

Spot Safety Project Evaluation

Order # 41000014264

Spot Safety Project # 06-04-222

Spot Safety Project Evaluation of the 2 Foot Paved Shoulder Installation and Guardrail Extension Around Bridge #58 on SR 1005 at the County Line Cumberland / Sampson Counties

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

12-1-2011

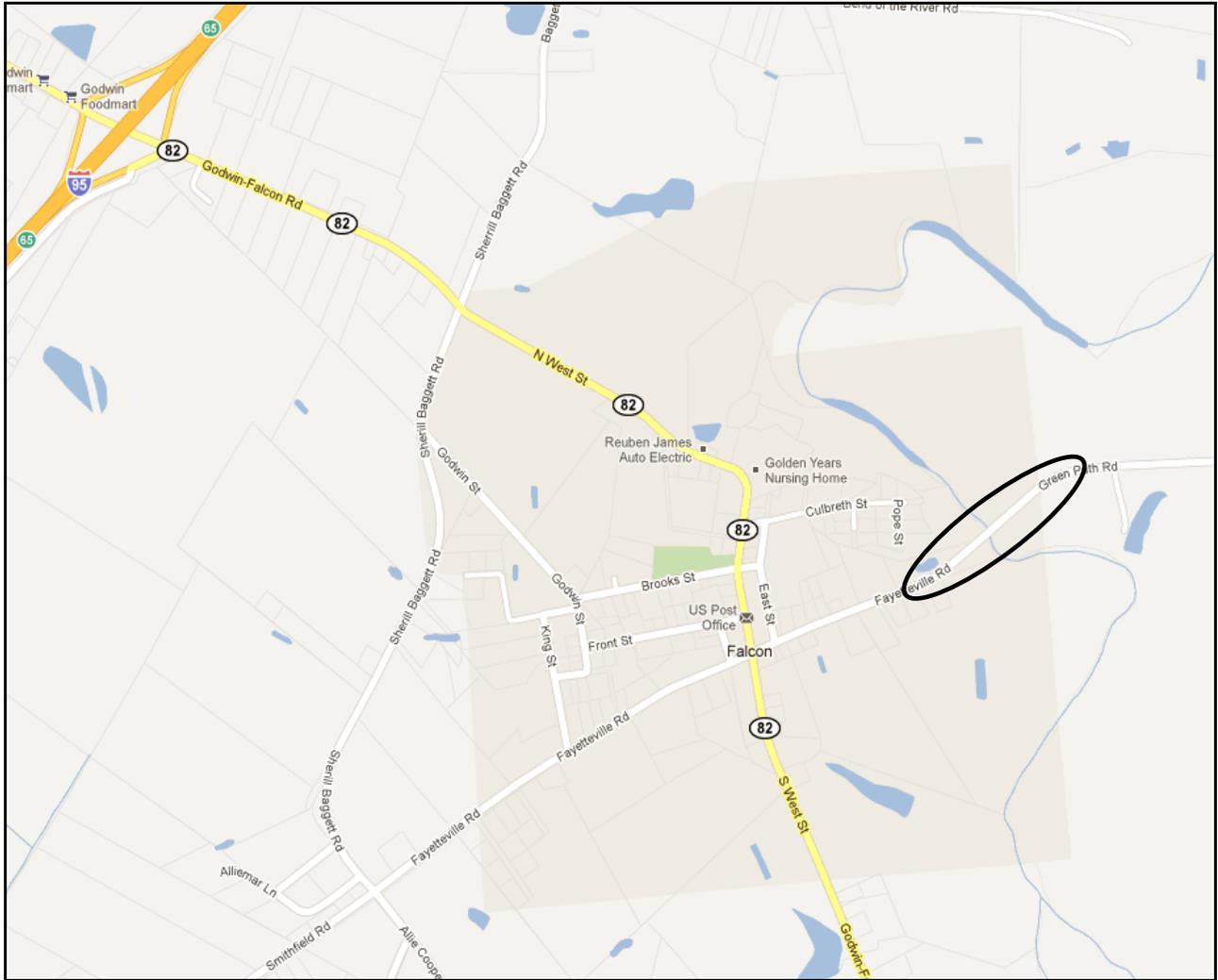
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 06-04-222 located in the vicinity of Bridge #58 at the Cumberland / Sampson County Line along SR 1005 (Fayetteville Road / Green Path Road), near the Town of Falcon.





