Spot Safety Project Evaluation

Work Order #41000010375

Spot Safety Project # 08-04-224

Spot Safety Project Evaluation of the Installation of Two Foot Paved Shoulders On SR 1318 (Steel Bridge Rd) from 0.4 Miles North of SR 1335 to 0.75 Miles South of SR 1335 Lee 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

Brad Robinson, PE

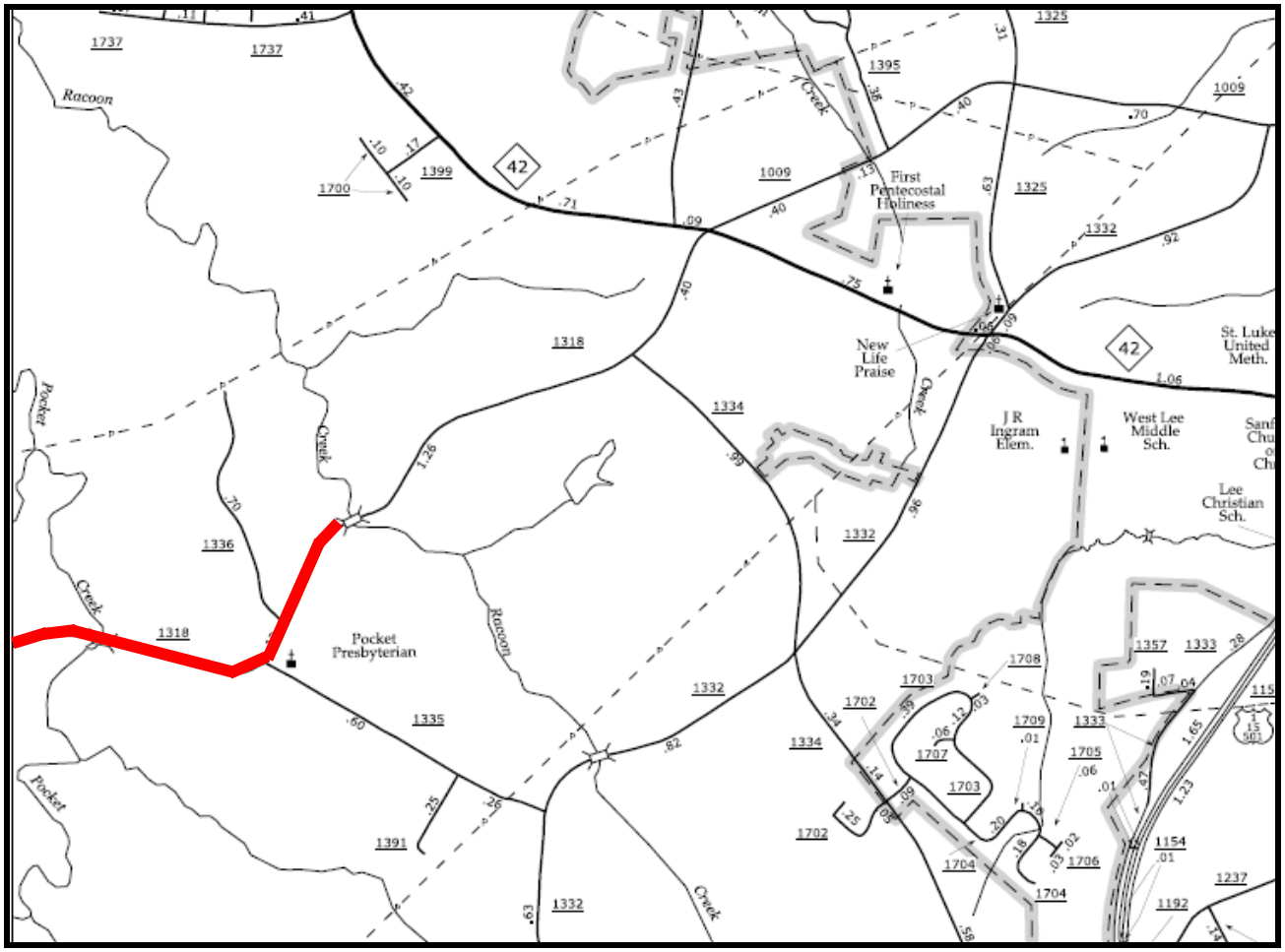
1/14/2011
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 08-04-224 – SR 1318 (Steel Bridge Rd) from 0.4 miles north of SR 1335 (Bridges Rd) to 0.75 miles south of SR 1335 in Lee County.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was to widen the existing 18 foot section to 22 feet in order to provide 2 foot paved shoulder sections for both directions of travel.

SR 1318 is a rural two lane roadway that did not have paved shoulders in the before period. The speed limit is 55 mph.

The initial crash analysis was conducted from May 1, 2001 to April 30, 2004 with a total of 14 reported crashes, nine of which were considered correctable by the chosen countermeasure. The final completion date for the improvements at the subject location was on August 31, 2006 with a total cost of $86,000.00.

