

# Spot Safety Project Evaluation

Order # 41000008320

Spot Safety Project # 01-03-212

## Spot Safety Project Evaluation of the Installation of a Left Turn Lane on US 158 at Its Intersection with SR 1175 Hertford 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

10/4/2010

Date

Traffic Safety Project Engineer

# *Spot Safety Project Evaluation Documentation*

## **Subject Location**

Evaluation of Spot Safety Project Number 01-03-212 – The intersection of US 158 and SR 1175 (Parkers Fishery/Big Mary) in Hertford County.



## **Project Information and Background from the Project File Folder**

According to the project information, the spot safety project improvement countermeasure chosen for the subject location was the installation of left turn lanes on both approaches of US 158 at the intersection. However, according to the aerial view and the street-view on Googlemaps there is not currently a turn lane on the westbound approach.

The subject location is a four-leg intersection which is controlled by a stop condition on SR 1175. Prior to the turn lane construction all approaches were single lane. The speed limit is 55 mph for all approaches.

The original statement of problem was that the lack of left turn lanes increased the potential for rear-end crashes.

The initial crash analysis was conducted from January 1, 2000 to December 31, 2002 with a total of one reported crash, which was considered correctable by the chosen countermeasure. The final completion date for the improvements at the subject intersection was on May 31, 2006 with a total cost of \$62,500.00.

### 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 was from April 1, 2006 to June 30, 2006. The before period consisted of reported crashes from March 1, 2002 through March 31, 2006 (4 years and 1 month) and the after period consisted of reported crashes from July 1, 2006 through July 31, 2010 (4 years and 1 month). 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 Rear-End Crashes on the eastbound approach of US 158 were the Target Crashes for the applied countermeasure.

<b>Treatment Information</b>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total Crashes	3	0	-100.0
Total Severity Index	28.73	0	-100.0
Target Crashes	1	0	-100.0
Target Crash Severity Index	1	0	-100.0
Volume	3,700	4,300	16.2
<b>Target Crash Severity Summary</b>			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	0	0	N/A
Class C Crashes	0	0	N/A
PDO Crashes	1	0	-100.0

The naive before and after analysis at the treatment location resulted in a 100 percent decrease in both Total Crashes and Target Crashes and a 16 percent increase in Average Daily Traffic (ADT). The before period ADT year was 2004 and the after period ADT year was 2008.

## Results and Discussion

The intersection experienced a 100 percent decrease in Target Crashes from the before to the after period. However, there was only one Target Crash in the before period to begin with. As stated in the *Project Background* section, the project was constructed more to prevent the potential for crashes rather than to correct an existing pattern.

There was a fatal crash in the before period that resulted from a northbound vehicle on SR 1175 failing to stop at the stop sign and hitting an eastbound vehicle on US 158.

The calculated benefit to cost ratio for this project is 16.51 considering total crashes. The benefit to cost ratio considering only target crashes is 0.11. 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 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.

**BENEFIT-COST ANALYSIS WORKSHEET**

LOCATION: US 158 at SR 1175  
 COUNTY: Hertford  
 FILE NO.: SS 01-03-212

BY: bdr  
 DATE: 9/23/2010

DETAILED COST: TYPE IMPROVEMENT - Left Turn Lane

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$62,500	10	0.149	\$9,314
Right-of-Way	\$0	0	0.000	\$0
<b>TOTALS</b>	<b>\$62,500</b>	<b>10</b>	<b>0.149</b>	<b>\$9,314</b>

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$400  
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$0  
 TOTAL ANNUAL COST= \$9,714  
 TOTAL COST OF PROJECT= \$62,500

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	4.08	1	0.25	1	0.25	1	0.25	\$160,368
AFTER	4.08	0	0.00	0	0.00	0	0.00	\$0

Annual Benefits from Crash Cost Savings \$160,368

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$150,653

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 16.51

TOTAL COST OF PROJECT - \$62,500 COMPREHENSIVE B/C RATIO - 16.51

**BENEFIT-COST ANALYSIS WORKSHEET**

LOCATION: US 158 at SR 1175  
 COUNTY: Hertford  
 FILE NO.: SS 01-03-212 Target Crashes Only

BY: bdr  
 DATE: 9/23/2010

DETAILED COST: TYPE IMPROVEMENT - Left Turn Lane

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$62,500	10	0.149	\$9,314
Right-of-Way	\$0	0	0.000	\$0
<b>TOTALS</b>	<b>\$62,500</b>	<b>10</b>	<b>0.149</b>	<b>\$9,314</b>

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$400  
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$0  
 TOTAL ANNUAL COST= \$9,714  
 TOTAL COST OF PROJECT= \$62,500

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	4.08	0	0.00	0	0.00	1	0.25	\$1,054
AFTER	4.08	0	0.00	0	0.00	0	0.00	\$0

Annual Benefits from Crash Cost Savings \$1,054

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$8,660)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 0.11

TOTAL COST OF PROJECT - \$62,500 COMPREHENSIVE B/C RATIO - 0.11

**Treatment Site Photos from Google Street-View**



Looking east on US 158



Looking west on US 158



Looking north from the intersection toward SR 1175 (Parkers Fishery)

