

Spot Safety Project Evaluation

Project Log # 200704274

Spot Safety Project # 01-01-218

**Spot Safety Project Evaluation of the Traffic Signal Installation at US 158 at Carolista
Dr./Hollowell St. in Dare County**

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
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Principal Investigator

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2/29/08
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 01-01-218 – Traffic Signal Installation at US 158 at Carolista Dr./Hollowell St. in Dare County.

Project Information and Background from the Project File Folder

US 158 is a five lane facility with two lanes in each direction and a center turn lane. The speed limit is 50 mph. Carolista Dr. (the entrance to Jockey's Ridge State Park) and Hollowell St. are two lane thru streets with speed limits of 25 mph. The intersection was controlled by a stop condition on Carolista Dr. and Hollowell St..

The original problem statement shows there was congestion during the tourist season that impeded safe traffic flow from the side streets. The countermeasure chosen to alleviate the problem was a full phase traffic signal. The traffic signal installation was completed on 6/7/2002 at a cost of \$75,000.

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 May 2002 through July 2002. The before period consisted of reported crashes from September 1, 1997 through April 30, 2002 (4 years, 8 months) and the after period consisted of reported crashes from August 1, 2002 through March 31, 2007 (4 years, 8 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	4	8	100.0
Total Severity Index	21.8	4.7	-78.4
Frontal Impact Crashes	2	0	-100.0
Frontal Severity Index	38.9	0.0	-100.0
Volume	29000	40000	37.9
<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	0	3	N/A
Property Damage Only	2	4	100.0
<u>Frontal Injury Crashes</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal	0	0	N/A
Class A	1	0	-100.0
Class B	0	0	N/A
Class C	0	0	N/A
Property Damage Only	1	0	-100.0

Table 1.

The naive before and after analysis at the treatment location resulted in a 100 percent increase in Total Crashes, a 100 percent decrease in Frontal Impact Crashes, and a 38 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 100 percent increase in Total Crashes and a 100 percent decrease 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 a decrease in the number of Frontal Impact Crashes from the before to the after period.

Despite the increase in crashes there is a significant reduction in severity and frontal impact crashes. Adding the signal at this intersection seems to be successful as a preventative measure for frontal impact crashes. There were no reported fatalities in the before or after period, and no further reported angle crashes in the after period.

The calculated benefit to cost ratio for this project is 7.15 considering total crashes. The benefit to cost ratio considering only target crashes is 8.21. 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: US 158 at Carolista/Hollowell
 COUNTY: Dare
 FILE NO.: SS 01-01-218

BY: S Coleman
 DATE: 10/29/2007

DETAILED COST: TYPE IMPROVEMENT - Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$74,000	10	0.149	\$11,028
	\$0	0	0.000	\$0
Right-of-Way	\$1,000	0	0.000	\$0
TOTALS	\$75,000	10	0.147	\$11,028

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$2,000
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$900
 TOTAL ANNUAL COST= \$13,928
 TOTAL COST OF PROJECT= \$75,000

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	4.67	1	0.21	1	0.21	2	0.43	\$119,315
AFTER	4.67	0	0.00	4	0.86	4	0.86	\$19,786

Annual Benefits from Crash Cost Savings \$99,529

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$85,601
 BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 7.15

TOTAL COST OF PROJECT - \$75,000 COMPREHENSIVE B/C RATIO - 7.15

TARGET SITE BENEFIT-COST ANALYSIS

LOCATION: US 158 at Carolista/Hollowell
 COUNTY: Dare
 FILE NO.: SS 01-01-218

BY: S Coleman
 DATE: 10/29/2007

DETAILED COST: TYPE IMPROVEMENT - Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$74,000	10	0.149	\$11,028
Right-of-Way	\$1,000	0	0.000	\$0
TOTALS	\$75,000	10	0.147	\$11,028

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$2,000
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$900
 TOTAL ANNUAL COST= \$13,928
 TOTAL COST OF PROJECT= \$75,000