Aerial Map provided from Google

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasures chosen for the subject location were the installation of 2-foot paved shoulders in the vicinity and extension of the bridge guardrail. SR 1005 (Fayetteville Road) in Cumberland County and SR 1005 (Green Path Road) in Sampson County are both two-lane rural roadways with a speed limit of 55-mph that changes to 35-mph on the Cumberland County side at the edge of the study limits; as you enter the Town Limits of Falcon.

The original statement of problem was the presence of vehicles running off the roadway and proceeding down the embankment near the bridge. The project was designed to eliminate the pattern and severity of run-off roadway type crashes.

The initial crash analysis was completed from April 1, 1994 to April 1, 2004 with three (3) reported crashes including one fatality crash. The final completion date for the improvement at the subject location was on September 27, 2007 with a total cost of \$134,000.

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 were the months of August through September 2007. The before period consisted of reported crashes from October 1, 2003 through July 31, 2007 (3 years and 10 months); and the after period consisted of reported crashes from October 1, 2007 through July 31, 2011 (3 years and 10 months). 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 a segment of 0.2 mile on each side of the county line bridge. *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 Lane Departure Crashes were the target crashes for the applied countermeasures. The Lane Departure Crash types considered are as follows: Ran-off Roadway (Left, Right, and Straight); Sideswipe (Opposite Direction); Fixed Object; Overturn/Rollover; and Head-on.

| <u>Treatment Information</u> | Before | After | Percent Reduction (-) Percent Increase (+) |
|------------------------------|---------------|--------------|---|
| Total Crashes | 3 | 3 | 0.0 % |
| Total Severity Index | 28.73 | 26.27 | - 8.6 % |
| | | | |
| Target Crashes | 3 | 2 | - 33.3 % |
| Target Crash Severity Index | 28.73 | 38.90 | 35.4 % |
| | | | |
| Volume (2005, 2009) | 1,600 | 1,300 | - 18.8 % |

| <u>Injury Crash Summary</u> | Before | After | Percent Reduction (-) Percent Increase (+) |
|-----------------------------|---------------|--------------|---|
| Fatal injury Crashes | 1 | 0 | - 100.0 |
| Class A injury Crashes | 0 | 1 | 100.0 % |
| Class B injury Crashes | 1 | 0 | - 100.0 % |
| Class C Injury Crashes | 0 | 0 | 0.0 % |
| Total Injury Crashes | 2 | 1 | - 50.0 % |

The naive before and after analysis at the treatment location resulted in a zero (0) percent change in Total Crashes, an 33 percent decrease in Target Crashes, and an 8 percent decrease in the Total Severity Index. The before period ADT year was 2005 and the after period ADT year was 2009.

Results and Discussion

Referencing the *Collision Diagrams*, the before period presented a pattern of three (3) lane departure crashes. There were two (2) ran-off roadway crashes in the curves approaching the bridge (one resulting in a fatality injury) where speed appeared to be the main factor. In both crashes, the impact speed was greater than 60-mph. The third before period crash was a head-on collision in

wet roadway conditions. After the improvements, this location experienced a similar crash pattern. There were two (2) ran-off roadway crashes including a rollover crash in the Sampson County curve that resulted in an A-injury.

The calculated benefit to cost ratio for this project is **0.20 considering total crashes**. The benefit to cost ratio **considering only target crashes is 0.25**. 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 from our Field Visit on September 14th, 2011 for both approaches to the treatment bridge. 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 – Field Visit 9/14/2011



