Spot Safety Project Evaluation

Project Log # 200906076

Spot Safety Project # 03-98-204

Spot Safety Project Evaluation of the Left Turn Lane Installation
SR 1426 (Mt. Misery Rd) and SR 1455 (Lincoln Road)
Brunswick County

Documents Prepared By:

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

Principal Investigator

Jason B. Schronce

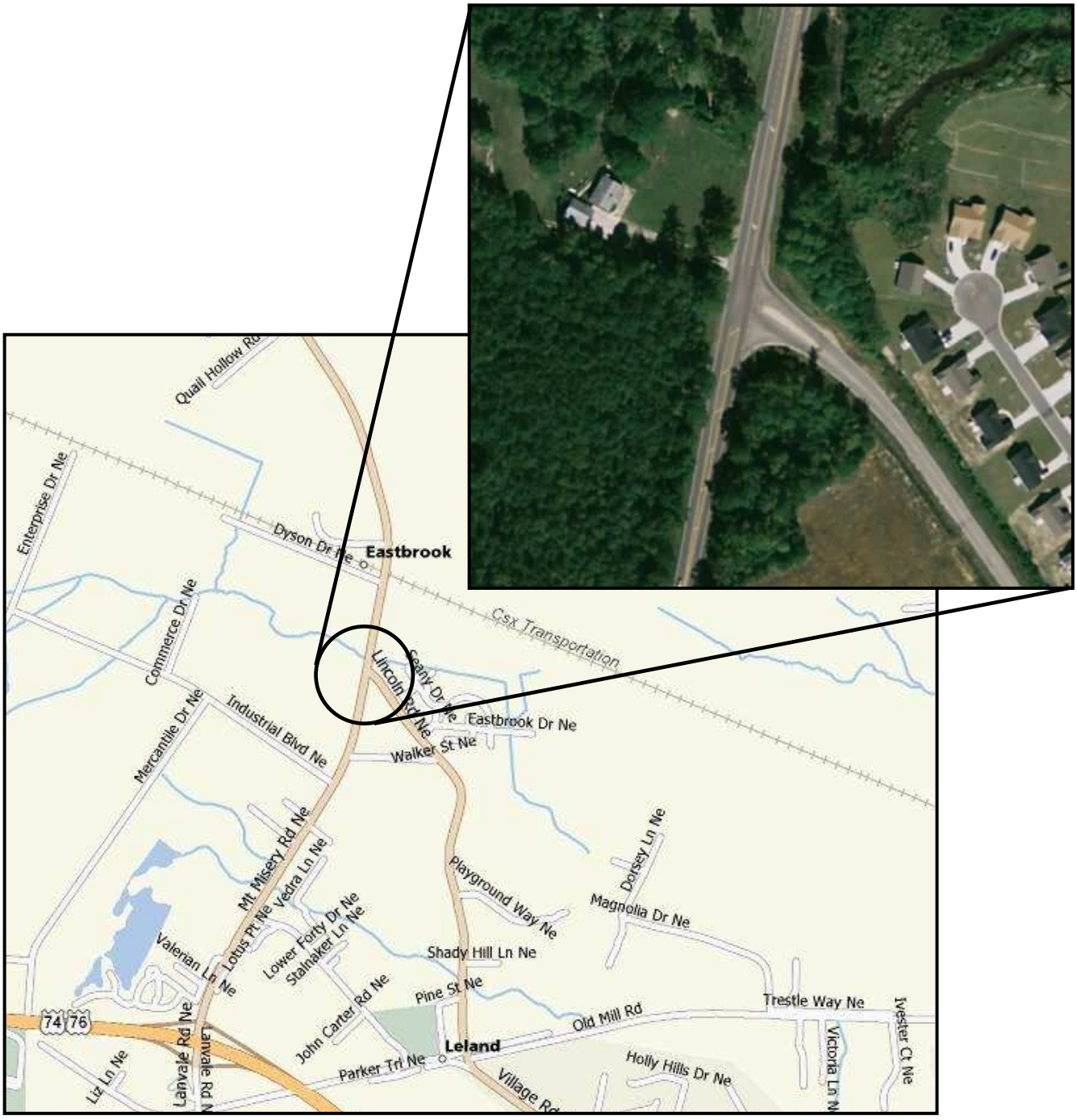
Traffic Safety Project Engineer

6-24-2009
Date

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 03-98-204 located at the Intersection of SR 1426 (Mt. Misery Road) and SR 1455 (Lincoln Road) in Brunswick County, near the City of Leland.



