Spot Safety Project Evaluation

Project Log # 200908068

Spot Safety Project # 01-02-253

Spot Safety Project Evaluation of the Left Turn Lane Extension at the Intersection of NC 12 and East Dogwood Trail
Dare 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

Brad Robinson, PE

8/31/2009
Date

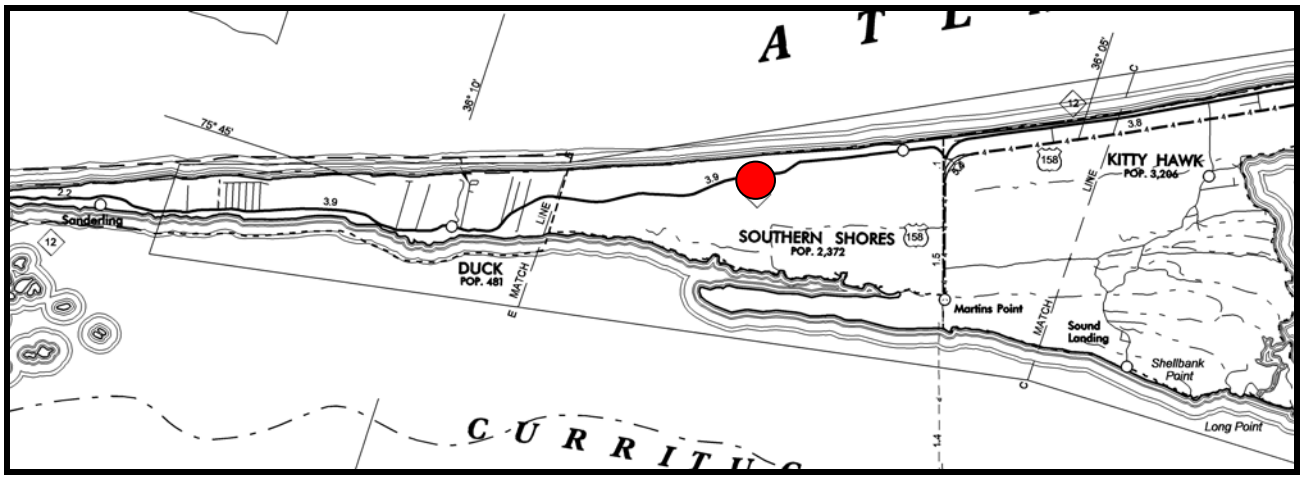
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 01-02-253 – The Intersection of NC 12 and East Dogwood Trail in Southern Shores, Dare County.

The Signal ID for the intersection is 01-0457.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was to extend the left turn lanes on both approaches of NC 12.

The subject location is a four-leg intersection which was controlled by a signal in both the before and the after periods. Prior to the turn lane construction there were short left turn lanes on both approaches of NC 12. The speed limit is 45 mph for NC 12 and 35 mph for East Dogwood Trail.

The original statement of problem was that heavy volumes on NC 12 had to wait for left turning vehicles queued beyond the end of the left turn lanes.

The initial crash analysis was conducted from June 1, 1999 to May 31, 2002 with one reported crash correctable crash. The final completion date for the improvements at the subject intersection was on November 19, 2004 with a total cost of $50,000.00.

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 October 1, 2004 to December 31, 2004. The before period consisted of reported crashes from April 1, 2000 through September 30, 2004 (4 years and 6 months) and the after period consisted of reported crashes from January 1, 2005 through June 30, 2009 (4 years and 6 months). 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 Left-Turn Same Roadway Crashes and Rear-End Crashes involving left turning vehicles on NC 12 were the Target Crashes for the applied countermeasure. The target crashes are clearly identified in the before and after period collision diagrams.

Treatment Information			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Total Crashes	4	9	125.0
Total Severity Index	2.85	3.47	21.8
Target Crashes	0	0	N/A
Target Crash Severity Index	0	0	N/A
Volume	11,000	11,000	0.0
Crash Severity Summary			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	1	1	0.0
Class C Crashes	0	2	N/A
PDO Crashes	3	6	100.0

The naive before and after analysis at the treatment location resulted in a 125 percent increase in Total Crashes, although no Target Crashes occurred in either the before or the after period. The before period ADT year was 2002 and the after period ADT year was 2007.

