

Spot Safety Project Evaluation

Order # 41000003045

Spot Safety Project # 03-01-214

**Spot Safety Project Evaluation of the Construction of a Directional Crossover at the
Intersection of US 117/NC 132 (College Rd) and SR 1378 (Spring View Dr)
New Hanover 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

12/14/2009

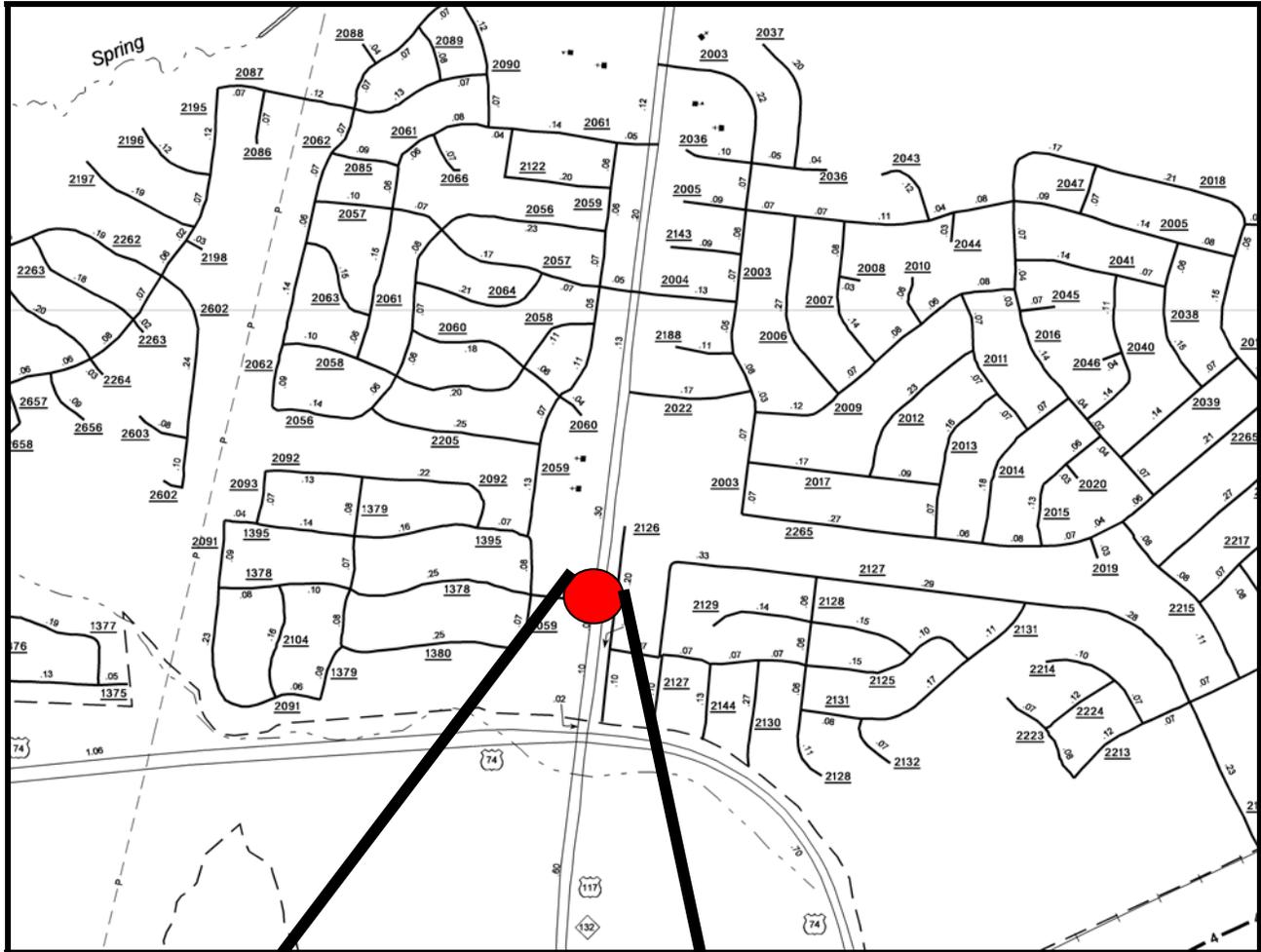
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 03-01-214 – US 117/NC 132 (College Rd) and SR 1378 (Spring View Dr) in New Hanover 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 northbound directional left-over in place of an existing full-movement crossover.

