

Spot Safety Project Evaluation

Order # 41000002981

Spot Safety Project # 02-98-243

Spot Safety Project Evaluation of the Installation of Left Turn Lanes at the Intersection of US 13/264A and SR 1138 (Ballards Crossroads) Pitt 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

12/2/2009

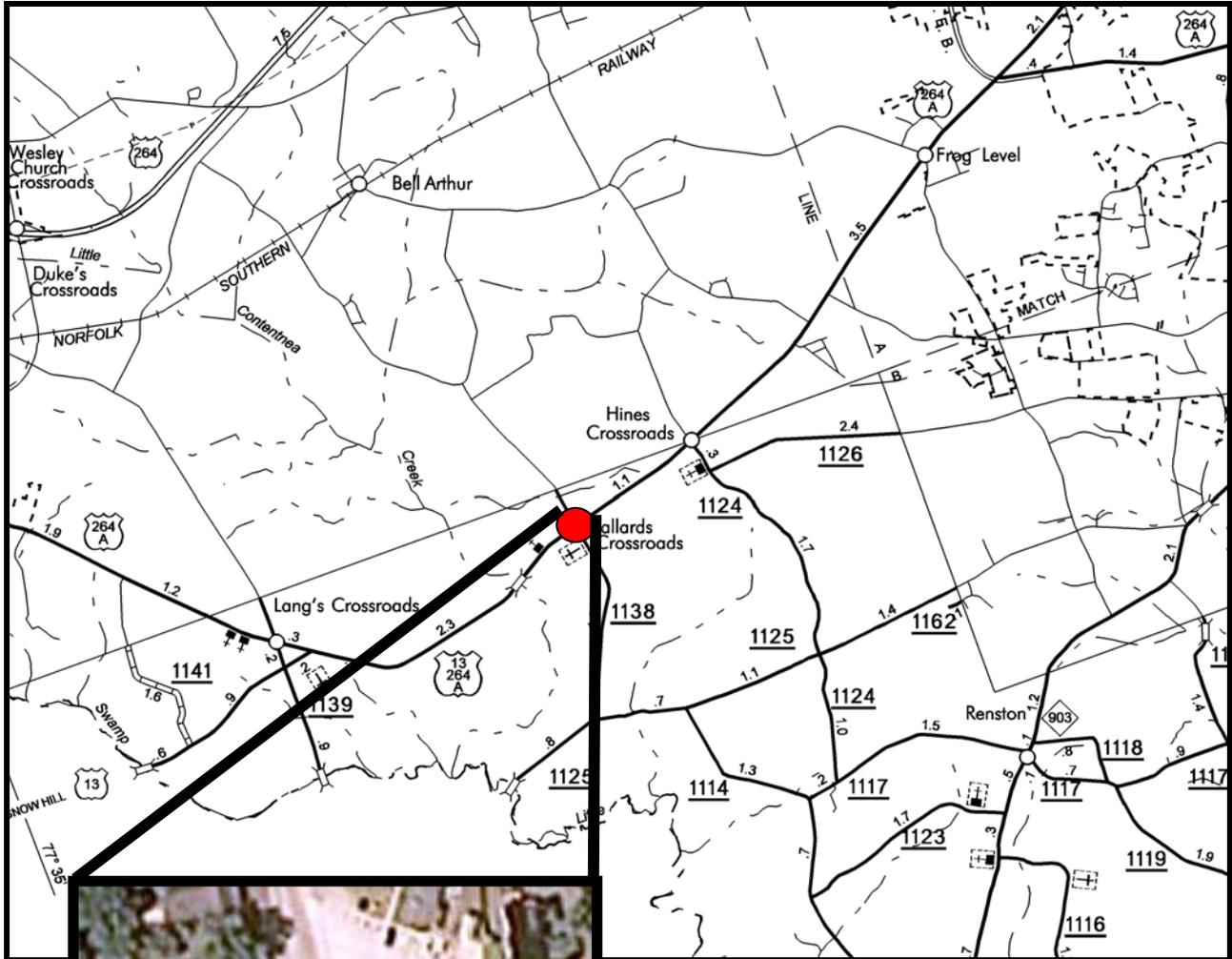
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 02-98-243 – The Intersection of US 13/264A and SR 1138 (Ballards Crossroads) in Pitt 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 both east and westbound left turn lanes on US 13/264A.

The subject location is a four-leg intersection which is controlled by stop signs on SR 1138. The original statement of problem was that the intersection is near the crest of a vertical curve on US 13/264A, creating sight restrictions for approaching vehicles on US 13/264A. Left turning traffic was also causing back-ups and delays on US 13/264A in addition to reducing gaps for traffic to enter from SR 1138.

