Spot Safety Project Evaluation

Project Log # 200806134

Spot Safety Project # 01-01-248

Spot Safety Project Evaluation of the Traffic Signal Installation
At the Intersection of US 158 (Caratoke Hwy) and Currituck High School Rd
Currituck County

Documents Prepared By:

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

Principal Investigator

_____ 9-30-2008
Jason B. Schronce Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 01-01-248 located at the intersection of US 158 (Caratoke Highway) and Currituck High School Road in Currituck County.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of a 2-phase, actuated traffic signal and widening of the school entrance. US 258 (Caratoke Highway) is five lane facility with a continuous center turn lane and a posted speed limit of 45 mph. Currituck High School Road is a two lane access loop serving a middle school, high school, and the county library. The subject location is a three-leg intersection, which was controlled by a side street stop sign.

The original statement of problem was that left turning motorists into the school complex could not find adequate gaps to make the movement safely. The intersection met signal warrant 3B. The investigation was requested by a Currituck County Commissioner and was primarily a congestion problem.

The initial crash analysis was completed from June 1, 1998 to May 31, 2001 with one (1) reported crash, which was a correctable angle collision. The final completion date for the improvement at the subject intersection was on July 1, 2003 with a total cost of $80,000.00.

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 June 1 to August 31, 2003. The before period consisted of reported crashes from September 1, 1998 through May 31, 2003 (4 years and 9 months); and the after period consisted of reported crashes from September 1, 2003 through May 31, 2008 (4 years and 9 months). The ending date for this analysis was determined by the date of available data at the time of analysis.

The treatment data consisted of all crashes within 150 feet of the subject intersection. *Please see attached location map and field photos for further details.*

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. The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

Treatment Information			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Total crashes	2	1	- 50.00 %
Total Severity Index	1.00	1.00	0.00 %
Target Crashes	1	0	- 100.00 %
Target Crash Severity Index	1.00	0.00	- 100.00 %
Volume	18,600	17,500	- 5.91 %

The naive before and after analysis at the treatment location resulted in a 50 percent decrease in Total Crashes, elimination of Target Crashes, and no change in the Total Severity Index. The before period ADT year was 2001 and the after period ADT year was 2006.

Results and Discussion

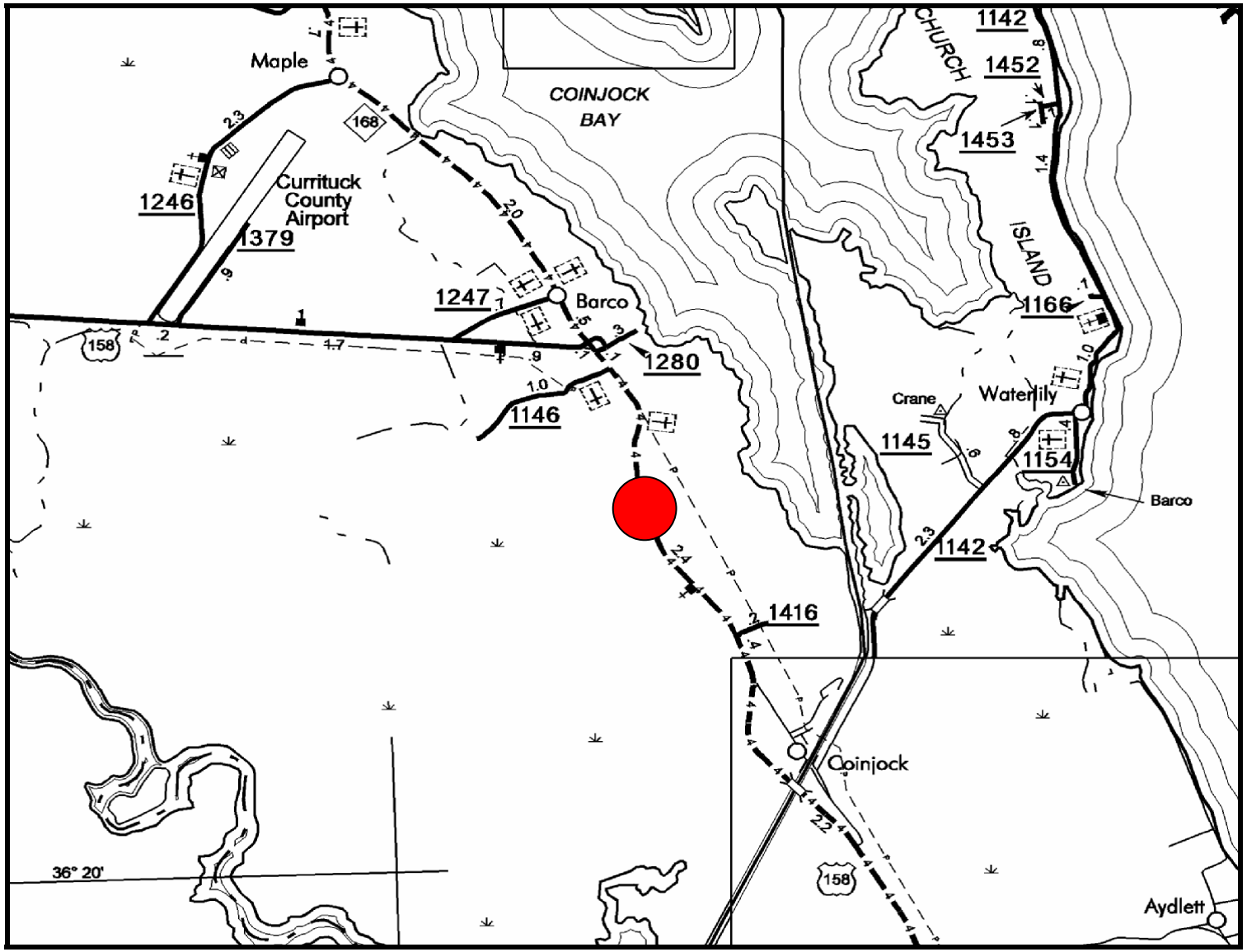
The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 50 percent decrease in Total Crashes and elimination of the single Target Crash. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have decreased at the treatment location from the before to the after period.