US 117/NC 132 (College Rd) is a four-lane divided facility that had auxiliary left turn lanes in both directions at the subject intersection in the before period. An auxiliary right turn lane also exists in the northbound direction. SR 1378 is a two-lane roadway under stop sign control. SR 2126 runs parallel to US 117 at this location and there is an opening between it and US 117 controlled by a stop sign on the east side of the subject intersection

The original statement of problem was that the intersection is in close proximity to a signalized intersection (US 117 and US 74/Martin Luther King Jr. Pkwy). Due to the volume of traffic along US 117, vehicles wanting to turn left at the signalized intersection were accessing the wrong left turn lane, therefore causing motorists to quickly shift into the thru lane and sideswipe other vehicles. There were also a high number of angle type collisions involving vehicles making left turns into the Springview subdivision.

The initial crash analysis was conducted from April 30, 1998 to April 30, 2001 with a total of 19 crashes, 12 of which were considered correctable by the chosen countermeasure. The final completion date for the improvements at the subject location was on May 18, 2004 with a total cost of \$150,000.00.

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 March 1, 2004 to June 30, 2004. The before period consisted of reported crashes from December 1, 1998 through February 29, 2004 (5 years and 3 months) and the after period consisted of reported crashes from July 1, 2004 through September 30, 2009 (5 years and 3 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 there were two types of Target Crashes for the applied countermeasure. The first are Side-Swipe Rear-End Crashes resulting from a vehicle exiting the southbound left turn lanes. The second type are Frontal Impact Crashes. These crash types considered are as follows: Left Turn, same roadway; Left Turn, different roadway; Right Turn, same roadway; Right Turn, different roadway; Head On and Angle. The target crashes are clearly identified in the before and after period collision diagrams.

.

Treatment Information			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	50	45	-10.0
Total Severity Index	6.36	4.78	-24.8
Target Crashes 1 (Wrong Turn Lane)	2	0	-100.0
Target Crash 1 Severity Index	1	0	-100.0
Target Crashes 2 (Frontal Impact)	26	29	11.5
Target Crash 2 Severity Index	8.47	5.34	-37.0
Volume	32,000	38,000	18.8
Target Crash Severity Summary			
Fatal Crashes	0	0	N/A
Class A Crashes	1	0	-100.0
Class B Crashes	6	3	-50.0
Class C Crashes	10	14	40.0
PDO Crashes	11	12	9.1

The naive before and after analysis at the treatment location resulted in a 10 percent decrease in Total Crashes, a 100 percent decrease in Type 1 Target Crashes, a 12 percent increase Type 2 Target Crashes, and a 19 percent increase in Average Daily Traffic (ADT). The before period ADT year was 2001 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 10 percent decrease in Total Crashes. Target Crashes associated with vehicles entering and exiting the southbound turn lane were reduced by 100 percent and Frontal Impact Target Crashes increased by 12 percent. The summary results above demonstrate that while both Total Crashes and Type 1 Target Crashes appear to have decreased at the treatment location, Frontal Impact Target Crashes have increased from the before to the after period.

The calculated benefit to cost ratio for this project is 8.22 considering total crashes. The benefit to cost ratio considering only target crashes is 7.18. 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 closing of the southbound left turn lane was effective in eliminating crashes resulting from vehicles intending to enter the turn lanes further south (Type 1 Target Crashes). There were two crashes of this type in the before period, one Sideswipe and one Rear-End, in which the vehicle

entered the left turn lane and then quickly exited after the driver realized they were in the wrong turn lane.

Frontal Impact Crashes (Type 2 Target Crashes) increased at the location from the before to the after period. In the before period there were a total of 26 Frontal Impact Crashes, 15 of which were Left Turn-Same Roadway crashes involving northbound left turns. In the after period there were 29 Frontal Impact Crashes, 26 of which were Left Turn-Same Roadway Crashes.

