table depicts the Naive Before and After Analysis for the above information. Please note that Frontal Impact crash types influenced by the implemented countermeasure were the target crashes for the treatment location. These crash types considered are as follows: Left Turn, same roadway; Left Turn, different roadway; Right Turn, same roadway; Right Turn, different roadway; Head On, and Angle. The target crashes are clearly identified in the before and after period collision diagrams.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	18	35	94.4
Total Severity Index	6.0	2.1	-65.9
Frontal Impact Crashes	12	19	58.3
Frontal Severity Index	2.2	2.6	14.5
Volume	21400	21700	1.4
<u>Treatment Injury Crashes</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal	0	0	N/A
Class A	1	0	-100.0
Class B	1	1	0.0
Class C	1	4	300.0
Property Damage Only	15	30	100.0
<u>Frontal Injury Crashes</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal	0	0	N/A
Class A	0	0	N/A
Class B	1	0	-100.0
Class C	1	4	300.0
Property Damage Only	10	15	50.0

Table 1.

The naive before and after analysis at the treatment location resulted in a 94 percent increase in Total Crashes, a 58 percent increase in Frontal Impact Crashes, and a one percent increase in Average Daily Traffic (ADT). The before period ADT year was 1999 and the after period ADT year was 2004.

Results and Discussion

The naïve before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 94 percent increase in Total Crashes and a 58 percent increase in Frontal Impact Crashes. The summary results above demonstrate that the treatment location appears to have had an increase in the number of Total Crashes and an increase in the number of Frontal Impact Crashes from the before to the after period.

The after period collision diagram shows 11 left turn crashes and 8 angle crashes. The angle crashes may be a result of vehicles attempting to cross during the yellow interval of the signal phase. The left turn crashes may have been a result of poor gap selection which was later addressed.

There is a protected/permitted left turn phase that was noted during the field investigation on the north and south legs of the intersection. This phasing was added as part of a repaving and widening project at the intersection in May and June of 2007. There were no reported frontal impact crashes at the intersection since October 2006.

To check the benefit of the added phase, a suggestion was made that the intersection be monitored during the peak season from May 2007 to September 2007 for any crash reduction once the crash data becomes available.

The calculated benefit to cost ratio for this project is 9.78 considering total crashes. The benefit to cost ratio considering only target crashes is -1.39. 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.

TREATMENT SITE BENEFIT-COST ANALYSIS

LOCATION: NC 12 at SR 1493
 COUNTY: Dare
 FILE NO.: SS 01-01-207

BY: S Coleman
 DATE: 10/29/2007

DETAILED COST: TYPE IMPROVEMENT - Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$40,000	10	0.149	\$5,961
	\$0	0	0.000	\$0
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$40,000	10	0.149	\$5,961

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$2,000
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$900
 TOTAL ANNUAL COST= \$8,861
 TOTAL COST OF PROJECT= \$40,000

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	4.75	1	0.21	2	0.42	15	3.16	\$132,526
AFTER	4.75	0	0.00	5	1.05	30	6.32	\$45,895

Annual Benefits from Crash Cost Savings \$86,632

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$77,770

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 9.78

TOTAL COST OF PROJECT - \$40,000 COMPREHENSIVE B/C RATIO - 9.78

TARGET CRASH BENEFIT-COST ANALYSIS

LOCATION: NC 12 at SR 1493
 COUNTY: Dare
 FILE NO.: SS 01-01-207

BY: S Coleman
 DATE: 10/29/2007

DETAILED COST: TYPE IMPROVEMENT - Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$40,000	10	0.149	\$5,961
	\$0	0	0.000	\$0
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$40,000	10	0.149	\$5,961

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$2,000
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$900
 TOTAL ANNUAL COST= \$8,861
 TOTAL COST OF PROJECT= \$40,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