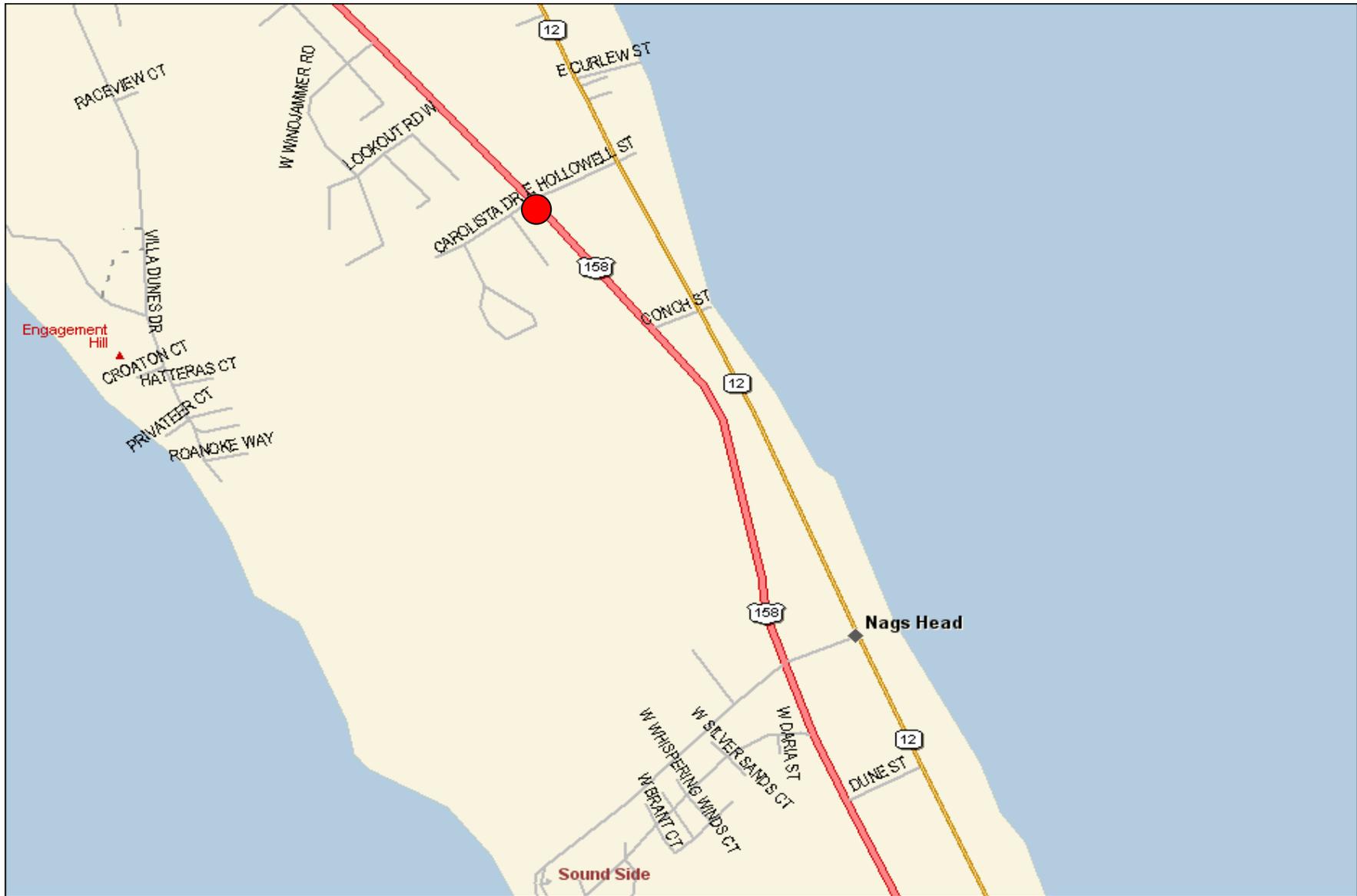
COMPREHENSIVE COST REDUCTION:

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	4.67	1	0.21	0	0.00	1	0.21	\$114,368
AFTER	4.67	0	0.00	0	0.00	0	0.00	\$0

Annual Benefits from Crash Cost Savings \$114,368

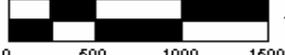
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$100,440
 BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 8.21

TOTAL COST OF PROJECT - \$13,928 COMPREHENSIVE B/C RATIO - 8.21



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MN (10.8° W)

 ft
0 500 1000 1500
Data Zoom 13-0

Location Map: US 158 at Carolista Dr. and Hollowell St.

Treatment Site Photos taken October 24, 2007



Driving west on Hollowell St.



Driving east on Carolista Dr.



Driving south on US 158



Driving north on US 158