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 SR 1426 southbound left turn lane. SR 1426 and SR 1455 are both two-lane facilities at the subject intersection with speed limits of 55 mph on all approaches. The subject location is a three-leg intersection, which is controlled by dual posted stop signs on SR 1455 (Lincoln Road).

The original statement of problem was that the lack of left turn storage has created a hazardous situation for southbound motorists on SR 1426. The intended purpose of the countermeasure is to mitigate the rear-end type crash pattern approaching the intersection.

The initial crash analysis was completed from January 1, 1989 to January 31, 1998 with nine (9) reported crashes, three (3) of which were deemed correctable. The final completion date for the improvement at the subject intersection was on February 4, 2003 with a total cost of $210,000.

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 the months of January through February 2003. The before period consisted of reported crashes from November 1, 1996 through December 31, 2002 (6 years and 2 months); and the after period consisted of reported crashes from March 1, 2003 through April 30, 2009 (6 years and 2 months). The ending date for this analysis was determined by the date of available crash 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, aerial map, and photos for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Southbound SR 1426 Rear-End Crashes approaching SR 1455 were the target crashes for the applied countermeasure. The Target Crash types considered are as follows: Rear-End, Turn; and Rear-End, Slow or Stop.

Treatment Information			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Total crashes	18	8	- 55.6 %
Total Severity Index	8.50	3.78	- 55.5 %
Target Crashes	7	0	- 100.0 %
Target Crash Severity Index	7.34	0.00	- 100.0 %
Volume	8,500	9,600	12.9 %

Injury Crash Summary	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	1	0	- 100.0 %
Class A injury Crashes	0	0	N/A
Class B injury Crashes	0	0	N/A
Class C Injury Crashes	8	3	- 62.5 %
Total Injury Crashes	9	3	- 66.7 %

The naive before and after analysis at the treatment location resulted in a 56 percent decrease in Total Crashes, elimination of Target Crashes, and a 55.5 percent decrease in the Total Severity Index. The before period ADT year was 1999 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 56 percent decrease in Total Crashes and complete elimination of Target Crashes. 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.

Referencing the *Collision Diagrams*, the before period southbound rear-end crash pattern at the intersection consisted of seven (7) collisions, including five (5) vehicles waiting to turn left onto SR 1455 and two (2) collisions in the traffic queue. After the left turn lane installation, this pattern was completely eliminated. There was one non-target fatality crash in the before period resulting from an out-of-control vehicle crossing the centerline into the oncoming path of a tractor-trailer. The intersection showed a collision reduction improvement in both the number and severity of crashes through the analysis with no defined crash patterns in the after period.

The calculated benefit to cost ratio for this project is **3.10 considering total crashes**. The benefit to cost ratio **considering only target crashes is 0.57**. 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 three 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.

TREATMENT SITE PHOTOS

Looking South on SR 1426 (Mt. Misery Rd)

Looking South on SR 1426 (Mt. Misery Rd) at Intersection

Looking East onto SR 1455 (Lincoln Road) – Median with Dual Stop Signs

Looking North on SR 1426 (Mt. Misery Road) approaching SR 1455

BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes

LOCATION: SR 1426 at SR 1455 | BY: JBS
COUNTY: Brunswick | DATE: 6/22/2009
FILE NO.: SS 03-98-204 | NOTES: Total Crashes

DETAILED COST: TYPE IMPROVEMENT - Southbound Left Turn Lane

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$210,000	10	0.149	$31,296
	$0	0	0.000	$0
Right-of-Way	$0	0	0.000	$0
TOTALS	$210,000	10	0.149	$31,296