In the project folder it was mentioned that a southbound left-over would be installed north of the existing location to allow southbound left turns. It appears that this was installed approximately 650 feet north of the subject intersection at another opening between US 117 and SR 2126. There were three crashes at this location in both the before and the after periods.

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 roadway.

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: NC 132 and SR 1378
 COUNTY: New Hanover
 FILE NO.: SS 03-01-214

BY: BDR
 DATE: 11/30/2009

DETAILED COST: TYPE IMPROVEMENT - Directional Crossover

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
Right-of-Way	\$150,000	20	0.102	\$15,278
	\$0	0	0.000	\$0
TOTALS	\$150,000	20	0.102	\$15,278

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$800
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$0
 TOTAL ANNUAL COST= \$16,078
 TOTAL COST OF PROJECT= \$150,000

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	5.25	1	0.19	26	4.95	23	4.38	\$237,448
AFTER	5.25	0	0.00	23	4.38	22	4.19	\$105,219

Annual Benefits from Crash Cost Savings \$132,229

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$116,151

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 8.22

TOTAL COST OF PROJECT - \$150,000 COMPREHENSIVE B/C RATIO - 8.22

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: NC 132 and SR 1378
 COUNTY: New Hanover
 FILE NO.: SS 03-01-214 Target Crashes Only

BY: BDR
 DATE: 11/30/2009

DETAILED COST: TYPE IMPROVEMENT - Directional Crossover

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
Right-of-Way	\$150,000	20	0.102	\$15,278
	\$0	0	0.000	\$0
TOTALS	\$150,000	20	0.102	\$15,278

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$800
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$0
 TOTAL ANNUAL COST= \$16,078
 TOTAL COST OF PROJECT= \$150,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES						ANNUAL COSTS
		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	
BEFORE	5.25	1	0.19	16	3.05	11	2.10	\$189,752
AFTER	5.25	0	0.00	17	3.24	12	2.29	\$74,362

Annual Benefits from Crash Cost Savings \$115,390

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$99,313

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 7.18

TOTAL COST OF PROJECT - \$150,000 COMPREHENSIVE B/C RATIO - 7.18

Site Photos from Google Street-View



Looking north on US 117 (College Rd)



Looking north on US 117 (College Rd)



Looking south on US 117 (College Rd)



Looking east from SR 1378 (Spring View)

