

Spot Safety Project Evaluation

Project Log # 200712059

Spot Safety Project # 14-01-203

**Spot Safety Project Evaluation of the Traffic Signal Installation
At the Intersection of NC 280 (Boylston Hwy) and SR 1328 / 1426
Henderson 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

9-30-2008
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 14-01-203 located at the intersection of NC 280 (Boylston Highway) and SR 1328 (Old Turnpike Road) / SR 1426 (Schoolhouse Road) in Henderson 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 an actuated traffic signal. NC 280 is a major arterial with a five lane cross section and statutory speed limit of 55 mph. The center turn lane on NC 280 provides dedicated left turn lanes at the intersection and right turn slips are also provided on both approaches. SR 1328 (Old Turnpike Rd) and SR 1426 (Schoolhouse Rd) are both two-lane facilities at the subject intersection with no turn lanes and speed limits of 55 mph. The subject location is a four-leg crossroads intersection, which was controlled by stop signs on SR 1328 / 1426 in the before period.

The original statement of problem was an increase in vehicle usage of the location was leading to congestion and delay. The investigation request came from local residents living nearby. The intersection met signal warrants 2, 7, 9, and 11 and was designed based off the 85th percentile speed.

The initial crash analysis was completed from August 1, 1997 to July 31, 2000 with six (6) reported crashes, three (3) of which were Angle Crashes. The final completion date for the improvement at the subject intersection was on January 28, 2002 with a total cost of \$50,500.00.

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 were the months of January and February 2002. The before period consisted of reported crashes from December 1, 1995 through December 31, 2002 (6 years and 1 month); and the after period consisted of reported crashes from March 1, 2002 through March 31, 2008 (6 years and 1 month). 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 and field photos for further details.* Please notice that SR 1328 (Turnpike Road) t-intersects within the study area of SR 1426 to the southwest of the location and this intersection was also included in the analysis.

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.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	11	5	- 54.55 %
Total Severity Index	6.38	3.96	- 37.93 %
Target Crashes – Frontal Impact	10	2	- 80.00 %
Target Crash Severity Index	6.18	4.70	- 23.95 %
Volume	17,000	17,900	5.29 %
<u>Injury Crash Summary - Total</u>			
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	0	N/A
Class B injury Crashes	3	2	- 33.33 %
Class C Injury Crashes	5	0	- 100.00 %
Total Injury Crashes	8	2	- 75.00 %

The naive before and after analysis at the treatment location resulted in a 54.5 percent decrease in Total Crashes, an 80 percent decrease in Target Crashes, and a 38 percent decrease in the Total Severity Index. The before period ADT year was 1998 and the after period ADT year was 2005.