The intended purpose of this Spot Safety Project was not to correct a crash pattern. Referencing the *Collision Diagrams*, the single frontal impact crash was eliminated and rear end crashes remained consistent at one (1) from the before to the after periods. During the progress of this evaluation, the other school complex entrances and exits were examined for developing crash patterns and none were discovered.

The calculated benefit to cost ratio for this project is **0.06 considering total crashes and when only considering target 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.

Please see the attached *Treatment Site Photos*. Photos are provided for all approaches to the treatment intersection. 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.

Location Map
Currituck County
Evaluation of Spot Safety Project # 01-01-248



Treatment Location: US 158 (Caratoke Highway) at Currituck High School Road

TREATMENT SITE PHOTOS TAKEN 8/7/2008

Traveling North on US 158 (Caratoke Hwy)

Traveling North on US 158 (Caratoke Hwy)

Traveling South on US 158 (Caratoke Highway)

Traveling South on US 158

Traveling West on Currituck High School Road
(Currituck County Library Driveway to right)

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: US 158 at Currituck High
COUNTY: Currituck
FILE NO.: SS 01-01-248

BY: JBS
DATE: 9/30/2008
NOTES: Total Crashes

DETAILED COST: TYPE IMPROVEMENT - New Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$80,000	10	0.149	$11,922
	$0	0	0.000	$0
Right-of-Way	$0	0	0.000	$0
TOTALS	$80,000	10	0.149	$11,922

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $2,000
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $900

TOTAL ANNUAL COST= $14,822
TOTAL COST OF PROJECT= $80,000

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	0	0.00	2	0.42	$1,642
AFTER	4.75	0	0.00	0	0.00	1	0.21	$821

Annual Benefits from Crash Cost Savings $821

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = ($14,001)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 0.06

TOTAL COST OF PROJECT - $80,000 COMPREHENSIVE B/C RATIO - 0.06

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: US 158 at Currituck High
COUNTY: Currituck
FILE NO.: SS 01-01-248

BY: JBS
DATE: 9/30/2008
NOTES: Target Crashes - Frontal Impact

DETAILED COST: TYPE IMPROVEMENT - New Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$80,000	10	0.149	$11,922
	$0	0	0.000	$0
Right-of-Way	$0	0	0.000	$0
TOTALS	$80,000	10	0.149	$11,922