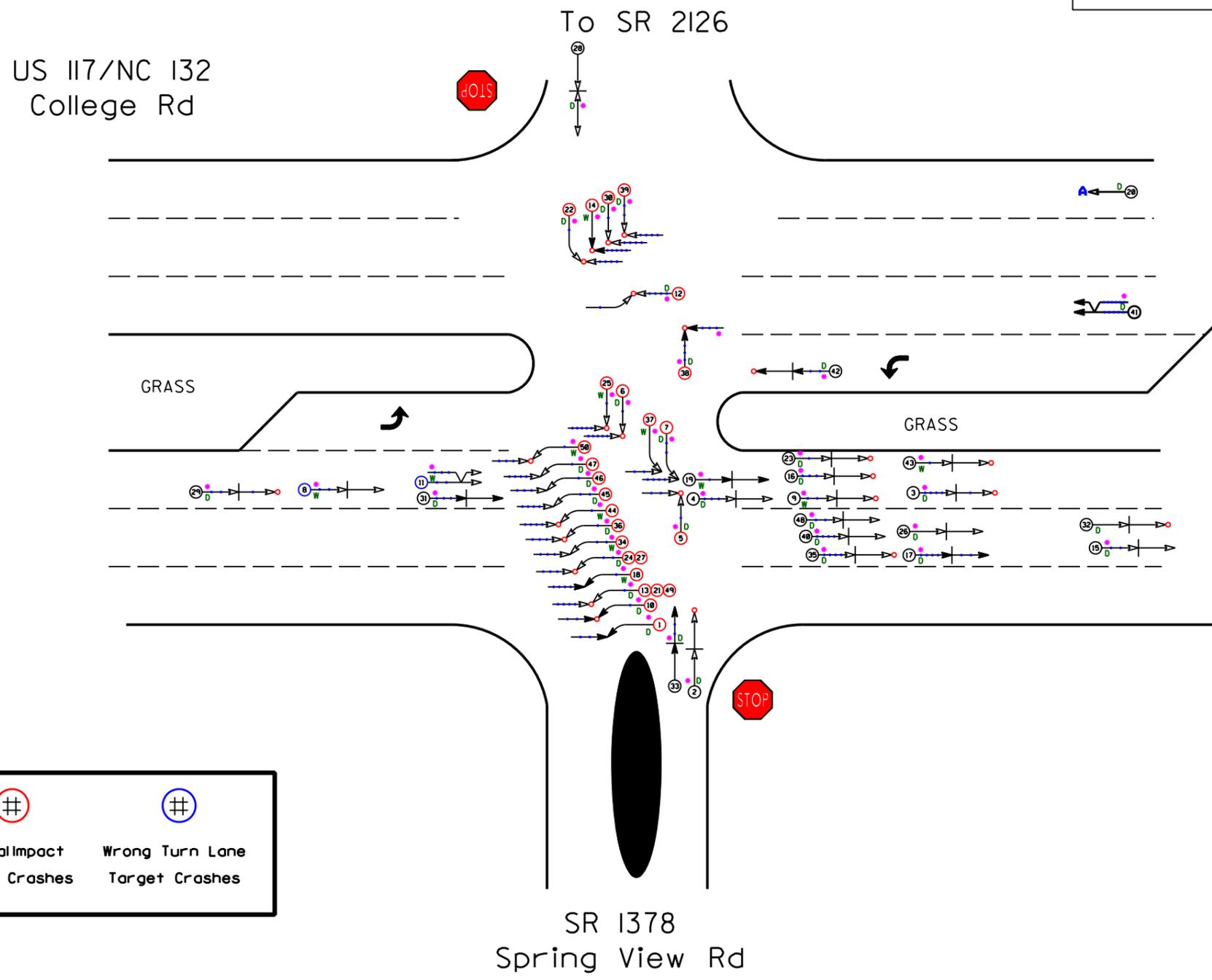


Looking West from SR 2126 – A parallel roadway with an opening to US 117 at intersection

New Hanover County
 US 117/NC 132 (College Rd) at
 SR 1378 (Spring View Rd)
 BEFORE Period
 12/1/1998-2/29/2004