The initial crash analysis was conducted from September 1, 1996 to August 31, 1999 with a total of 16 reported crashes, 10 of which were considered correctable by the chosen countermeasure. The final completion date for the improvements at the subject intersection was on January 1, 2004 with a total cost of \$52,000.00.

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 December 1, 2003 to February 29, 2004. The before period consisted of reported crashes from May 1, 1998 through November 30, 2003 (5 years and 7 months) and the after period consisted of reported crashes from March 1, 2004 through September 30, 2009 (5 years and 7 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 both Rear-End Crashes approaching the intersection on US 13/264A and Left Turn-Same Roadway Crashes on US 13/264A were the Target Crashes for the applied countermeasure.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	26	10	-61.5
Total Severity Index	4.98	4.7	-5.6
Target Crashes	17	2	-88.2
Target Crash Severity Index	4.92	4.7	-4.5
Volume	10,800	13,000	20.4
<u>Crash Severity Summary</u>			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	2	1	-50.0
Class C Crashes	7	0	-100.0
PDO Crashes	8	1	-87.5

The naive before and after analysis at the treatment location resulted in a 62 percent decrease in Total Crashes, an 88 percent decrease in Target Crashes, and a 20 percent increase in Average Daily Traffic (ADT). 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 62 percent decrease in Total Crashes and an 88 percent decrease in 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.

The calculated benefit to cost ratio for this project is 4.38 considering total crashes. The benefit to cost ratio considering only target crashes is 3.96. 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.

It is apparent that the construction of left turn lanes at the intersection was effective in reducing Target Crashes at the intersection. In the before period there was a total of 15 Rear-End Crashes on the US 13/264A approaches to the intersection (10 westbound and 5 eastbound). In the after period there were none.

There were two Left Turn-Same Roadway Crashes in both the before and the after periods. One of the before period Left Turn-Same Roadway Crashes (Crash #2) involved two vehicles going in the same direction and one attempting to pass the other on the left-hand side as the left turn was being made.

Please see the attached *Treatment Site Photos*. 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.

Site Photos from Google Street-View



Looking west on US 13/264A



Looking east on US 13/264A



Looking South on SR 1138



Looking south toward SR 1138 from intersection

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: US 13/264A at SR 1138
 COUNTY: Pitt
 FILE NO.: SS 02-98-243

BY: BDR
 DATE: 11/24/2009

DETAILED COST: TYPE IMPROVEMENT - Left Turn Lanes

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$52,000	10	0.149	\$7,750
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$52,000	10	0.149	\$7,750

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$800
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$0
 TOTAL ANNUAL COST= \$8,550
 TOTAL COST OF PROJECT= \$52,000

COMPREHENSIVE COST REDUCTION:

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	5.59	0	0.00	14	2.50	12	2.15	\$59,106
AFTER	5.59	0	0.00	5	0.89	5	0.89	\$21,646

Annual Benefits from Crash Cost Savings \$37,460

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$28,910

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 4.38

TOTAL COST OF PROJECT - \$52,000 COMPREHENSIVE B/C RATIO - 4.38

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: US 13/264A at SR 1138
 COUNTY: Pitt
 FILE NO.: SS 02-98-243 Target Crashes Only

BY: BDR
 DATE: 11/24/2009

DETAILED COST: TYPE IMPROVEMENT - Left Turn Lanes

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ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

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		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	CRASHES	CRASHES PER YR	
BEFORE	5.59	0	0.00	9	1.61	8	1.43	\$38,211
AFTER	5.59	0	0.00	1	0.18	1	0.18	\$4,329

Annual Benefits from Crash Cost Savings \$33,882

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$25,332

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 3.96

TOTAL COST OF PROJECT - \$52,000 COMPREHENSIVE B/C RATIO - 3.96

Pitt County
 US 13/264A at SR 1138
 (Ballards Crossroads)
 BEFORE Period
 5/1/1998-11/30/2003

SR 1138
 (Ballards Crossroads)