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 July 1, 2006 to September 30, 2006. The before period consisted of reported crashes from May 1, 2002 through June 30, 2006 (4 years and 2 months) and the after period consisted of reported crashes from October 1, 2006 through November 30, 2010 (4 years and 2 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 that occurred on SR 1318 from 0.4 miles east of SR 1335 to 0.75 miles west of SR 1335. The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Ran Off Road Crashes were the Target Crashes for the applied countermeasure. The target crashes are clearly identified in the before and after period collision diagrams.

Treatment Information			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Total Crashes	16	10	-37.5
Total Severity Index	8.51	3.96	-53.5
Target Crashes	9	7	-22.2
Target Severity Index	13.53	4.17	-69.2
Volume	1,400	1,300	-7.1
Target Crash Severity Summary			
Fatal Crashes	0	0	N/A
Class A Crashes	1	0	-100
Class B Crashes	1	0	-100
Class C Crashes	4	3	-25
PDO Crashes	3	4	33.3

The naive before and after analysis at the treatment location resulted in a 38 percent decrease in Total Crashes, a 22 percent decrease in Target Crashes and a 7 percent decrease in Average Daily Traffic (ADT). The before period ADT year was 2004 and the after period ADT year was 2008.

Results and Discussion

The installation of the 2 foot paved shoulders appears to have been effective at reducing Target Crashes at the subject location. There was a total of nine ran off road crashes in the before period and seven in the after. After reviewing the crash reports it appears that two of the after period

Target Crashes were caused by drivers swerving to avoid animals (crash #s 1 and 9). One after period Target Crash occurred after the weight on a trailer shifted, causing the vehicle pulling it to roll over (crash #3). One after period crash occurred after a vehicle ran over "some deep water on the roadway," causing it to lose control and overturn. There were no causes given for any of the before period Target Crashes.

The calculated benefit to cost ratio for this project is 19.20 considering total crashes. The benefit to cost ratio considering only target crashes is 18.72. 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 roadway.

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1318 in the vicinity of SR 1335 BY: bdr
COUNTY: Lee DATE: 1/4/2011
FILE NO.: SS 08-04-224

DETAILED COST: TYPE IMPROVEMENT - 2' paved shoulders

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$0	0	0.000	$0
	$86,000	20	0.102	$8,759
Right-of-Way	$0	0	0.000	$0
TOTALS	$86,000	20	0.102	$8,759

ESTIMATED INCREASE IN ANNUAL MAINT. COST = ($230)
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $0

TOTAL ANNUAL COST= $8,529
TOTAL COST OF PROJECT= $86,000

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	4.17	1	0.24	6	1.44	9	2.16	$189,137
AFTER	4.17	0	0.00	4	0.96	6	1.44	$25,372

Annual Benefits from Crash Cost Savings $163,765

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = $155,236

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 19.20

TOTAL COST OF PROJECT - $86,000 COMPREHENSIVE B/C RATIO - 19.20

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1318 in the vicinity of SR 1335 BY: bdr
COUNTY: Lee DATE: 1/4/2011
FILE NO.: SS 08-04-224 Target Crashes Only

DETAILED COST: TYPE IMPROVEMENT - 2' paved shoulders

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$0	0	0.000	$0
	$86,000	20	0.102	$8,759
Right-of-Way	$0	0	0.000	$0
TOTALS	$86,000	20	0.102	$8,759

ESTIMATED INCREASE IN ANNUAL MAINT. COST = ($230)
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $0

TOTAL ANNUAL COST= $8,529
TOTAL COST OF PROJECT= $86,000

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	4.17	1	0.24	5	1.20	3	0.72	$178,153
AFTER	4.17	0	0.00	3	0.72	4	0.96	$18,513