LEGEND

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



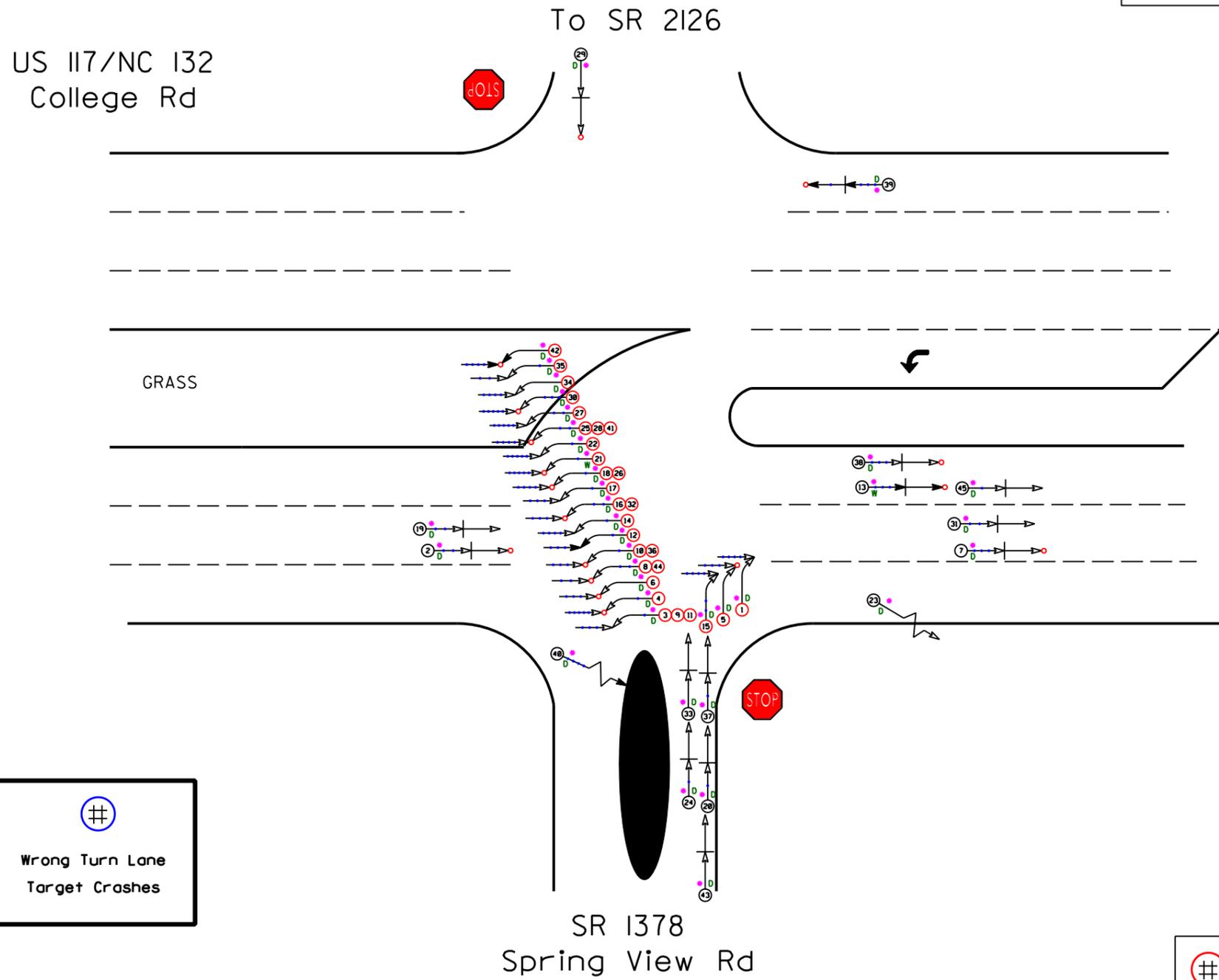
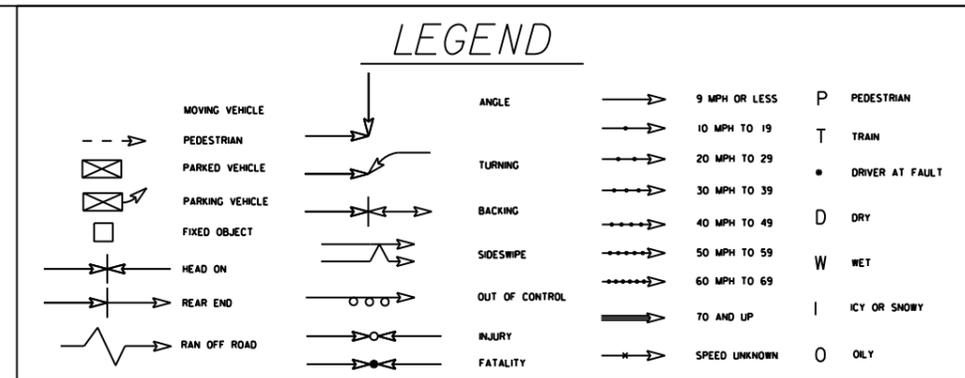
Frontal Impact Target Crashes	Wrong Turn Lane Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 3	AREA:
	STUDY PERIOD: 12/198-2/29/04	
	DISTANCE: Y-LINE = 150 FT	
	ANALYSIS PREPARED BY: BDR	
ANALYSIS CHECKED BY:		
DIAGRAM PREPARED BY: BDR		
DIAGRAM REVIEWED BY:		
SCALE: NOT TO SCALE		
DATE: November 2009		
ORDER NUMBER: 4100003045		

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

New Hanover County
 US 117/NC 132 (College Rd) at
 SR 1378 (Spring View Rd)
 AFTER Period
 7/1/2004-9/30/2009



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 3	AREA:
STUDY PERIOD: 7/1/04-9/30/09		
DISTANCE: Y-LINE = 150 FT		
ANALYSIS PREPARED BY: BDR		
ANALYSIS CHECKED BY:		
DIAGRAM PREPARED BY: BDR		
DIAGRAM REVIEWED BY:		
SCALE: NOT TO SCALE		
DATE: November 2009		
ORDER NUMBER: 4000003045		

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