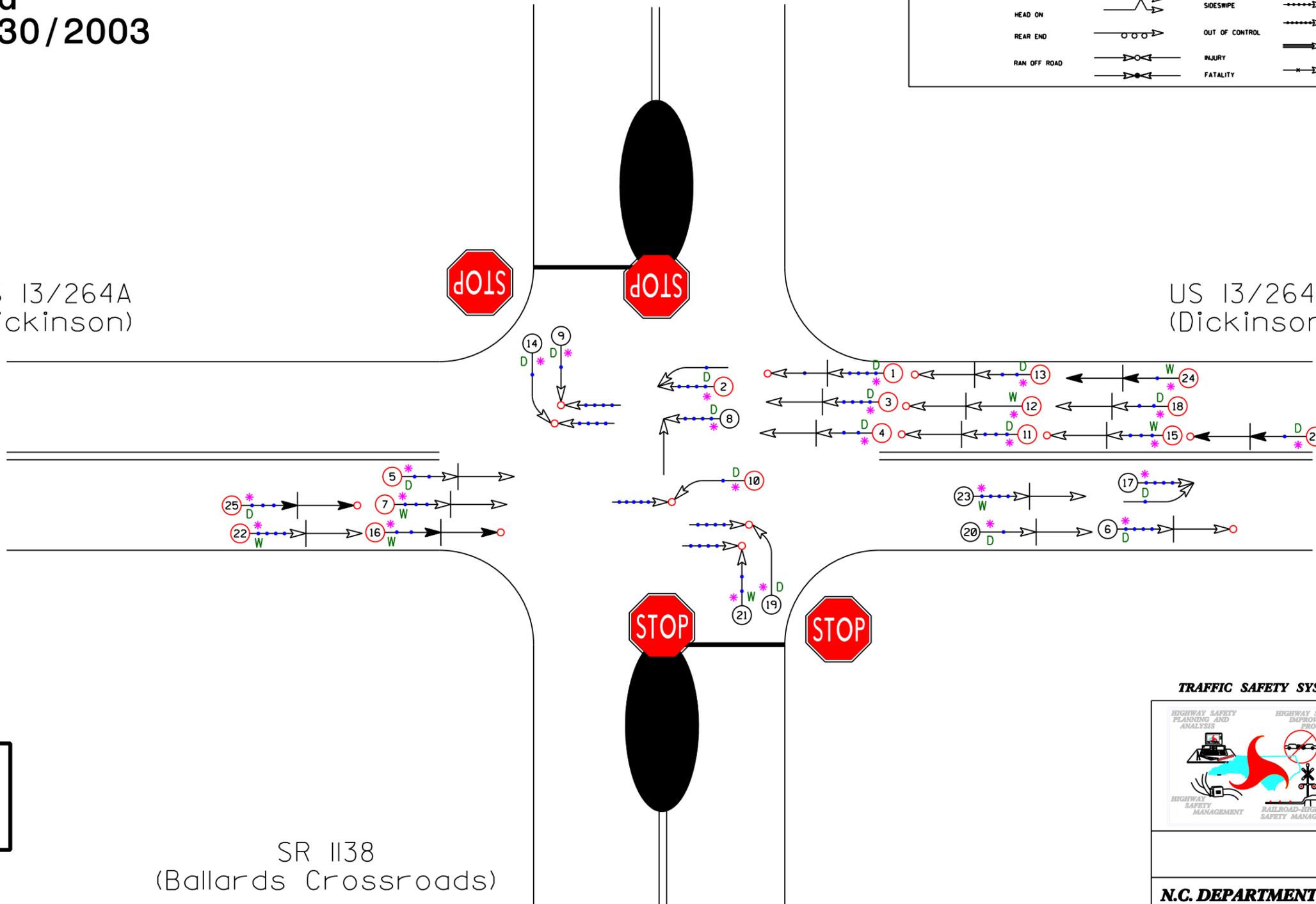
US 13/264A
 (Dickinson)

US 13/264A
 (Dickinson)

SR 1138
 (Ballards Crossroads)

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: 2	AREA:
	STUDY PERIOD: 5/1/98-11/30/03	
	DISTANCE: Y-LINE + 150 FT	
	ANALYSIS PREPARED BY: BOR	
	ANALYSIS CHECKED BY:	
	DIAGRAM PREPARED BY: BOR	
	DIAGRAM REVIEWED BY:	
	SCALE: NOT TO SCALE	
	DATE: November 2009	
	ORDER NUMBER: 4000002981	