Results and Discussion

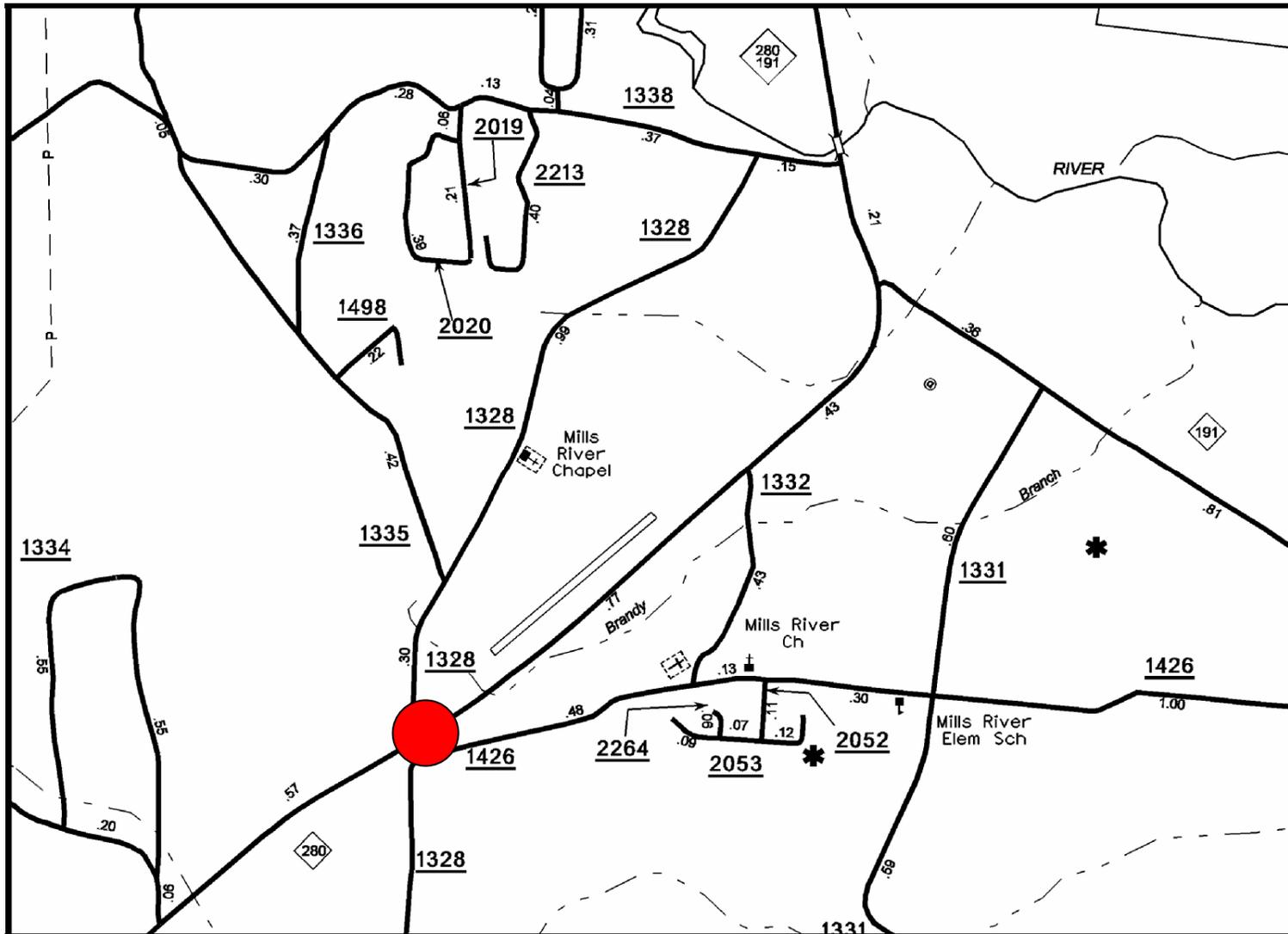
The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 54.5 percent decrease in Total Crashes and an 80 percent decrease in Target Crashes. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have decreased at the treatment location from the before to the after period.

Referencing the *Collision Diagrams*, a large portion of crashes at the intersection in the before period (7 of 11) were the result of a vehicle attempting to cross NC 280 resulting in an angle collision. After the signal installation, this pattern was completely eliminated and the only resulting target crashes existed from permissive green movements. Rear end crashes approaching the intersection slightly increased from one (1) in the before period to two (2) after the signal installation.

The calculated benefit to cost ratio for this project is **1.70 considering total crashes**. The benefit to cost ratio considering **only target crashes is 1.83**. 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
Henderson County
Evaluation of Spot Safety Project # 14-01-203**



Treatment Location: NC 280 (Boylston) at SR 1328 (Old Turnpike) / SR 1426 (Schoolhouse)

TREATMENT SITE PHOTOS TAKEN 9/17/2008



Traveling East / Northeast on NC 280 (Boylston Highway)



Traveling East / Northeast on NC 280



Traveling West / Northwest on SR 1426 (Schoolhouse Road)



Traveling West / Northwest on SR 1426 (Schoolhouse Road)
Notice SR 1328 (Turnpike Road) intersecting to the left



Traveling Northwest on SR 1426 (Schoolhouse Road)



Traveling South on SR 1328 (Old Turnpike Road)



