

Spot Safety Project Evaluation

Work Order #41000012228

Spot Safety Project # 04-06-203

**Spot Safety Project Evaluation of the Traffic Signal Installation at the Intersection of
SR 2398 (Industrial Park Dr.) and Venture Dr.
Johnston County**

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Transportation Mobility and Safety Division
North Carolina Department of Transportation

Principal Investigator



Brad Robinson, PE

6/16/2011

Date

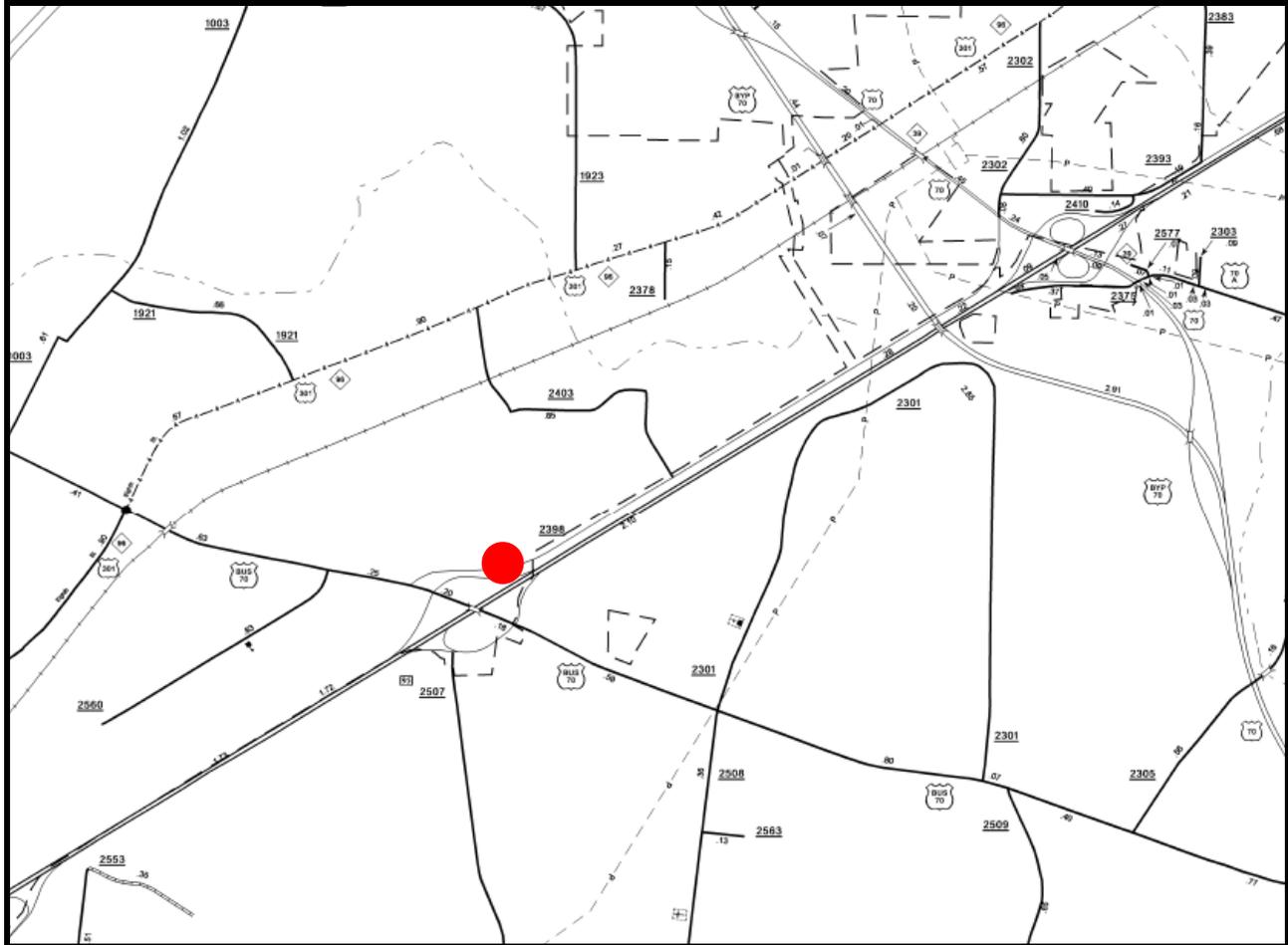
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 04-06-203 – The intersection of SR 2398 (Industrial Park Dr.) and Venture Dr. in Johnston County.

The signal number for this location is 04-1334.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was to install a traffic signal.

The subject location is a three-legged intersection. SR 2398 is a two lane roadway with an eastbound left turn lane and a westbound right turn lane on its approaches to Venture Dr. Venture Dr. is a city street with a right and a left turn lane onto SR 2398. The intersection was controlled by a stop sign on Venture Dr. prior to the signal installation.