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

TOTAL ANNUAL COST= $31,696
TOTAL COST OF PROJECT= $210,000

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	6.17	1	0.16	8	1.30	9	1.46	$110,065
AFTER	6.17	0	0.00	3	0.49	5	0.81	$11,912

Annual Benefits from Crash Cost Savings $98,152

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = $66,456

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 3.10

TOTAL COST OF PROJECT - $210,000 COMPREHENSIVE B/C RATIO - 3.10

BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes

LOCATION: SR 1426 at SR 1455 | BY: JBS
COUNTY: Brunswick | DATE: 6/22/2009
FILE NO.: SS 03-98-204 | NOTES: Target Crashes - SB Rear-Ends

DETAILED COST: TYPE IMPROVEMENT - Shoulder Guardrail

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$210,000	10	0.149	$31,296
	$0	0	0.000	$0
Right-of-Way	$0	0	0.000	$0
TOTALS	$210,000	10	0.149	$31,296

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

TOTAL ANNUAL COST= $31,696
TOTAL COST OF PROJECT= $210,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

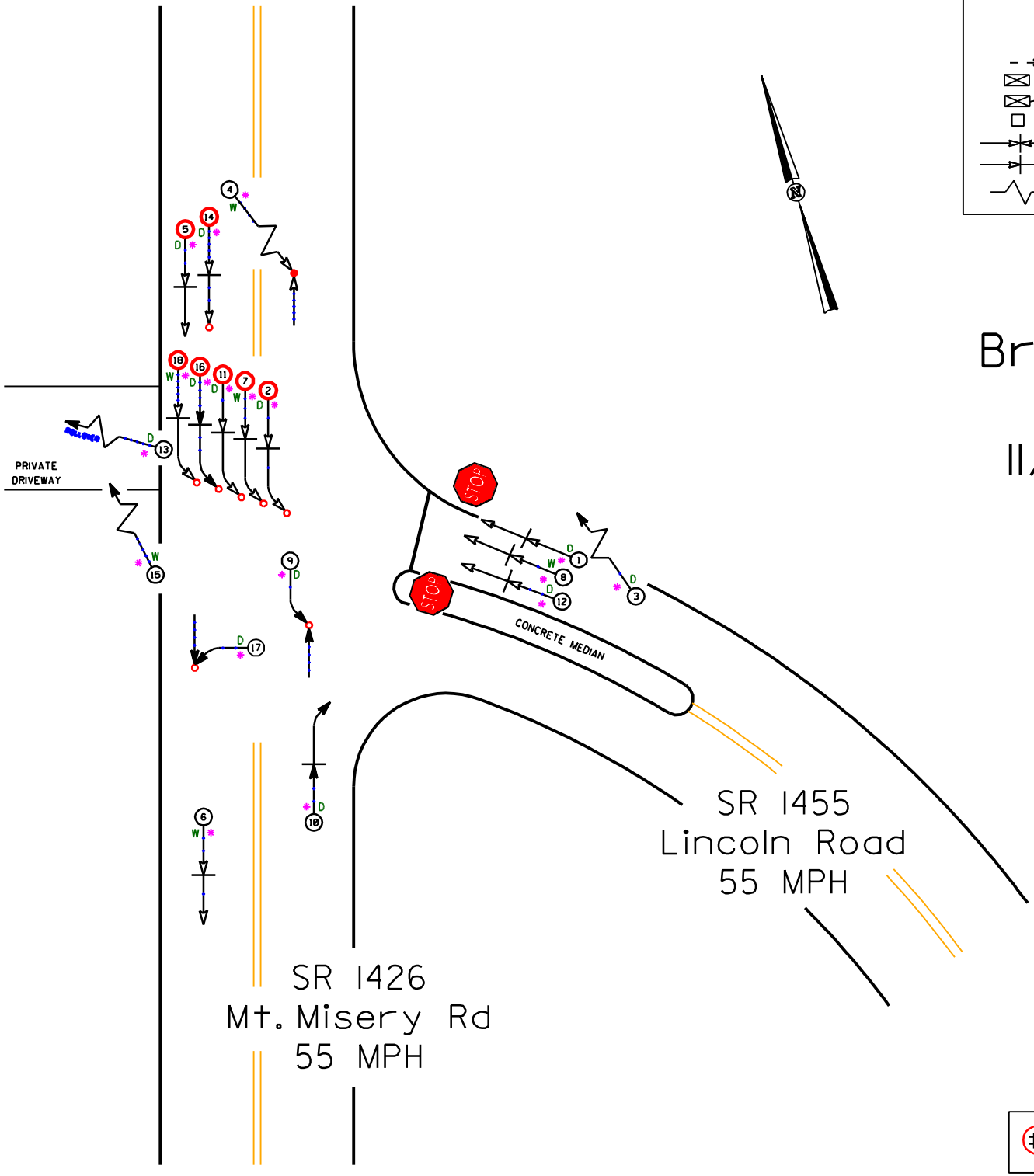
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	6.17	0	0.00	6	0.97	1	0.16	$18,136
AFTER	6.17	0	0.00	0	0.00	0	0.00	$0