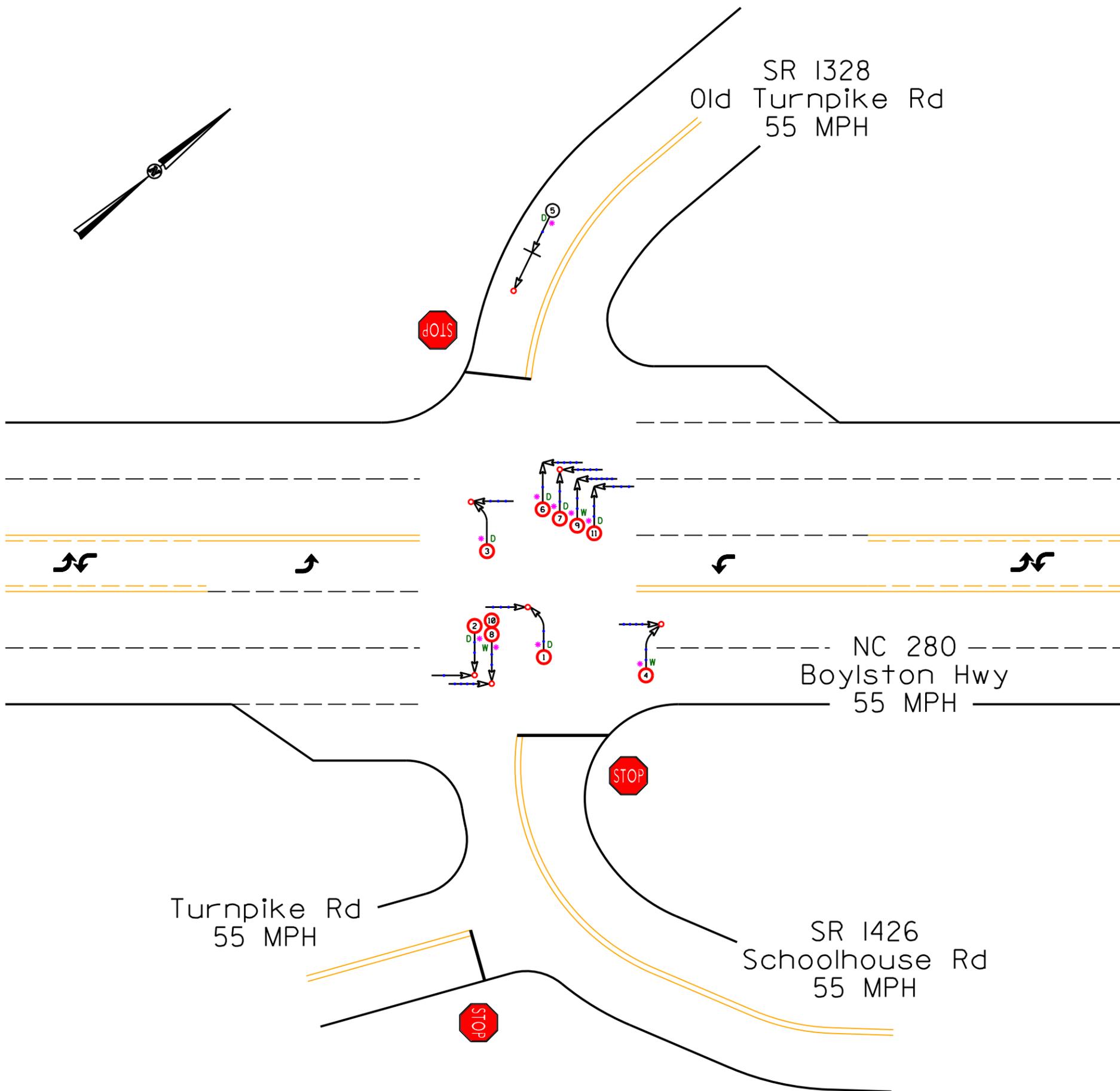
Traveling West / Southwest on NC 280 (Boylston Highway)



Traveling West / Southwest on NC 280 (Boylston Highway)