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 125 percent increase in Total Crashes. The Total Severity Index increased by 22. There were no Target Crashes in either time period. The summary results above demonstrate that although Total Crashes appear to have increased, Target Crashes appear unaffected at the treatment location from the before to the after period.

The calculated benefit to cost ratio for this project is -2.13 considering total crashes. 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 stated in the *Project Background*, the left turn lane extensions were more to alleviate congestion and clear queues created by left turning traffic more than for any safety benefits.

Six of the nine after period crashes were Rear-End Crashes on NC 12 that occurred on the through-right lane just prior to the intersection. There were no crashes of this type in the before period. There is no apparent reason for emergence of this crash pattern.

Please see the attached *Site Photos*. The *Site Photos* were obtained from Google Street-view. 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: NC 12 and East Dogwood Trail BY: BDR
COUNTY: Dare DATE: 8/28/2009
FILE NO.: SS 01-02-253

DETAILED COST: TYPE IMPROVEMENT - Left Turn Lane Extention

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$0	0	0.000	$0
	$50,000	20	0.102	$5,093
Right-of-Way	$0	0	0.000	$0
TOTALS	$50,000	20	0.102	$5,093

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $400
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $0

TOTAL ANNUAL COST= $5,493
TOTAL COST OF PROJECT= $50,000

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	4.50	0	0.00	1	0.22	3	0.67	$7,244
AFTER	4.50	0	0.00	3	0.67	6	1.33	$18,933

Annual Benefits from Crash Cost Savings ($11,689)

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = ($17,181)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = -2.13

TOTAL COST OF PROJECT - $50,000 COMPREHENSIVE B/C RATIO - -2.13

Treatment Site Photos from Google Street-View

Looking North on NC 12

Looking South on NC 12.