Annual Benefits from Crash Cost Savings $159,640

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = $151,111

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 18.72

TOTAL COST OF PROJECT - $86,000 COMPREHENSIVE B/C RATIO - 18.72

Treatment Site Photos from Google Street-View

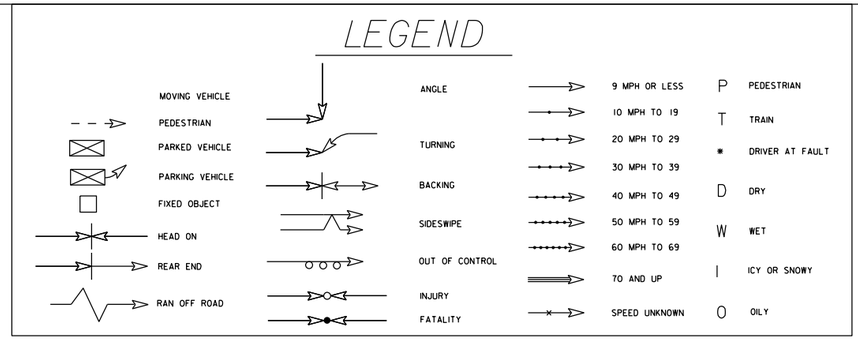
Looking southwest on SR 1318

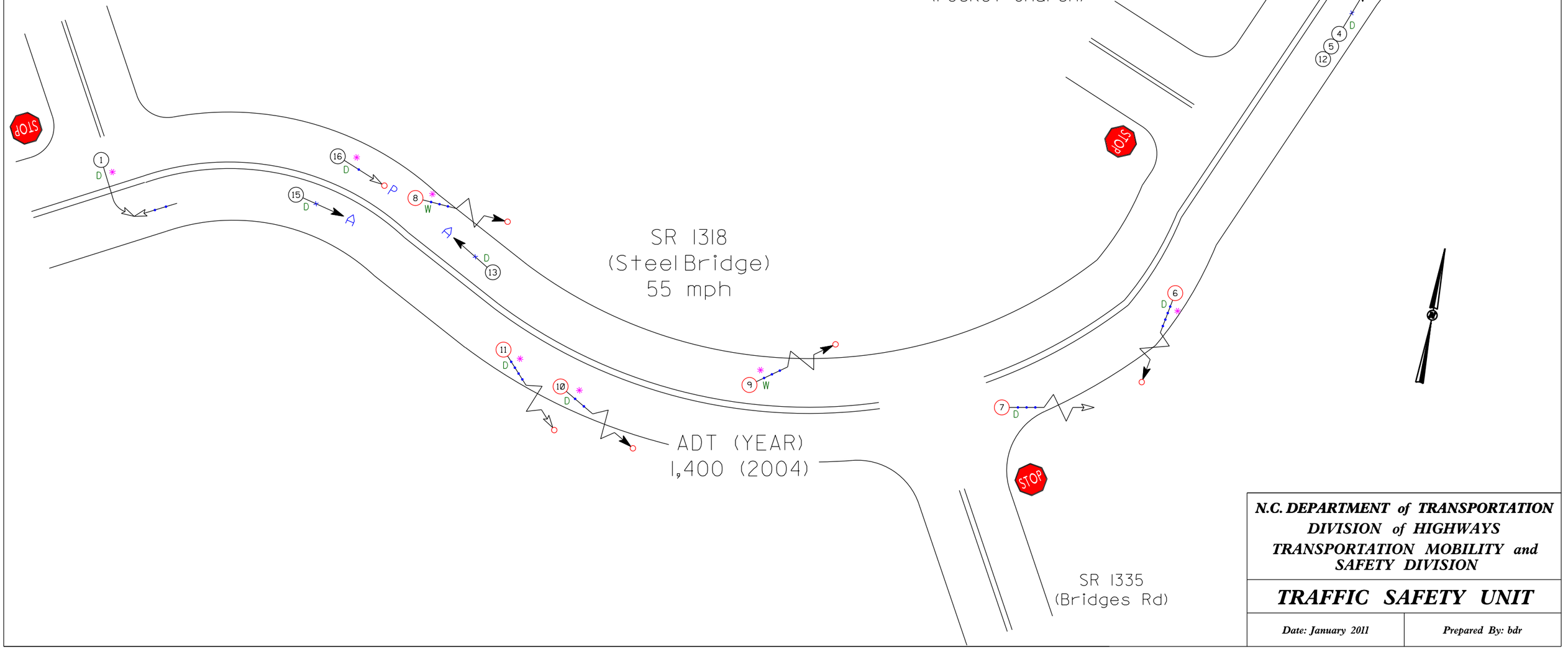
Looking southwest on SR 1318, approaching SR 1335

Looking southwest on SR 1318, west of SR 1335

Looking southwest on SR 1318

SS# 08-04-224
Order# 41000010375
Lee County
BEFORE Period
5/1/2002-6/30/2006





N.C. DEPARTMENT of TRANSPORTATION	
DIVISION of HIGHWAYS	
TRANSPORTATION MOBILITY and SAFETY DIVISION	
TRAFFIC SAFETY UNIT	
Date: January 2011	***Prepared By: bdr***

SS# 08-04-224
Order# 41000010375
Lee County
AFTER Period
10/1/2006-11/30/2010

LEGEND

MOVING VEHICLE
PEDESTRIAN
PARKED VEHICLE
PARKING VEHICLE
FIXED OBJECT
HEAD ON
REAR END
RAN OFF ROAD

ANGLE
TURNING
BACKING
SIDESWIPE
OUT OF CONTROL
INJURY
FATALITY

9 MPH OR LESS
10 MPH TO 19
20 MPH TO 29
30 MPH TO 39
40 MPH TO 49
50 MPH TO 59
60 MPH TO 69
70 AND UP
SPEED UNKNOWN

P PEDESTRIAN
T TRAIN
* DRIVER AT FAULT
D DRY
W WET
I ICY OR SNOWY
O OILY

SR 1397
(Creekwood)

SR 1336
(Pocket Church)

SR 1318
(Steel Bridge)
55 mph

2 foot paved shoulder

ROLLOVER

STOP

ADT (YEAR)
1,300 (2008)

SR 1335
(Bridges Rd)

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

TRAFFIC SAFETY UNIT

Date: January 2011 | Prepared By: bdr