SR 1328
Old Turnpike Rd
55 MPH



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		SPEED UNKNOWN		70 AND UP		

SS# 14-01-203
Henderson County
BEFORE Period
12/1/95 - 12/31/01

NC 280
Boylston Hwy
55 MPH

Turnpike Rd
55 MPH

SR 1426
Schoolhouse Rd
55 MPH

Target Crashes
 Frontal Impact

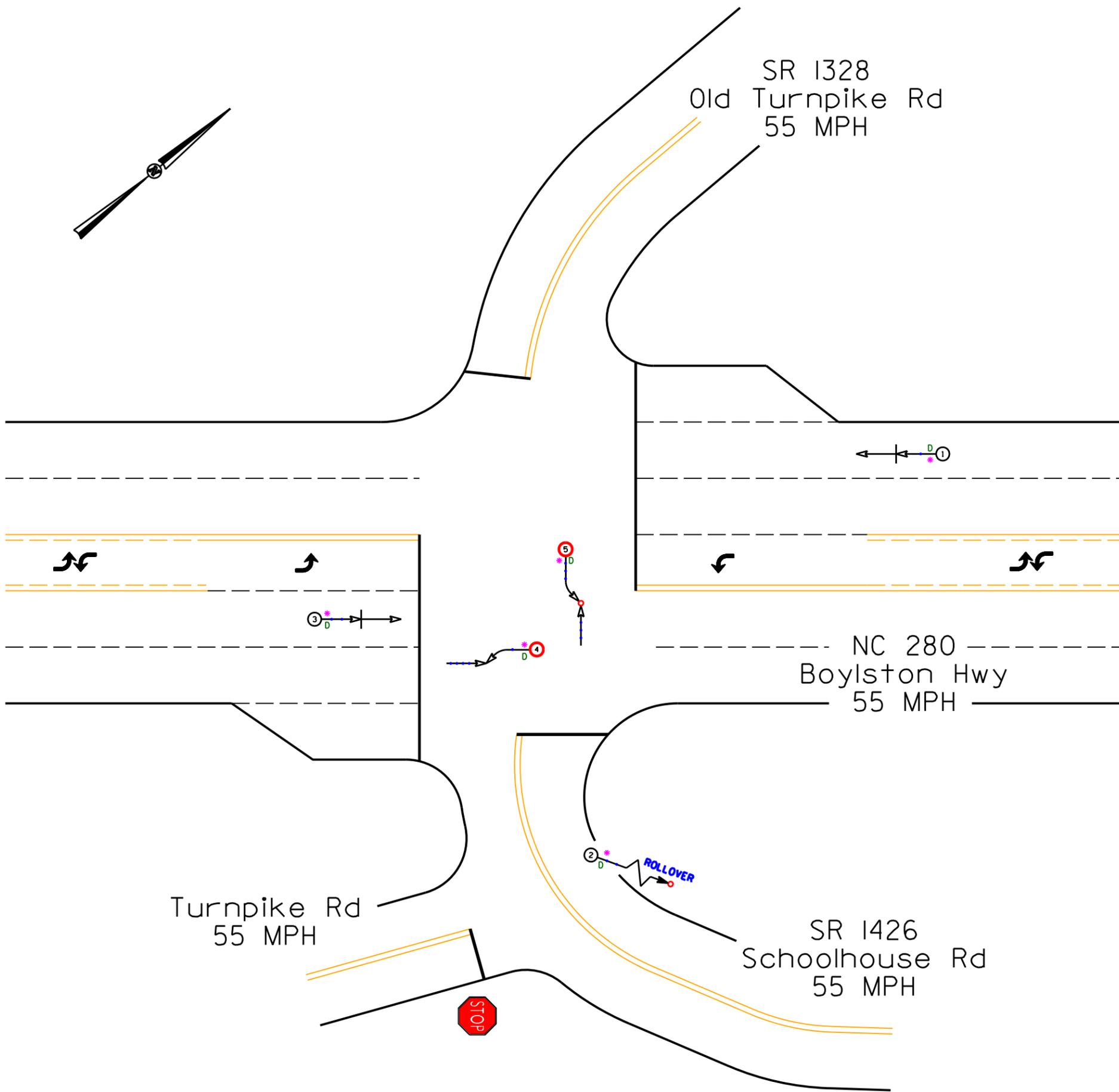
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 14	AREA: 1
	STUDY PERIOD: 12/1/1995 - 12/31/2001	
	DISTANCE: Y-LINE = 150 FT	
ANALYSIS PREPARED BY: JBS		
ANALYSIS CHECKED BY: BR		
DIAGRAM PREPARED BY: JBS		
DIAGRAM REVIEWED BY: ST		
SCALE: NOT TO SCALE		
DATE: 9-29-2008		
LOG NUMBER: SS* 14-01-203 BEFORE		

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



SR 1328
Old Turnpike Rd
55 MPH



Turnpike Rd
55 MPH

SR 1426
Schoolhouse Rd
55 MPH

NC 280
Boylston Hwy
55 MPH

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
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	HEAD ON		INJURY		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		SPEED UNKNOWN
	RAN OFF ROAD				70 AND UP		OILY

SS# 14-01-203
Henderson County
AFTER Period
3/1/02 - 3/31/08



New Signalized
Intersection

Target Crashes
 Frontal Impact

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 14	AREA: 1
	STUDY PERIOD: 3/1/2002 - 3/31/2008	
	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: 9-29-2008		
LOG NUMBER: SS* 14-01-203 AFTER		

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