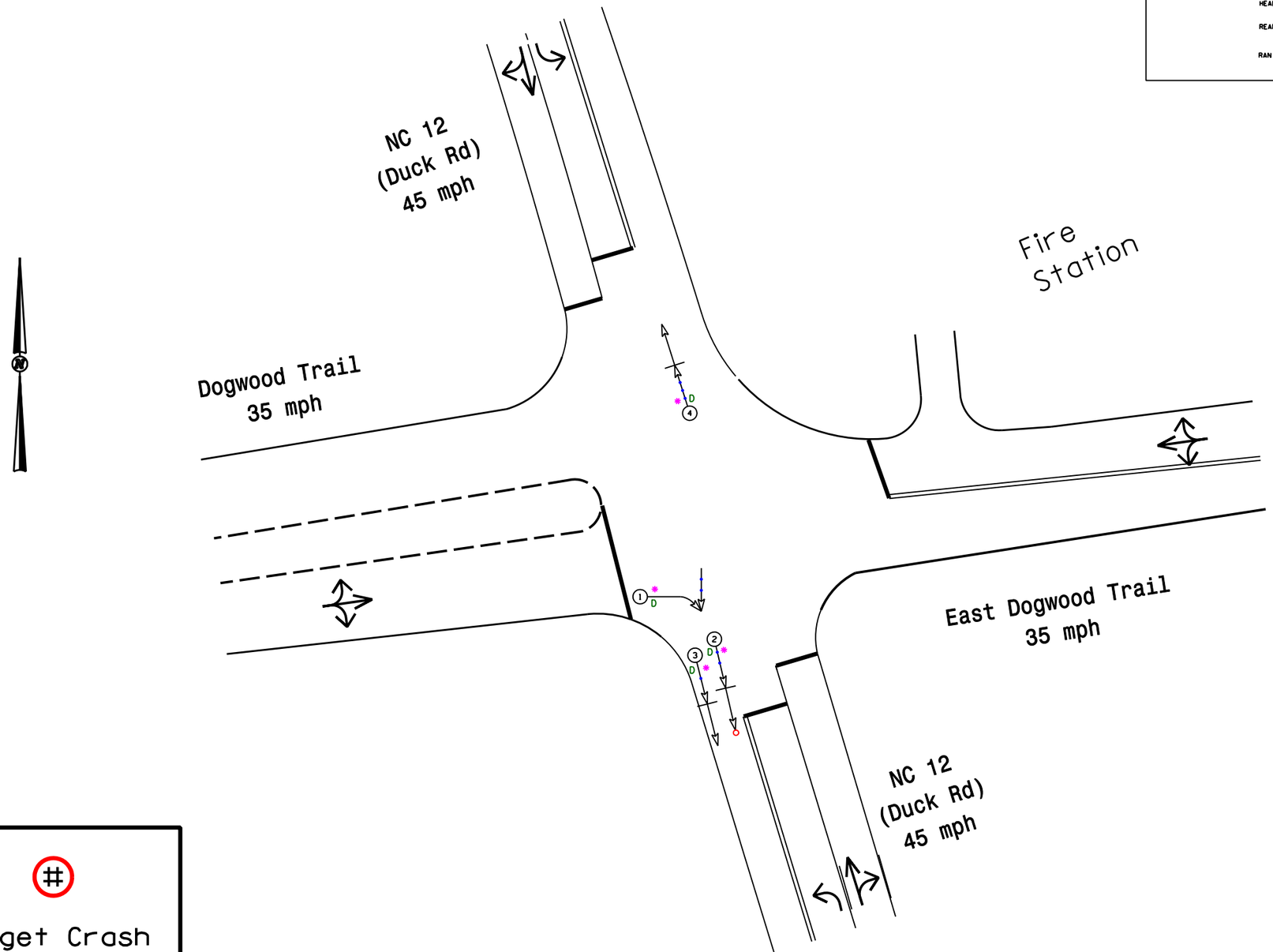
Looking East on East Dogwood Trail

Looking West on East Dogwood Trail

Dare County
NC 12 and East Dogwood Trail
BEFORE Period
4/1/2000-9/30/2004

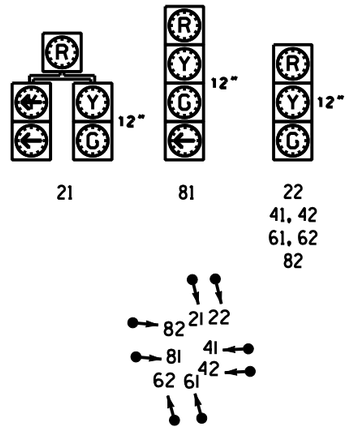
LEGEND

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



SIGNAL FACE I.D.

Denotes L.E.D.