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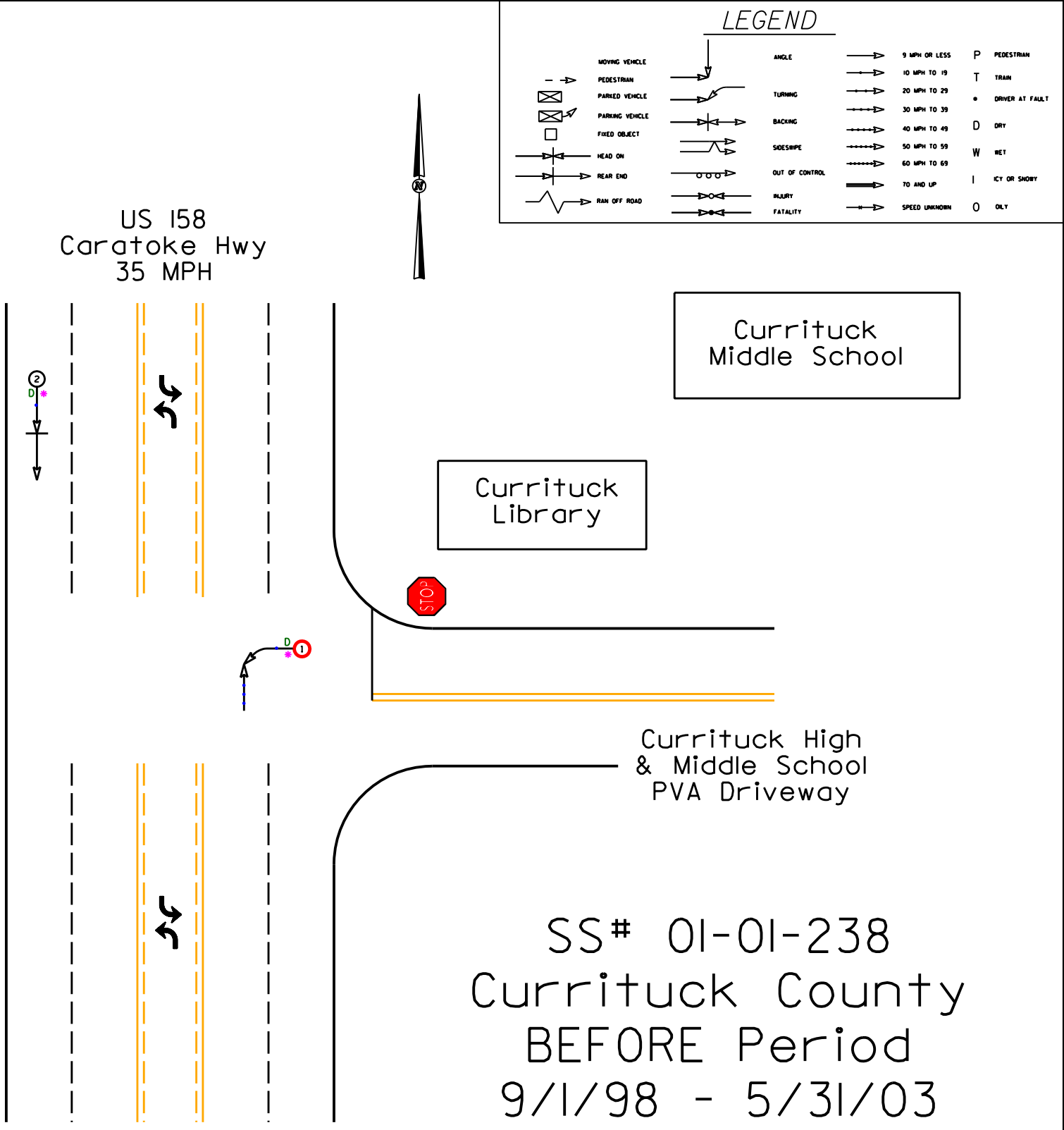
BEFORE	4.75	0	0.00	0	0.00	1	0.21	$821
AFTER	4.75	0	0.00	0	0.00	0	0.00	$0

Annual Benefits from Crash Cost Savings $821

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = ($14,001)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 0.06

TOTAL COST OF PROJECT - $80,000 COMPREHENSIVE B/C RATIO - 0.06



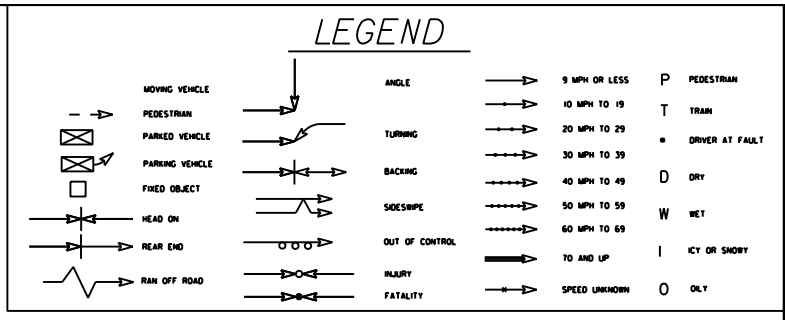
SS# 01-01-238
Currituck County
BEFORE Period
9/1/98 - 5/31/03

