

Spot Safety Project Evaluation

Project Log # 200908038

Spot Safety Project # 01-02-252

Spot Safety Project Evaluation of the Left Turn Lane Extension at the Intersection of NC 12 and Hillcrest 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, PE

8/31/2009

Date

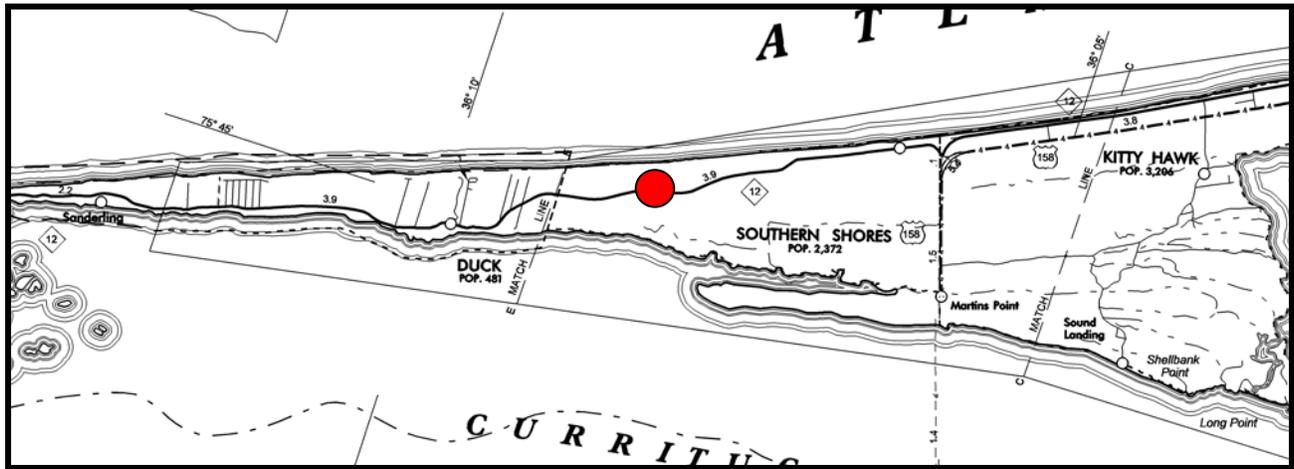
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 01-02-252 – The Intersection of NC 12 and Hillcrest in Dare County.

The Signal ID for the intersection is 01-0458.



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 Hillcrest Ave.

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, 2001 with one reported crash and no Target Crashes. 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.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	1	2	100.0
Total Severity Index	8.4	1	-88.1
Target Crashes	0	0	N/A
Target Crash Severity Index	0	0	N/A
Volume	11,000	11,000	0.0
<u>Crash Severity Summary</u>			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	1	0	-100.0
Class C Crashes	0	0	N/A
PDO Crashes	0	2	N/A

The naive before and after analysis at the treatment location resulted in a 100 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 100 percent increase in Total Crashes. The Total Severity Index decreased by 88. 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 0.47 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.

The two after period crashes were Rear-End Crashes that occurred near the stop bar on the thru-right lane on NC 12.

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 Hillcrest
 COUNTY: Dare
 FILE NO.: SS 01-02-252

BY: BDR
 DATE: 8/27/2009

DETAILED COST: TYPE IMPROVEMENT - 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	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES				PDO		ANNUAL COSTS
		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	CRASHES	CRASHES PER YR	
BEFORE	4.50	0	0.00	1	0.22	0	0.00	\$4,444
AFTER	4.50	0	0.00	0	0.00	2	0.44	\$1,867

Annual Benefits from Crash Cost Savings \$2,578

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$2,915)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 0.47

