

Spot Safety Project Evaluation

Order # 41000009641

Spot Safety Project # 06-05-211

**Spot Safety Project Evaluation of the Installation of Flashing Yellow Arrow Signal Heads
At the Intersection of NC 87 and SR 1115 (Buffalo Lakes Road)
Spout Springs, In Harnett County**

Documents Prepared By:

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

Principal Investigator



Chad J. Neilson

11/16/2010

Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 06-05-211 located at the intersection of NC 87 and SR 1115 (Buffalo Lakes Road) in Spout Springs, Harnett County.

The signal ID for the existing signal is 06-0716.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of Flashing Yellow Arrow (FYA) signal heads on NC 87 at the subject location. NC 87 is a four-lane, median divided facility at the subject intersection with speed limit of 55 mph for both approaches. SR 1115 (Buffalo Lakes Road) is a two-lane facility with a speed limit of 55 mph. The subject location is a signalized three-leg intersection.

The original statement of problem was vehicles traveling on NC 87 attempting to access SR 1115 (Buffalo Lakes Road) are failing to yield to vehicles on the through leg of the intersection under the permissive left turn phase.

The initial crash analysis was completed from July 1, 2002 to January 31, 2005 with nine (9) reported left-turn same roadway crashes. The final completion date for the improvement at the subject intersection was on February 28, 2006 with a total cost of \$ 30,000.00.

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 were the months of January 2006 through March 2006. The before period consisted of reported crashes from July 1, 2002 through December 31, 2005 (3 years and 6 months); and the after period consisted of reported crashes from April 1, 2006 through September 30, 2009 (3 years and 6 months). The ending date for this analysis was determined by the original signal installation date. The end date for the after period data set was chosen to have equal time frames for before and after.

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 Left-turn, same roadway crashes are considered the target crashes for the applied countermeasure.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	23	14	- 39.13 %
Total Crash Severity Index	20.70	10.64	- 48.60 %
Target Crashes	12	4	- 66.67 %
Target Crash Severity Index	29.97	6.55	- 78.14 %
Volume (2004, 2008)	23,550	26,250	11.47 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	5	1	- 80.00 %
Class B injury Crashes	4	1	- 75.00 %
Class C Injury Crashes	6	7	16.67 %
Total Injury Crashes	15	9	- 40.00 %

The naive before and after analysis at the treatment location resulted in a thirty-nine (39) percent decrease in Total Crashes, sixty-six (66) percent decrease of Target Crashes, and a forty-eight (48) percent decrease in the Total Severity Index. The before period ADT year was 2004 and the after period ADT year was 2008.

Results and Discussion

Referencing the *Collision Diagrams*, the before period presented twelve (12) target crashes. There was an eastbound left-turn, same roadway crash pattern at the intersection. After the installation of the FYA signal heads, there were four (4) left-turn, same roadway target crashes.

The calculated benefit to cost ratio for this project is **159.09 considering total crashes**. The benefit to cost ratio **considering only target crashes is 159.79**. 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.

Photos were provided for this location by Google Street View for all three approaches of this 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 West on NC 87



Looking South on SR 1115 (Buffalo Lakes Rd)



Looking East on NC 87

BENEFIT-COST ANALYSIS WORKSHEET - TOTAL

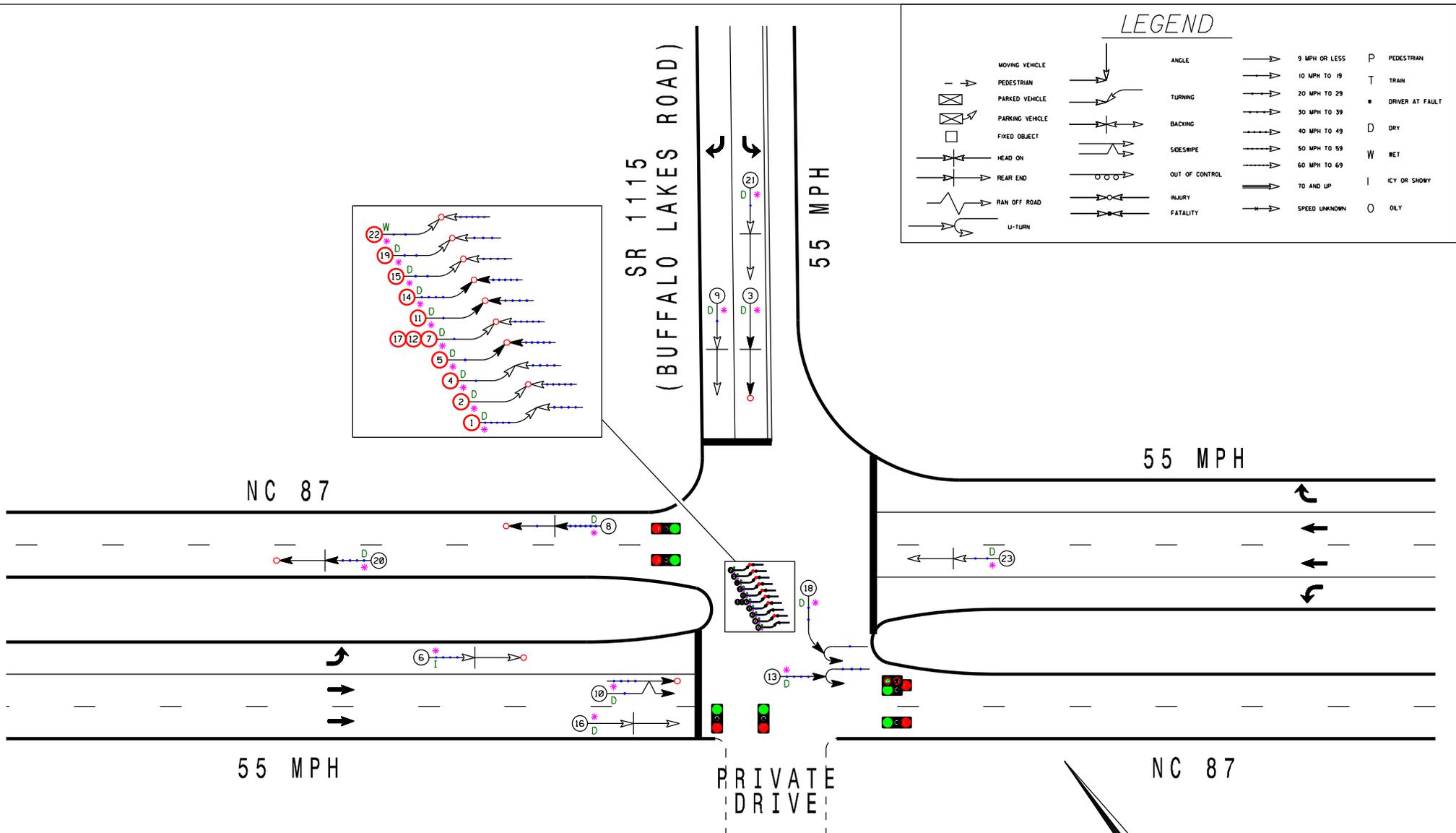
LOCATION: NC 87 and SR 1115 (Buffalo Lakes Road)		BY: C Neilson						
COUNTY: Harnett		DATE: 11/15/2010						
FILE NO.: SS 06-05-211								
DETAILED COST:	TYPE IMPROVEMENT -	FYA Signal Head Upgrade						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$30,000	10	0.149	\$4,471			
		\$0	0	0.000	\$0			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$30,000	10	0.149	\$4,471			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$0			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$150			
	TOTAL ANNUAL COST=				\$4,621			
	TOTAL COST OF PROJECT=				\$30,000			
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	3.50	5	1.43	10	2.86	8	2.29	\$966,971
AFTER	3.50	1	0.29	8	2.29	5	1.43	\$231,857
							Annual Benefits from Crash Cost Savings	\$735,114
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$730,493	
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	159.09	
	TOTAL COST OF PROJECT	-	\$30,000	COMPREHENSIVE B/C RATIO	-			159.09

BENEFIT-COST ANALYSIS WORKSHEET - TARGET

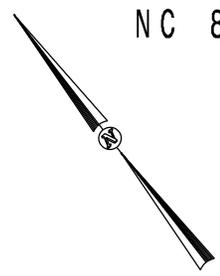
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COUNTY: Harnett		DATE: 11/15/2010						
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DETAILED COST:	TYPE IMPROVEMENT -	FYA Signal Head Upgrade						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$30,000	10	0.149	\$4,471			
		\$0	0	0.000	\$0			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$30,000	10	0.149	\$4,471			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$0			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$150			
	TOTAL ANNUAL COST=				\$4,621			
	TOTAL COST OF PROJECT=				\$30,000			
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	3.50	4	1.14	6	1.71	2	0.57	\$756,743
AFTER	3.50	0	0.00	3	0.86	1	0.29	\$18,371
							Annual Benefits from Crash Cost Savings	\$738,371
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$733,751	
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	159.79	
	TOTAL COST OF PROJECT	-	\$30,000	COMPREHENSIVE B/C RATIO	-			159.79

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		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 ONLY
	RAN OFF ROAD				TO AND LIP		
	U-TURN				SPEED UNKNOWN		



SS# 06-05-211
 Order# 41000009641
 Harnett County
 BEFORE Period
 7/1/02 - 12/31/05



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

TRAFFIC SAFETY UNIT

Date: 11-15-2010 Prepared By: C Neilson

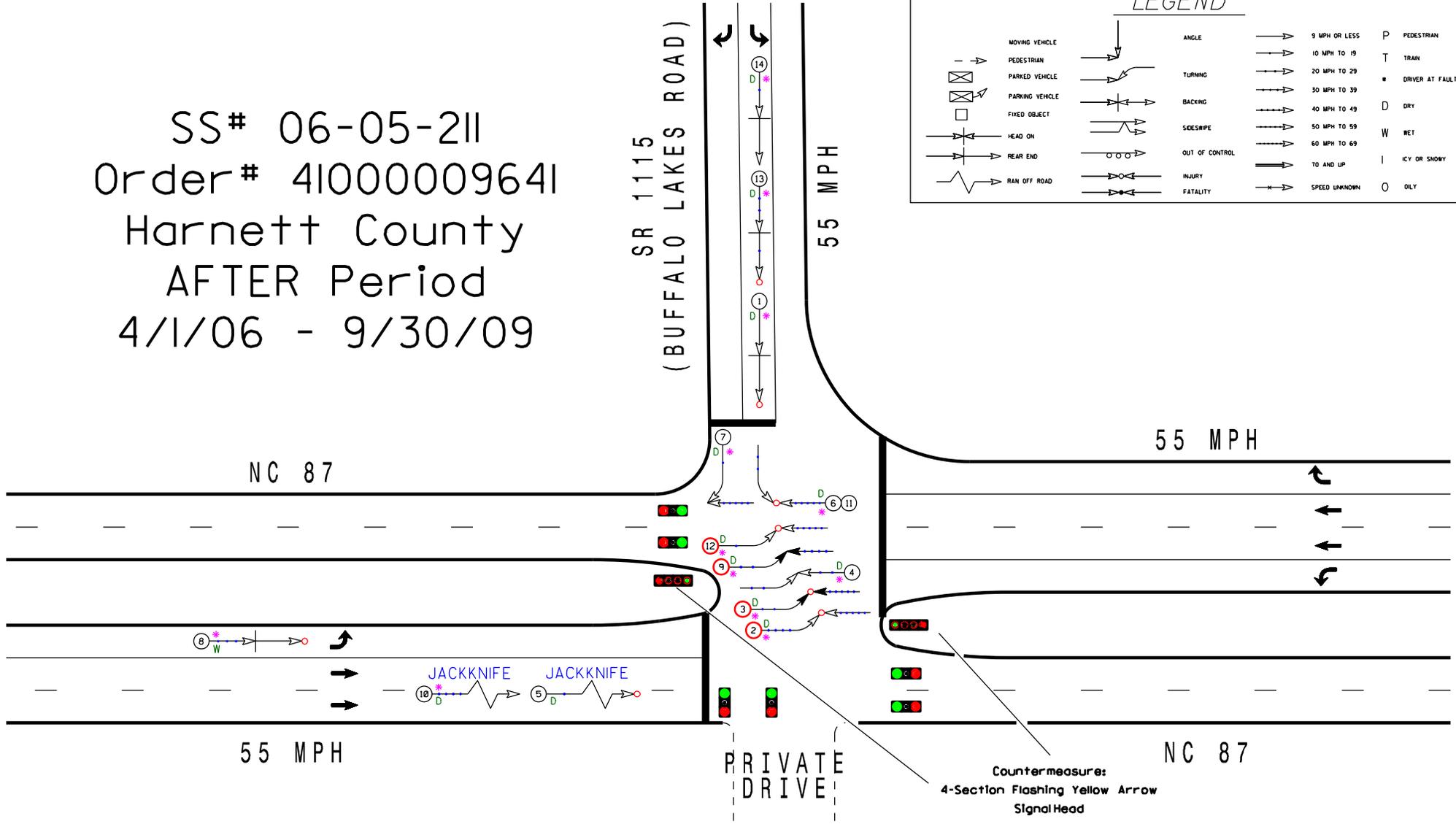
SS# 06-05-211
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 Harnett County
 AFTER Period
 4/1/06 - 9/30/09

SR 1115
 (BUFFALO LAKES ROAD)

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		TO AND LIP
	RAN OFF ROAD		SPEED UNKNOWN		SPEED UNKNOWN		ONLY



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