The original statement of problem was the traffic volumes and crashes were increasing due to the major regional shopping center located in the area.

The initial crash analysis was conducted from December 1, 2000 to November 30, 2005 with a total of 15 reported crashes. The final completion date for the improvements at the subject intersection was on February 14, 2007 with a total cost of \$43,750.00.

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 January 1, 2007 to March 31, 2007. The before period consisted of reported crashes from January 1, 2003 through December 31, 2006 (4 years) and the after period consisted of reported crashes from April 1, 2007 through March 31, 2011 (4 years). The ending date for this analysis was limited by the available crash data at the time the analysis was conducted.

The treatment data consisted of all reported crashes within 150 feet of the subject intersection. The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Frontal Impact Crashes were the Target Crashes for the applied countermeasure. These crash types are considered as follows: Left Turn, same roadway; Left Turn, different 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	15	24	60.0
Total Severity Index	2.97	2.54	-14.5
Target Crashes	7	5	-28.6
Target Severity Index	3.11	3.96	27.3
Volume	10,000	11,000	10.0
<u>Target Crash Severity Summary</u>			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	1	1	0.0
Class C Crashes	1	1	0.0
PDO Crashes	5	3	-40.0

The naive before and after analysis at the treatment location resulted in a 60 percent increase in Total Crashes and a 29 percent decrease in Target Crashes. The before period ADT year was 2004 and the after period ADT year was 2009.

Results and Discussion

The increase in Total Crashes at the intersection can be attributed to a pattern of rear-end crashes that developed on SR 2398. In the before period there was only one rear-end crash involving a vehicle approaching the intersection on SR 2398. In the after period there were seven rear-end crashes on the eastbound approach and four rear-end crashes on the westbound approach, for a total of 11 crashes.

The after period Target Crashes included two left turn-same roadway crashes involving an eastbound vehicle turning left on Venture Dr. The other three were all frontal impact crashes involving a vehicle entering the intersection from Venture Dr. In all three of these crashes both drivers claimed to have a green light and the reporting officer was unable to determine who was at fault.

The calculated benefit to cost ratio for this project is -4.69 considering total crashes. The benefit to cost ratio considering only target crashes is 0.74 . 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*. 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.

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 2398 at venture dr
 COUNTY: Johnston
 FILE NO.: SS 04-06-203

BY: bdr
 DATE: 5/31/2011

DETAILED COST: TYPE IMPROVEMENT - Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$43,750	0	0.000	\$0
Right-of-Way	\$0	0	0.000	\$0

TOTALS \$43,750 #DIV/0! 0.000 \$0

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$2,000
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$900
 TOTAL ANNUAL COST= \$2,900
 TOTAL COST OF PROJECT= \$43,750

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES				PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR			
BEFORE	4.00	0	0.00	4	1.00	11	\$31,825	
AFTER	4.00	0	0.00	5	1.25	19	\$45,425	

Annual Benefits from Crash Cost Savings (\$13,600)

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$16,500)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = -4.69

TOTAL COST OF PROJECT - \$43,750 COMPREHENSIVE B/C RATIO - -4.69

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 2398 at venture dr
 COUNTY: Johnston
 FILE NO.: SS 04-06-203 Target Crashes Only

BY: bdr
 DATE: 5/31/2011

DETAILED COST: TYPE IMPROVEMENT - Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$43,750	0	0.000	\$0
Right-of-Way	\$0	0	0.000	\$0

TOTALS \$43,750 #DIV/0! 0.000 \$0

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 TOTAL ANNUAL COST= \$2,900
 TOTAL COST OF PROJECT= \$43,750

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	4.00	0	0.00	2	0.50	5	1.25	\$15,375
AFTER	4.00	0	0.00	2	0.50	3	0.75	\$13,225

Annual Benefits from Crash Cost Savings \$2,150

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$750)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 0.74

TOTAL COST OF PROJECT - \$43,750 COMPREHENSIVE B/C RATIO - 0.74

Treatment Site Photos Taken May 25, 2011



Driving eastbound on SR 2398 (Industrial Park Dr)



Driving westbound on SR 2398 (Industrial Park Dr)



Driving southbound on Venture Dr

SS# 04-06-203
 Order# 4100012228
 Johnston County
 BEFORE Period
 1/1/2003-12/31/2006

LEGEND			
	MOVING VEHICLE		ANGLE
	PEDESTRIAN		9 MPH OR LESS
	PARKED VEHICLE		10 MPH TO 19
	PARKING VEHICLE		TURNING
	FIXED OBJECT		20 MPH TO 29
	HEAD ON		30 MPH TO 39
	REAR END		40 MPH TO 49
	RAN OFF ROAD		50 MPH TO 59
			60 MPH TO 69
			70 AND UP
			SPEED UNKNOWN
			P PEDESTRIAN
			T TRAIN
			* DRIVER AT FAULT
			D DRY
			W WET
			I ICY OR SNOWY
			O OILY