TOTAL COST OF PROJECT - \$50,000 COMPREHENSIVE B/C RATIO - 0.47

Treatment Site Photos from Google Street-View



Looking North on NC 12



Looking South on NC 12



Looking East on NC 12



Looking West on NC 12

Dare County
 NC 12 and Hillcrest
 BEFORE Period
 6/1/2000-11/30/2004

NC 12
 (Duck Rd)
 45 mph

Hillcrest Dr
 35 mph

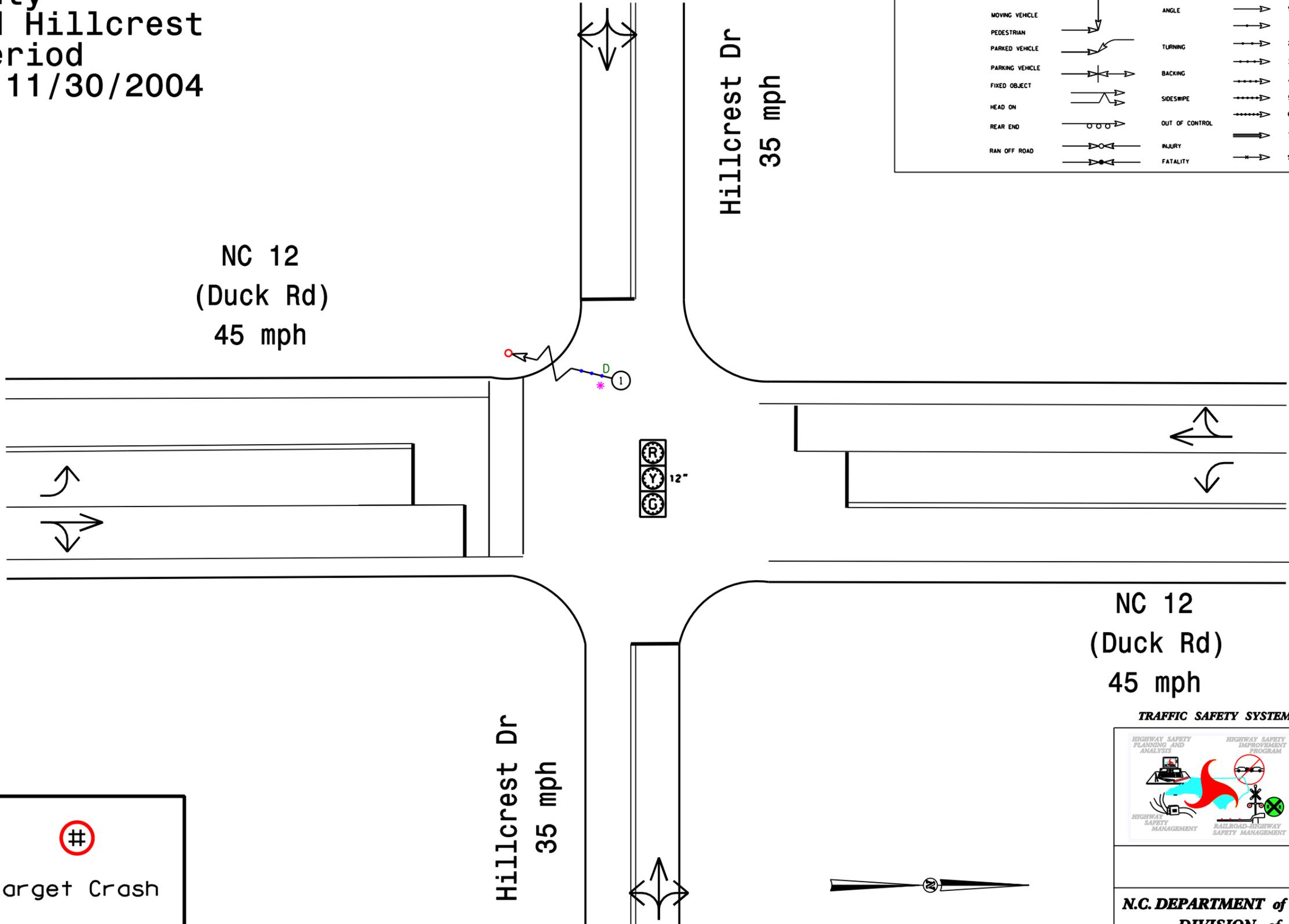
Hillcrest Dr
 35 mph

NC 12
 (Duck Rd)
 45 mph


 Target Crash

LEGEND

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



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 1	AREA:
	STUDY PERIOD: 6/1/00-11/30/04	
	DISTANCE: Y-LINE + 150 FT	
	ANALYSIS PREPARED BY: BDR	
ANALYSIS CHECKED BY:		
DIAGRAM PREPARED BY: BDR		
DIAGRAM REVIEWED BY:		
SCALE: NOT TO SCALE		
DATE: August 2009		
LOG NUMBER: 200908038		