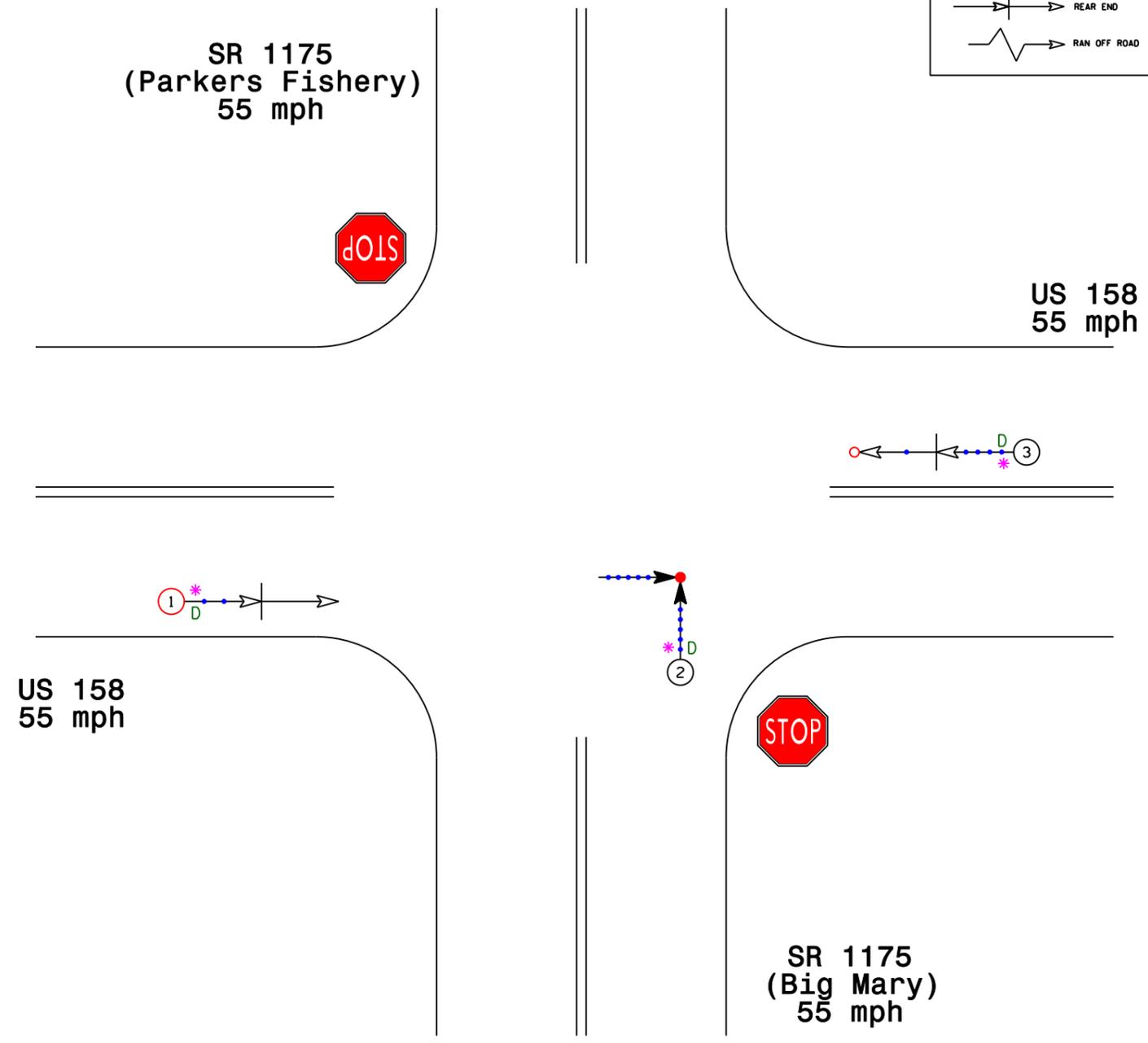


Looking south from the intersection toward SR 1175 (Parkers Fishery)

Hertford County  
 US 158 and SR 1175  
 BEFORE Period  
 3/1/2002-3/31/2006

**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		○ SPEED UNKNOWN
	RAN OFF ROAD				70 AND UP		



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

**TRAFFIC SAFETY UNIT**

Date: September 2010      Prepared By: BDR

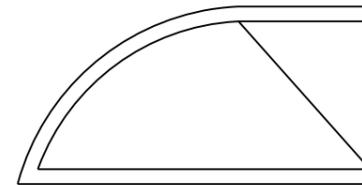
Hertford County  
 US 158 and SR 1175  
 AFTER Period  
 7/1/2006-7/31/2010

SR 1175  
 (Parkers Fishery)  
 55 mph



US 158  
 55 mph

**NO REPORTED CRASHES**



US 158  
 55 mph



SR 1175  
 (Big Mary)  
 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	OILY
RAN OFF ROAD		70 AND UP	
		SPEED UNKNOWN	



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

**TRAFFIC SAFETY UNIT**

Date: September 2010

Prepared By: BDR