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

**Pitt County
US 13/264A at SR 1138
(Ballards Crossroads)
AFTER Period
3/1/2004-9/30/2009**

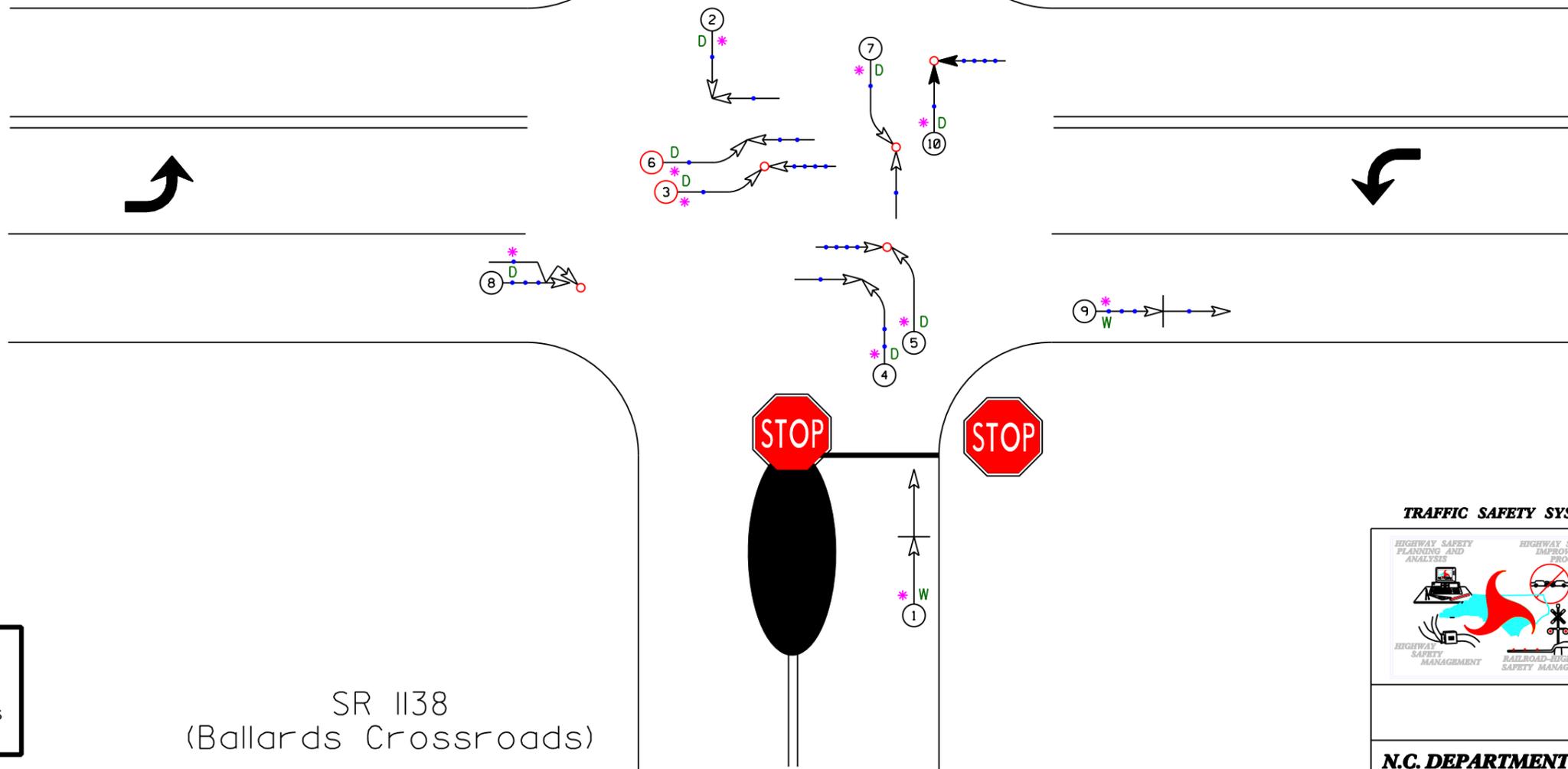
**SR 1138
(Ballards Crossroads)**

LEGEND

MOVING VEHICLE	ANGLE	9 MPH OR LESS	P PEDESTRIAN
PARKED VEHICLE	TURNING	10 MPH TO 19	T TRAIN
PARKING VEHICLE	BACKING	20 MPH TO 29	* DRIVER AT FAULT
FIXED OBJECT	SIDESWIPE	30 MPH TO 39	D DRY
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	INJURY	50 MPH TO 59	I ICY OR SNOWY
	FATALITY	60 MPH TO 69	O OILY
		70 AND UP	
		SPEED UNKNOWN	

US 13/264A
(Dickinson)

US 13/264A
(Dickinson)



#
Target Crashes

SR 1138
(Ballards Crossroads)

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 2	AREA:
STUDY PERIOD: 3/1/04-9/30/09		
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: 4000002981		

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