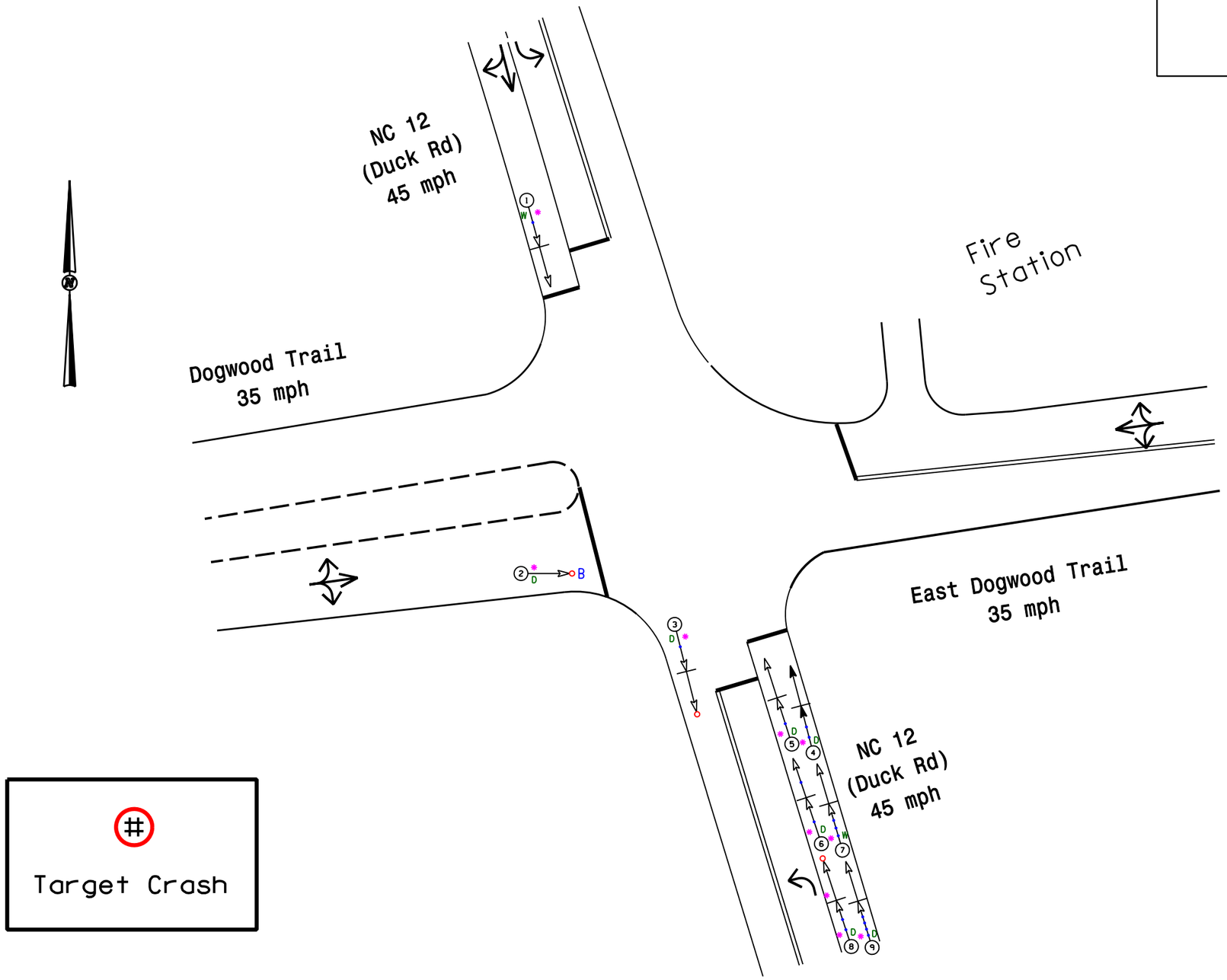
Target Crash

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM	
DIVISION: 1	AREA:
STUDY PERIOD: 4/1/00-9/30/04	
DISTANCE: Y-LINE = 150FT	
ANALYSIS PREPARED BY: BDR	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: BDR	
DIAGRAM REVIEWED BY:	
SCALE: NOT TO SCALE	
DATE: August 2009	
LOG NUMBER: 20090806	

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

Dare County
NC 12 and East Dogwood Trail
AFTER Period
1/1/2005-6/30/2009



Target Crash

LEGEND

MOVING VEHICLE	ANGLE	9 MPH OR LESS	P	PEDESTRIAN
		10 MPH TO 19	T	TRAIN
PARKED VEHICLE	TURNING	20 MPH TO 29	*	DRIVER AT FAULT
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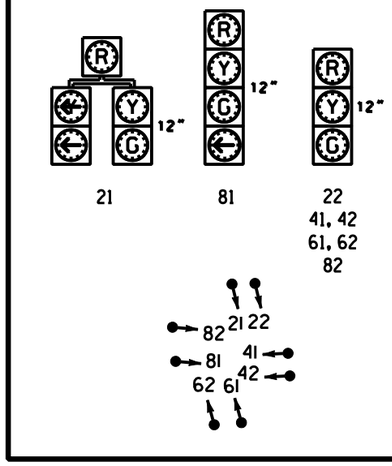
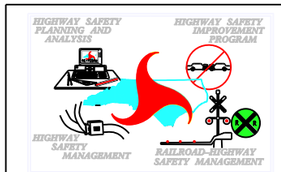


TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT



COLLISION DIAGRAM	
DIVISION: 1	AREA:
STUDY PERIOD: 1/1/05-6/30/09	
DISTANCE: Y-LINE = 150FT	
ANALYSIS PREPARED BY: BDR	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: BDR	
DIAGRAM REVIEWED BY:	
SCALE: NOT TO SCALE	
DATE: August 2009	
LOG NUMBER: 200908068	

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