Venture Drive
35 mph

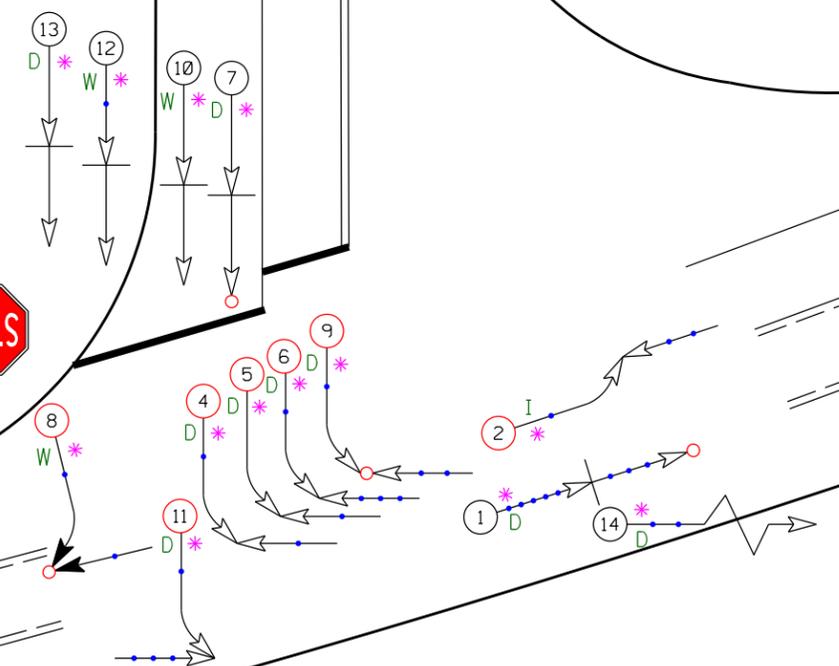
Metal Water Line Cover

ADT (YEAR)
8,000 (2004)

SR 2398
(Industrial Park Dr)
45 mph

SR 2398
(Industrial Park Dr)
45 mph

ADT (YEAR)
12,000 (2004)



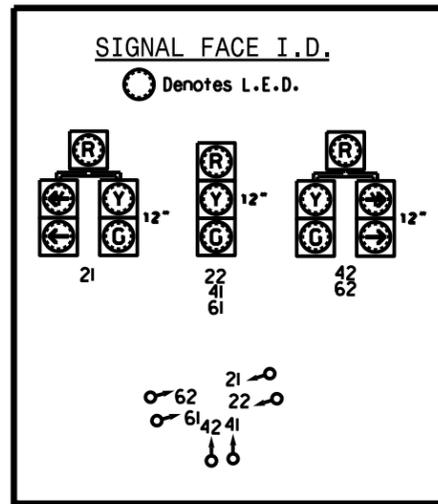
N.C. DEPARTMENT of TRANSPORTATION
 DIVISION of HIGHWAYS
 TRANSPORTATION MOBILITY and SAFETY DIVISION

TRAFFIC SAFETY UNIT

Date: May 2011 Prepared By: bdr

SS# 04-06-203
 Order# 4100012228
 Johnston County
 AFTER Period
 4/1/2007-3/31/2011

LEGEND			
	MOVING VEHICLE		ANGLE
	PEDESTRIAN		TURNING
	PARKED VEHICLE		BACKING
	PARKING VEHICLE		SIDESWIPE
	FIXED OBJECT		OUT OF CONTROL
	HEAD ON		INJURY
	REAR END		FATALITY
	RAN OFF ROAD		9 MPH OR LESS
			10 MPH TO 19
			20 MPH TO 29
			30 MPH TO 39
			40 MPH TO 49
			50 MPH TO 59
			60 MPH TO 69
			70 AND UP
			SPEED UNKNOWN
			P PEDESTRIAN
			T TRAIN
			* DRIVER AT FAULT
			D DRY
			W WET
			I ICY OR SNOWY
			O OILY



Venture Drive
 35 mph

ADT (YEAR)
 9,900 (2008)

SR 2398
 (Industrial Park Dr)
 45 mph

SR 2398
 (Industrial Park Dr)
 45 mph

ADT (YEAR)
 12,000 (2008)



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 DIVISION of HIGHWAYS
 TRANSPORTATION MOBILITY and SAFETY DIVISION

TRAFFIC SAFETY UNIT

Date: May 2011 Prepared By: bdr