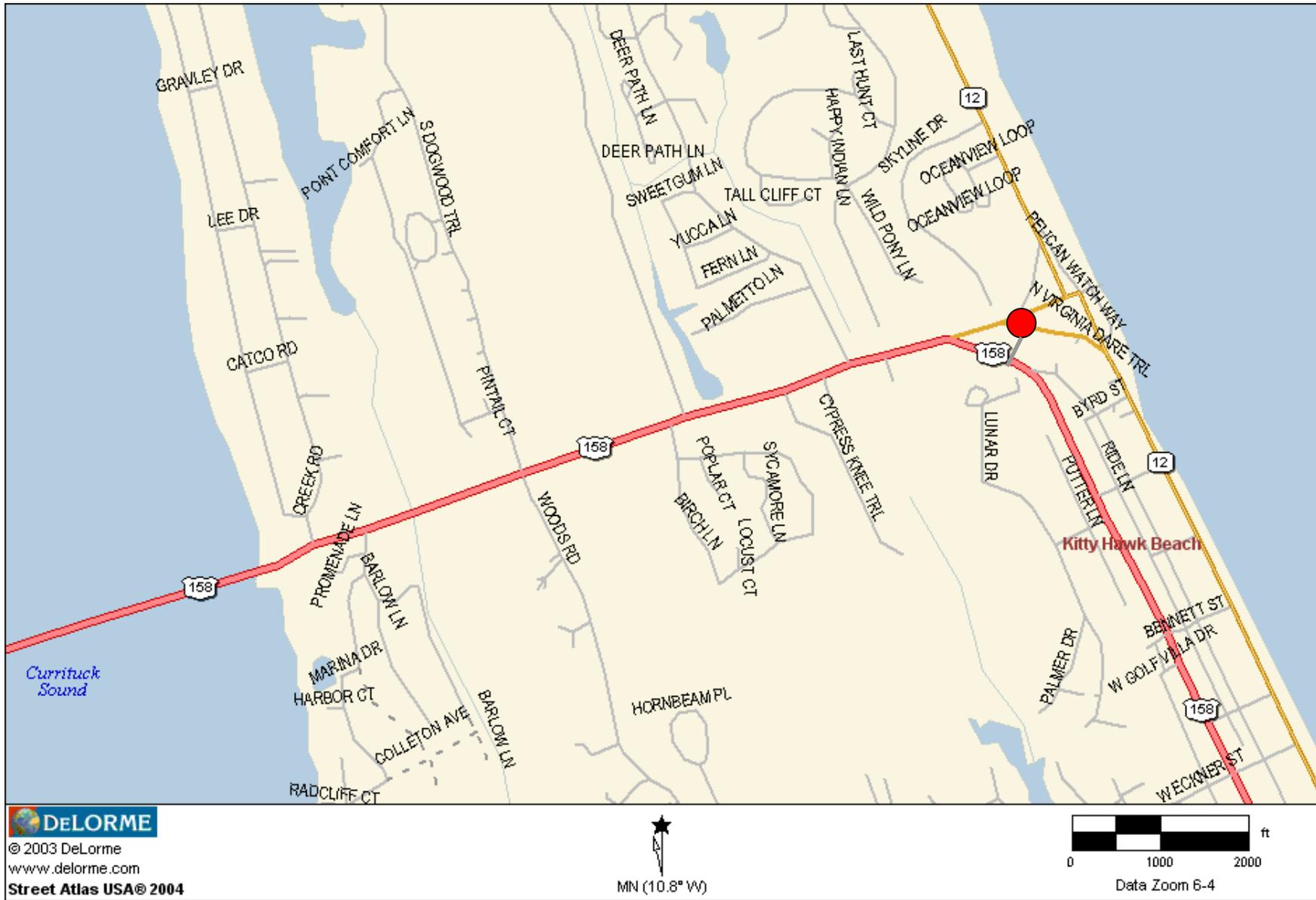
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	4.75	0	0.00	2	0.42	10	2.11	\$16,632
AFTER	4.75	0	0.00	4	0.84	15	3.16	\$28,947

Annual Benefits from Crash Cost Savings (\$12,316)

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$21,177)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = -1.39

TOTAL COST OF PROJECT - \$40,000 COMPREHENSIVE B/C RATIO - -1.39



Location Map: NC 12 at SR 1493 / Virginia Dare Trail.

Treatment Site Photos taken October 24, 2007



On Ocean Blvd driving south



On Ocean Blvd driving north



On NC 12 driving west



On NC 12 driving west



On NC 12 driving east