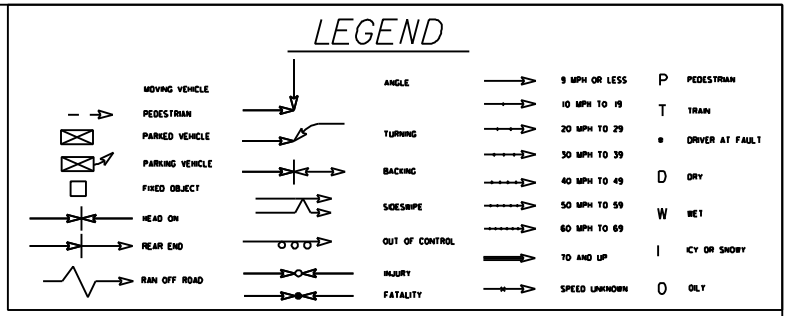
Annual Benefits from Crash Cost Savings $18,136

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = ($13,560)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 0.57

TOTAL COST OF PROJECT - $210,000 COMPREHENSIVE B/C RATIO - 0.57





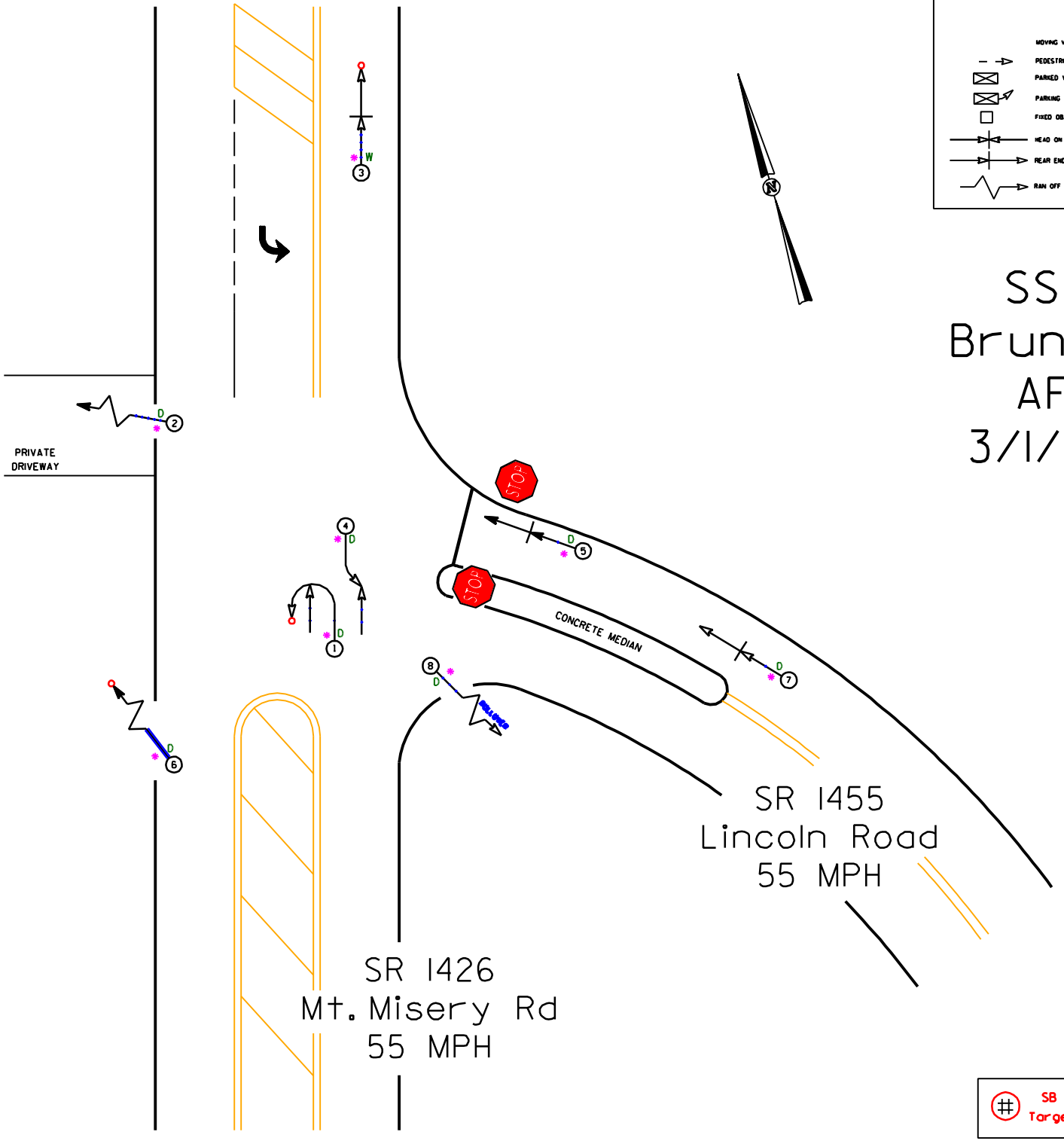
SS# 03-98-204
Brunswick County
BEFORE Period
11/1/96 - 12/31/02

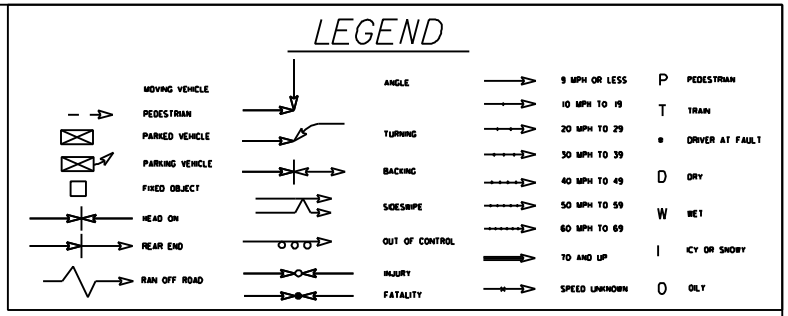
SB Rear-End Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM	
DIVISION: 3	AREA:
STUDY PERIOD: 11/1/1996 - 12/31/2002	
DISTANCE:	Y-LINE = 150FT
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: N/A	
DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE	
DATE: 6-22-2009	
LOG NUMBER: SS# 03-98-204 BEFORE	

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





SS# 03-98-204
Brunswick County
AFTER Period
3/1/03 - 4/30/09

SB Rear-End
Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM	
DIVISION: 3	AREA:
STUDY PERIOD: 3/1/2003 - 4/30/2009	
DISTANCE:	Y-LINE = 150FT
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: N/A	
DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE	
DATE: 6-22-2009	
LOG NUMBER: SS# 03-98-204 AFTER	

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