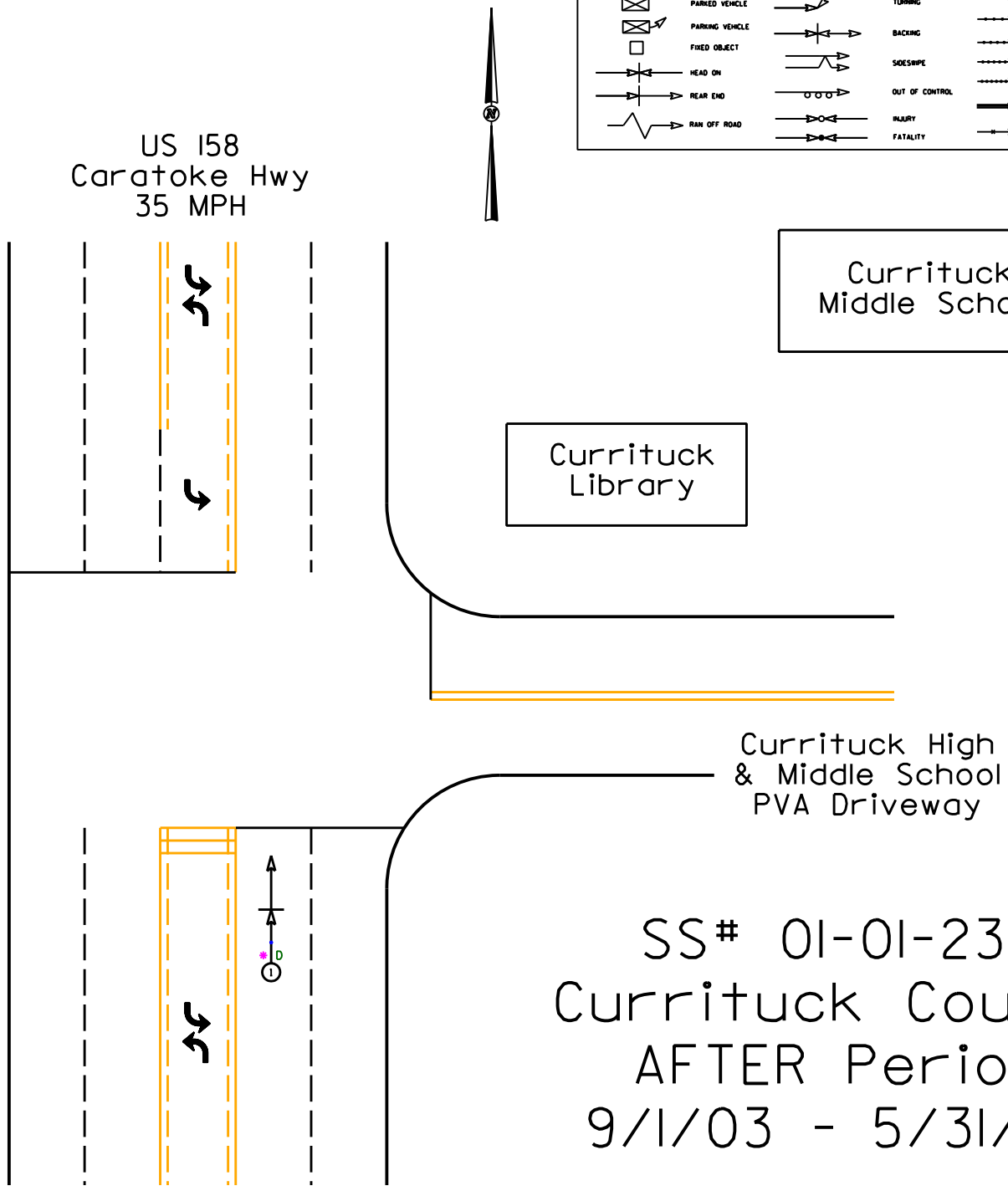
Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM	
DIVISION: 1	AREA:
STUDY PERIOD: 9/1/1998 - 5/31/2003	
DISTANCE: Y-LINE = 150FT	
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: BR	
DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE	
DATE: 9-16-2008	
LOG NUMBER: 01-01-238 BEFORE	

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH





SS# 01-01-238
Currituck County
AFTER Period
9/1/03 - 5/31/08

R
Y
G
New Signalized Intersection

Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM	
DIVISION: 1	AREA:
STUDY PERIOD: 9/1/2003 - 5/31/2008	
DISTANCE: Y-LINE = 150FT	
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: BR	
DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE	
DATE: 9-16-2008	
LOG NUMBER: 01-01-238 AFTER	

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH