

Spot Safety Project Evaluation

Project Log # 200906070

Spot Safety Project # 03-02-202

Spot Safety Project Evaluation of the 1.5 Foot Paved Shoulders Installation Along SR 1407 (Wolf Swamp Road) Entire Route Onslow 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

8-3-2009

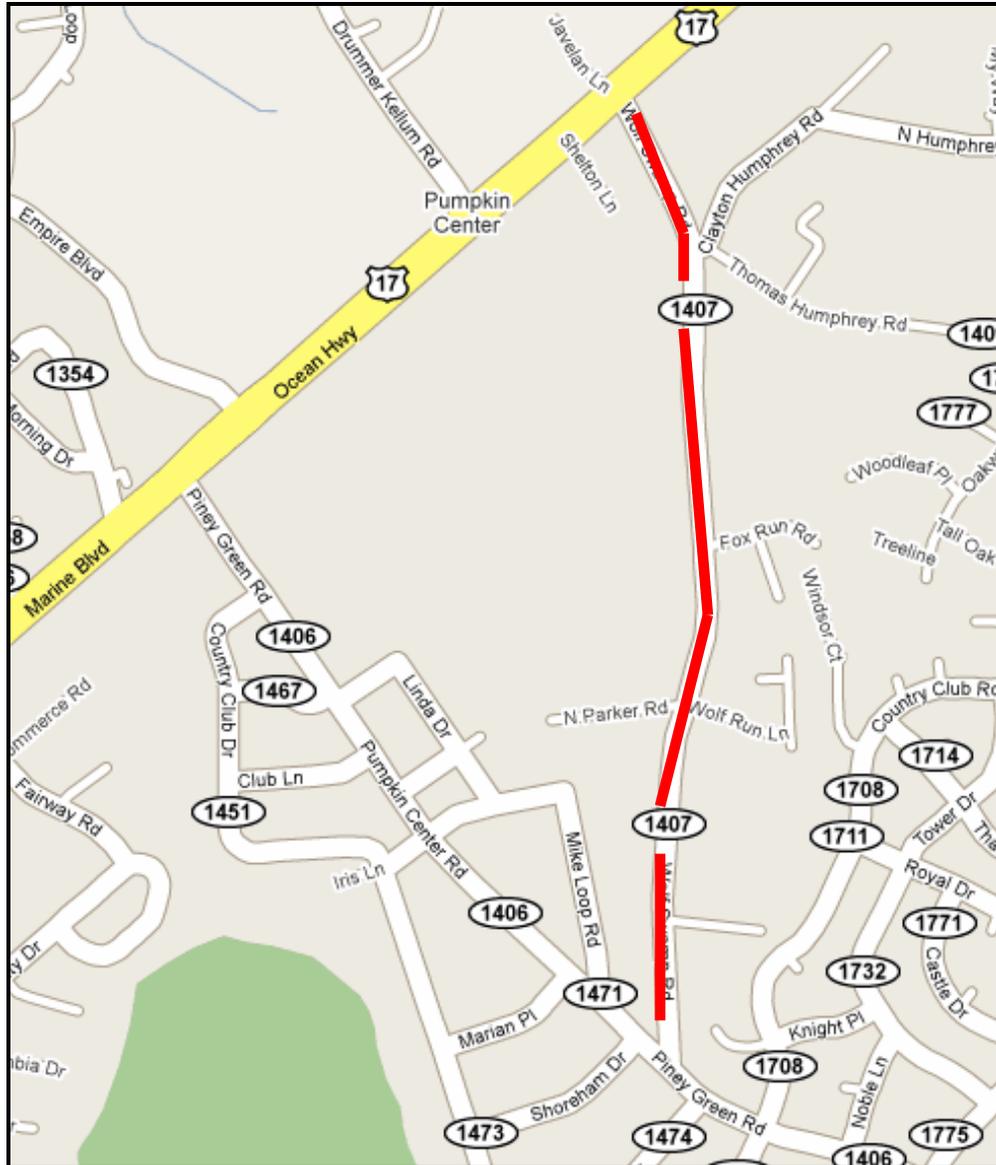
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 03-02-202 located along SR 1407 (Wolf Swamp Road) in Onslow County, near the City of Jacksonville.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of 1.5 foot paved shoulders along both sides of the roadway. SR 1407 is a two lane, two way roadway with a 55 mph speed limit. The road is mainly residential with multiple driveways. SR 1407 also acts as a connector roadway between US 17 and SR 1406 (Piney Green Road).

The original statement of problem was the concern that motorists are repeatedly running off the edge of roadway causing shoulder rutting and collisions from vehicles overcorrecting. The intended purpose of the new paved shoulders was to alleviate the existing and potential ran-off roadway crash pattern.

The initial crash analysis was completed from September 30, 1998 to September 30, 2001 with thirteen (13) reported crashes, two (2) of which were deemed correctable including one fatality crash. The final completion date for the improvement at the subject intersection was on March 17, 2003 with a total cost of \$65,000.

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 February through March 2003. The before period consisted of reported crashes from January 1, 1997 through January 31, 2003 (6 years and 1 month); and the after period consisted of reported crashes from April 1, 2003 through April 30, 2009 (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 on SR 1407 from MP 0.028 (150 feet from SR 1406) to MP 1.172 (150 feet from US 17) with a zero foot y-line. *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 SR 1407 Ran-off Roadway Collisions were the target crashes for the applied countermeasure. The Target Crash types considered are as follows: Ran-off Road, Right; Ran-off Road, Left; Ran-off Road, Straight; and Head-on crashes.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	12	11	- 8.3 %
Total Severity Index	14.87	16.80	13.0 %
Target Crashes	4	5	25.0 %
Target Crash Severity Index	21.80	19.12	- 12.3 %
Volume	2,700	2,500	- 7.4 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	1	0	- 100.0 %
Class A injury Crashes	1	2	100.0 %
Class B injury Crashes	1	0	- 100.0 %
Class C Injury Crashes	1	3	200.0 %
Total Injury Crashes	4	5	25.0 %

The naive before and after analysis at the treatment location resulted in an 8 percent decrease in Total Crashes, a 25 percent increase in Target Crashes, and a 13 percent increase in the Total Severity Index. The before period ADT year was 2000 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 an 8 percent decrease in Total Crashes but a 25 percent increase in Target Crashes. The summary results above demonstrate that the overall crash totals appear to have remained consistent at the treatment location from the before to the after period.

Referencing the *Collision Diagrams*, the before period and after period crash patterns appear remarkably similar. The before period fatal target crash is located in the same general vicinity as the after period A-injury target collision. The before period head-on collision (crash # 7) was not considered as a target collision because the colliding “vehicle 1” was actually a trailer that had become unhitched and crossed the double yellow centerline. The benefit-cost ratio for this countermeasure yielded a negative result due to the fact that the after period had an increase of one injury collision.

The calculated benefit to cost ratio for this project is **(-0.26) considering total crashes**. The benefit to cost ratio **considering only target crashes is (-0.46)**. 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 at several points along the subject roadway and were obtained through 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 countermeasure.

TREATMENT SITE PHOTOS



Looking North on SR 1407 near SR 1406 Intersection



Looking North on SR 1407 near SR 1477 / SR 1861 Intersection



Looking North on SR 1407 near SR 1846 Intersection



Looking North on SR 1407 approaching US 17 Intersection

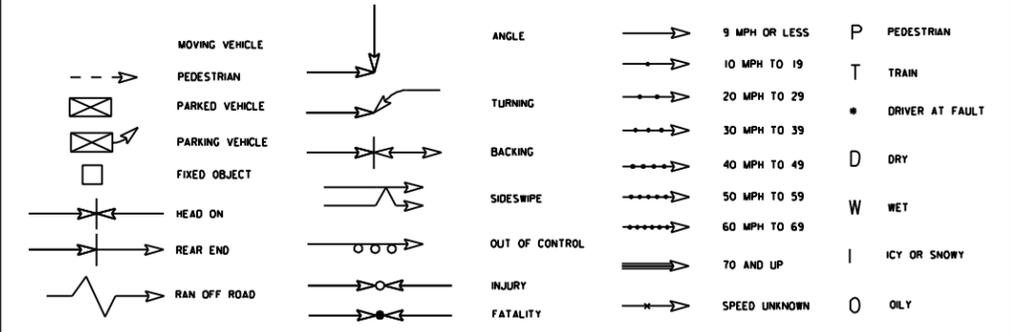
BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes

LOCATION: SR 1407 (Wolf Swamp)		BY: JBS							
COUNTY: Onslow		DATE: 7/28/2009							
FILE NO.: SS 03-02-202		NOTES: Total Crashes							
DETAILED COST:	TYPE IMPROVEMENT - 1.5 Foot Paved Shoulders								
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
	Construction	\$65,000	20	0.102	\$6,620				
	Right-of-Way	\$0	0	0.000	\$0				
	TOTALS	\$65,000	20	0.102	\$6,620				
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				(\$120)				
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0				
	TOTAL ANNUAL COST=				\$6,500				
	TOTAL COST OF PROJECT=				\$65,000				
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	6.08	2	0.33	2	0.33	8	1.32	\$175,526	
AFTER	6.08	2	0.33	3	0.49	6	0.99	\$177,204	
						Annual Benefits from Crash Cost Savings		(\$1,678)	
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST				=	(\$8,178)			
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST				=	-0.26			
	TOTAL COST OF PROJECT	-	\$65,000	COMPREHENSIVE B/C RATIO	-			-0.26	

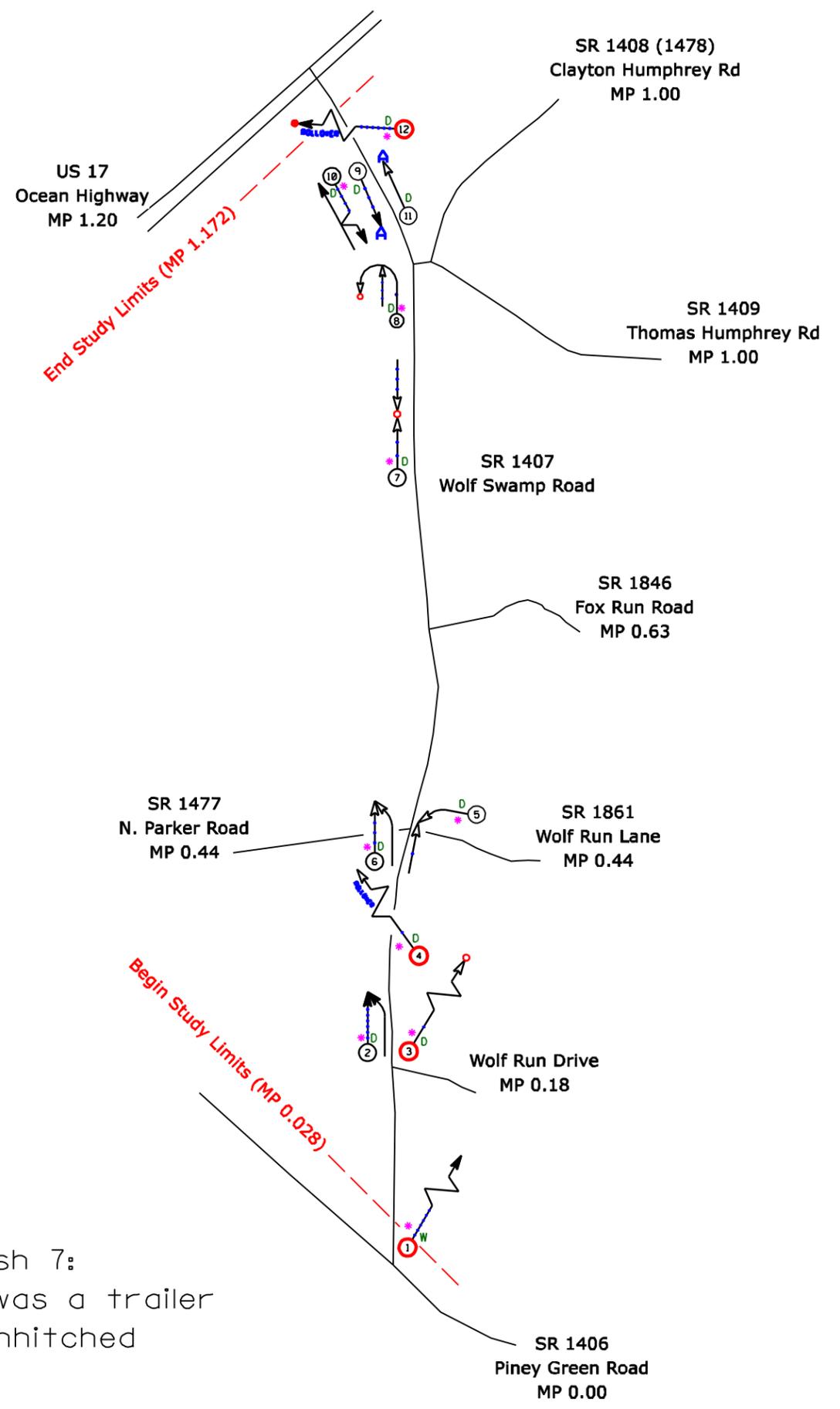
BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes

LOCATION: SR 1407 (Wolf Swamp)		BY: JBS							
COUNTY: Onslow		DATE: 7/28/2009							
FILE NO.: SS 03-02-202		NOTES: Target Crashes - Ran-Off Roadway							
DETAILED COST:	TYPE IMPROVEMENT - 1.5 Foot Paved Shoulders								
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
	Construction	\$65,000	20	0.102	\$6,620				
	Right-of-Way	\$0	0	0.000	\$0				
	TOTALS	\$65,000	20	0.102	\$6,620				
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				(\$120)				
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0				
	TOTAL ANNUAL COST=				\$6,500				
	TOTAL COST OF PROJECT=				\$65,000				
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	6.08	1	0.16	1	0.16	2	0.33	\$86,480	
AFTER	6.08	1	0.16	2	0.33	2	0.33	\$89,441	
						Annual Benefits from Crash Cost Savings		(\$2,961)	
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST				=	(\$9,461)			
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST				=	-0.46			
	TOTAL COST OF PROJECT	-	\$65,000	COMPREHENSIVE B/C RATIO	-			-0.46	

LEGEND



SS# 03-02-202
 Onslow County
 BEFORE Period
 1/1/97 - 1/31/03
 SR 1407 (Wolf Swamp Rd)
 Entire Route



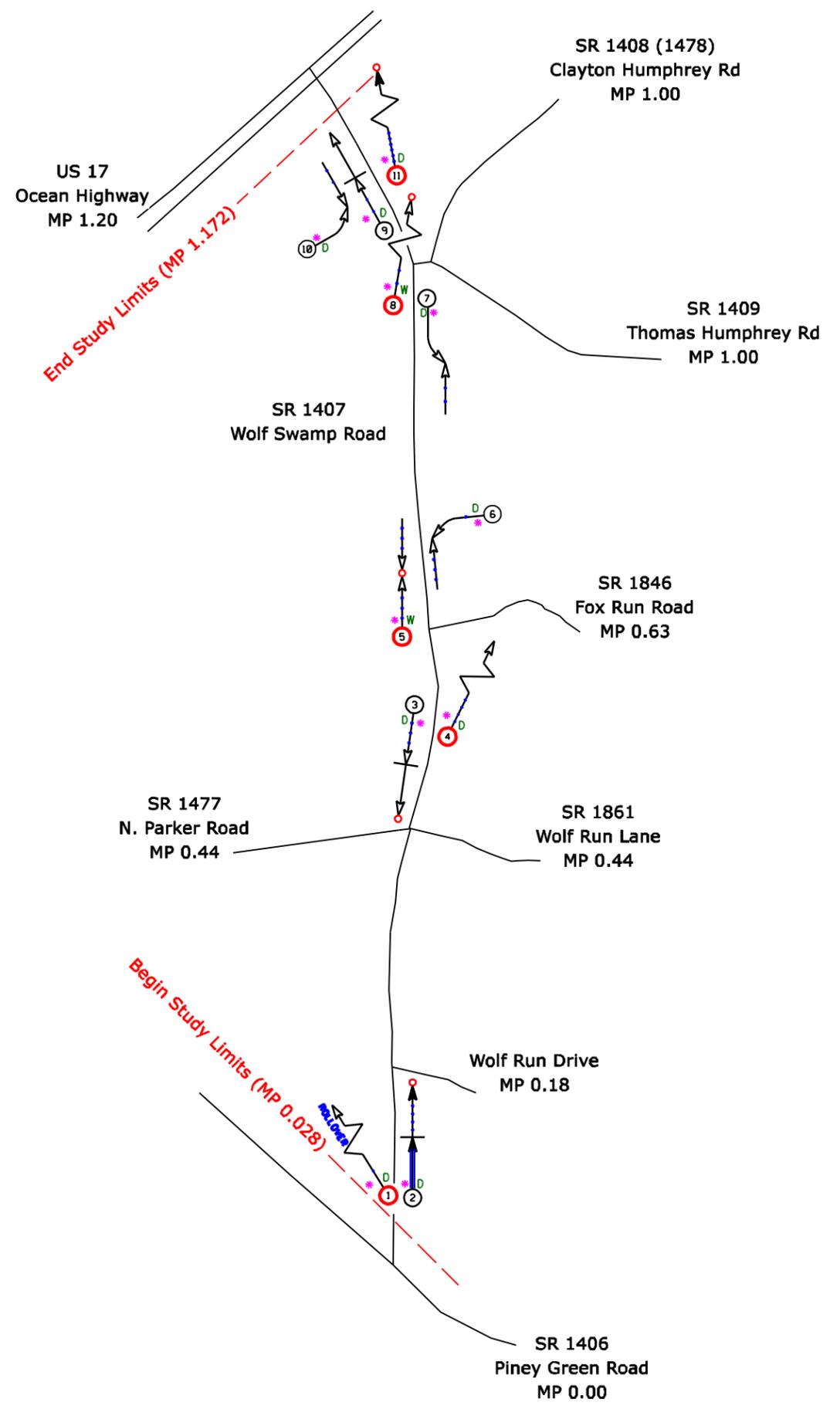
Note Crash 7:
 "Head-on" vehicle was a trailer
 that came unhitched

⊕ Ran-Off Roadway
 Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 3	AREA:
	STUDY PERIOD: 1/1/1997 - 1/31/2003	
	DISTANCE: Y-LINE : OFT	
ANALYSIS PREPARED BY: JBS		
ANALYSIS CHECKED BY: N/A		
DIAGRAM PREPARED BY: JBS		
DIAGRAM REVIEWED BY: ST		
SCALE: NOT TO SCALE		
DATE: 7-28-2009		
LOG NUMBER: SS* 03-02-202 BEFORE		

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



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		OILY
	RAN OFF ROAD		70 AND UP		SPEED UNKNOWN		

SS# 03-02-202
 Onslow County
 After Period
 4/1/03 - 4/30/09
 SR 1407 (Wolf Swamp Rd)
 Entire Route

After Period Countermeasure:
 Install 1.5 Foot Paved Shoulders
 along each side of roadway

Ran-Off Roadway
 Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 3	AREA: 1
STUDY PERIOD: 4/1/2003 - 4/30/2009		
DISTANCE: Y-LINE : OFT		
ANALYSIS PREPARED BY: JBS		
ANALYSIS CHECKED BY: N/A		
DIAGRAM PREPARED BY: JBS		
DIAGRAM REVIEWED BY: ST		
SCALE: NOT TO SCALE		
DATE: 7-28-2009		
LOG NUMBER: SS* 03-02-202 AFTER		

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