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

Dare County
 NC 12 and Hillcrest
 AFTER Period
 1/1/2005-6/30/2009

NC 12
 (Duck Rd)
 45 mph

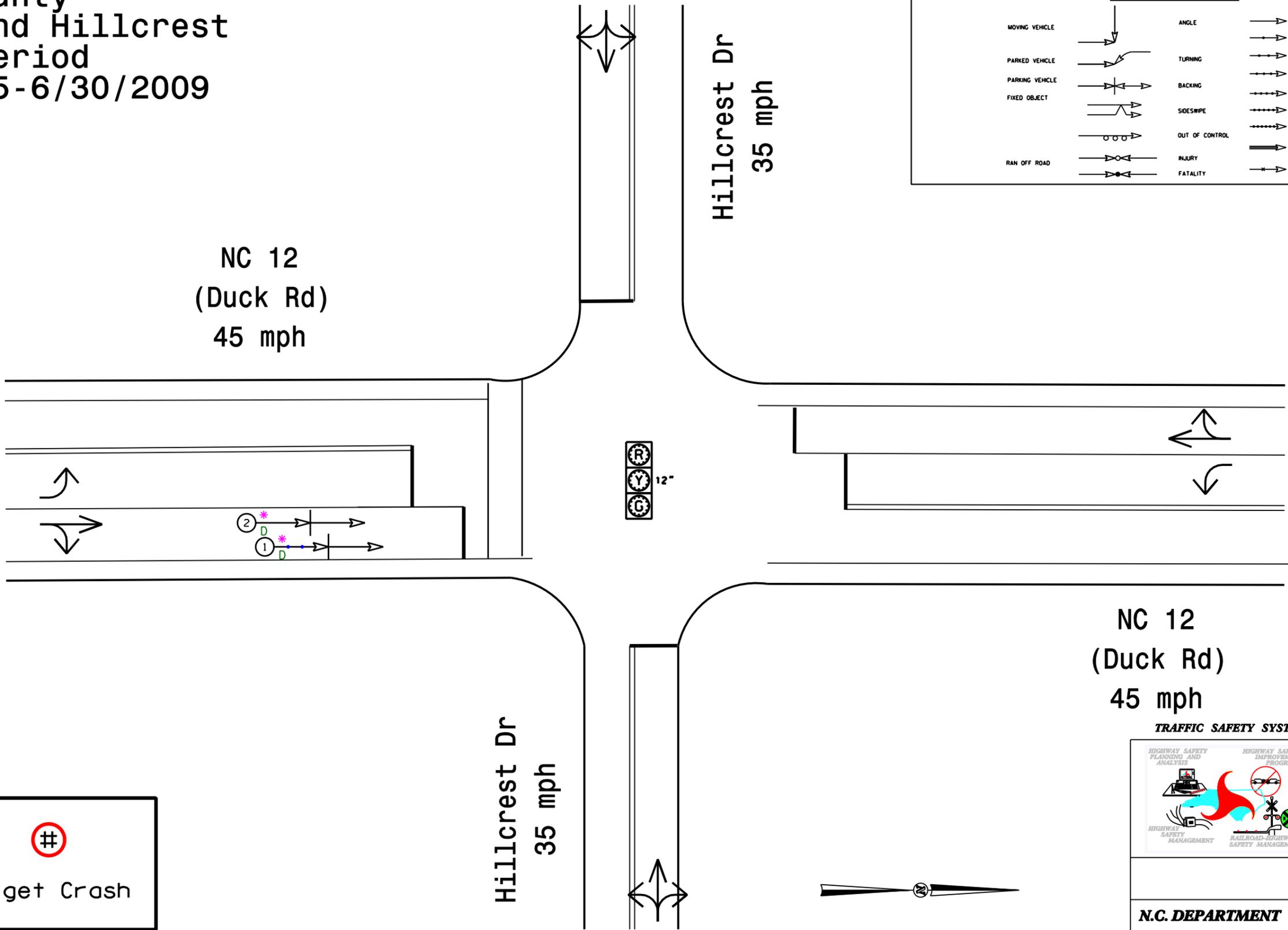
Hillcrest Dr
 35 mph

Hillcrest Dr
 35 mph

NC 12
 (Duck Rd)
 45 mph

LEGEND

MOVING VEHICLE	ANGLE	9 MPH OR LESS	P PEDESTRIAN
PARKED VEHICLE	TURNING	10 MPH TO 19	T TRAIN
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		70 AND UP	
		SPEED UNKNOWN	



 Target Crash

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 1	AREA:
	STUDY PERIOD: 1/1/05-6/30/09	
	DISTANCE: Y-LINE = 150 FT	
	ANALYSIS PREPARED BY: BDR	
ANALYSIS CHECKED BY:		
DIAGRAM PREPARED BY: BDR		
DIAGRAM REVIEWED BY:		
SCALE: NOT TO SCALE		
DATE: August 2009		
LOG NUMBER: 200908038		

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