Travelling East on SR 1005 in Cumberland County



Travelling West on SR 1005 in Sampson County



Travelling West on SR 1005 at County Line

BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes

| | | | | | | | | |
|---|---|------------------|----------------------------|-------------------------|----------------------------|----------------|--------------------------|-----------------|
| LOCATION: SR 1005 at Bridge #58 | | BY: JBS | | | | | | |
| COUNTY: Cumberland/Sampson | | DATE: 11/29/2011 | | | | | | |
| FILE NO.: SS 06-04-222 | | | | | | | | |
| DETAILED COST: | TYPE IMPROVEMENT - 2' Paved Shoulders & Guardrail | | | | | | | |
| ITEMS | TOTAL | SERVICE | CRF | ANNUAL COST | | | | |
| Construction | \$134,000 | 10 | 0.149 | \$19,970 | | | | |
| Right-of-Way | \$0 | 0 | 0.000 | \$0 | | | | |
| TOTALS | \$134,000 | 10 | 0.149 | \$19,970 | | | | |
| ESTIMATED INCREASE IN ANNUAL MAINT. COST = | | | | \$750 | | | | |
| ESTIMATED INCREASE IN ANNUAL UTILITY COST = | | | | \$0 | | | | |
| TOTAL ANNUAL COST= | | | | \$20,720 | | | | |
| TOTAL COST OF PROJECT= | | | | \$134,000 | | | | |
| 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 | 3.83 | 1 | 0.26 | 1 | 0.26 | 1 | 0.26 | \$170,836 |
| AFTER | 3.83 | 1 | 0.26 | 0 | 0.00 | 2 | 0.52 | \$166,736 |
| Annual Benefits from Crash Cost Savings | | | | | | | | \$4,099 |
| NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST | | | | | = | (\$16,621) | | |
| BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST | | | | | = | 0.20 | | |
| TOTAL COST OF PROJECT | | - | \$134,000 | COMPREHENSIVE B/C RATIO | | - | 0.20 | |

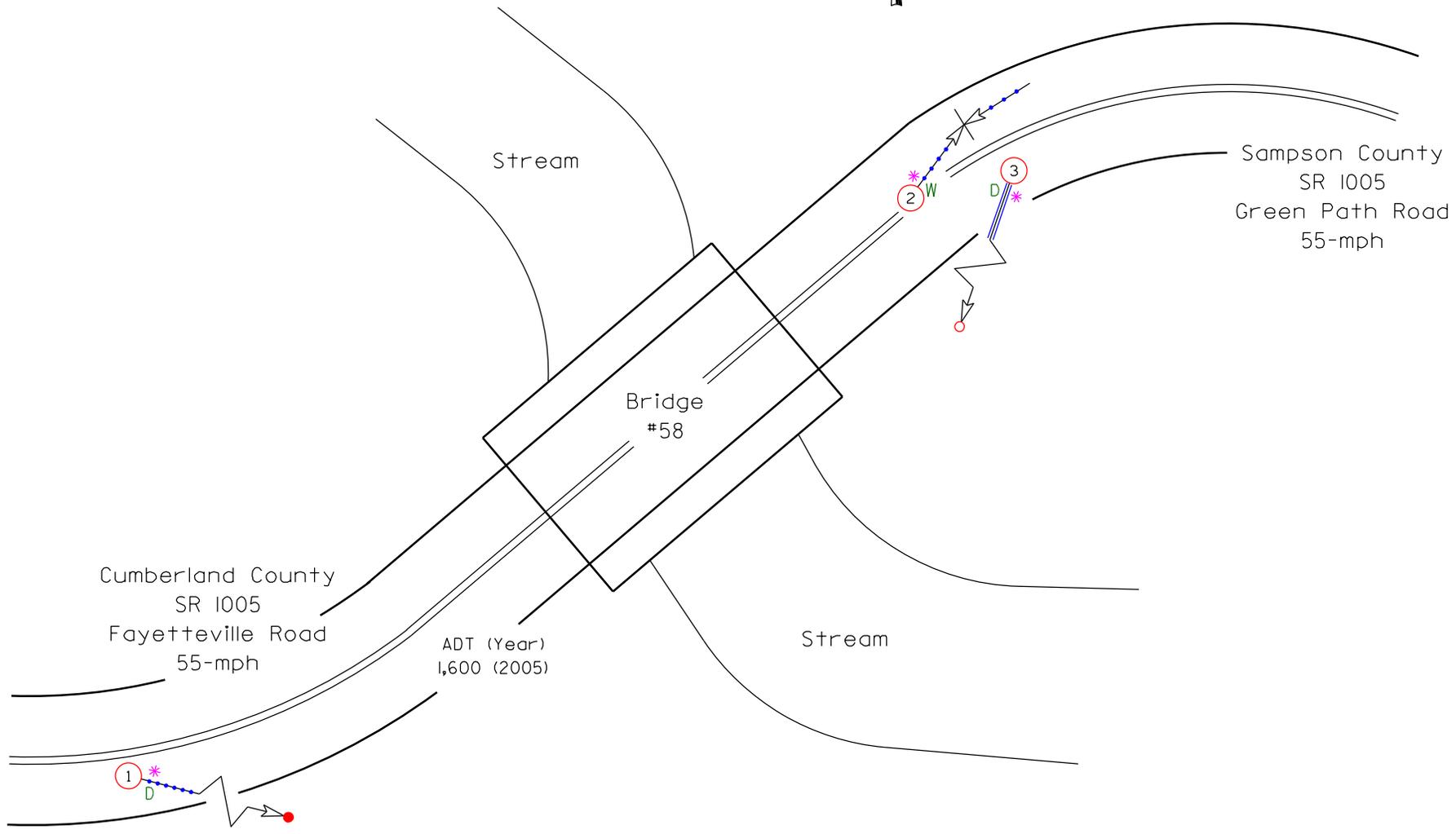
BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes

| | | | | | | | | |
|---|---|------------------------|----------------------------|-------------------------|----------------------------|----------------|--------------------------|-----------------|
| LOCATION: SR 1005 at Bridge #58 | | BY: JBS | | | | | | |
| COUNTY: Cumberland/Sampson | | DATE: 11/29/2011 | | | | | | |
| FILE NO.: SS 06-04-222 | | Lane Departure Crashes | | | | | | |
| DETAILED COST: | TYPE IMPROVEMENT - 2' Paved Shoulders & Guardrail | | | | | | | |
| ITEMS | TOTAL | SERVICE | CRF | ANNUAL COST | | | | |
| Construction | \$134,000 | 10 | 0.149 | \$19,970 | | | | |
| Right-of-Way | \$0 | 0 | 0.000 | \$0 | | | | |
| TOTALS | \$134,000 | 10 | 0.149 | \$19,970 | | | | |
| ESTIMATED INCREASE IN ANNUAL MAINT. COST = | | | | \$750 | | | | |
| ESTIMATED INCREASE IN ANNUAL UTILITY COST = | | | | \$0 | | | | |
| TOTAL ANNUAL COST= | | | | \$20,720 | | | | |
| TOTAL COST OF PROJECT= | | | | \$134,000 | | | | |
| 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 | 3.83 | 1 | 0.26 | 1 | 0.26 | 1 | 0.26 | \$170,836 |
| AFTER | 3.83 | 1 | 0.26 | 0 | 0.00 | 1 | 0.26 | \$165,614 |
| Annual Benefits from Crash Cost Savings | | | | | | | | \$5,222 |
| NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST | | | | | = | (\$15,498) | | |
| BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST | | | | | = | 0.25 | | |
| TOTAL COST OF PROJECT | | - | \$134,000 | COMPREHENSIVE B/C RATIO | | - | 0.25 | |

SS# 06-04-222
 Order# 41000014264
 Cumberland/Sampson Counties
 BEFORE Period
 10/1/03 - 7/31/07

LEGEND

| | | | | | | | |
|--|----------------|--|-----------------|--|---------------|--|-----------------|
| | MOVING VEHICLE | | ANGLE | | 9 MPH OR LESS | | PEDESTRIAN |
| | PEDESTRIAN | | TURNING | | 10 MPH TO 19 | | TRAIN |
| | PAKED VEHICLE | | BACKING | | 20 MPH TO 29 | | DRIVER AT FAULT |
| | PAKED VEHICLE | | SIDESWIPE | | 40 MPH TO 49 | | DRY |
| | FIXED OBJECT | | OUT OF CONTROL | | 50 MPH TO 59 | | WET |
| | HEAD ON | | RAN OFF ROAD | | 60 MPH TO 69 | | ICE OR SNOW |
| | REAR END | | NARROW FIDELITY | | TO AND UP | | SPEED UNKNOWN |
| | RAN OFF ROAD | | NARROW FIDELITY | | SPEED UNKNOWN | | ONLY |



Cumberland County
 SR 1005
 Fayetteville Road
 55-mph

ADT (Year)
 1,600 (2005)

Sampson County
 SR 1005
 Green Path Road
 55-mph

Bridge
 #58

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

TRAFFIC SAFETY UNIT

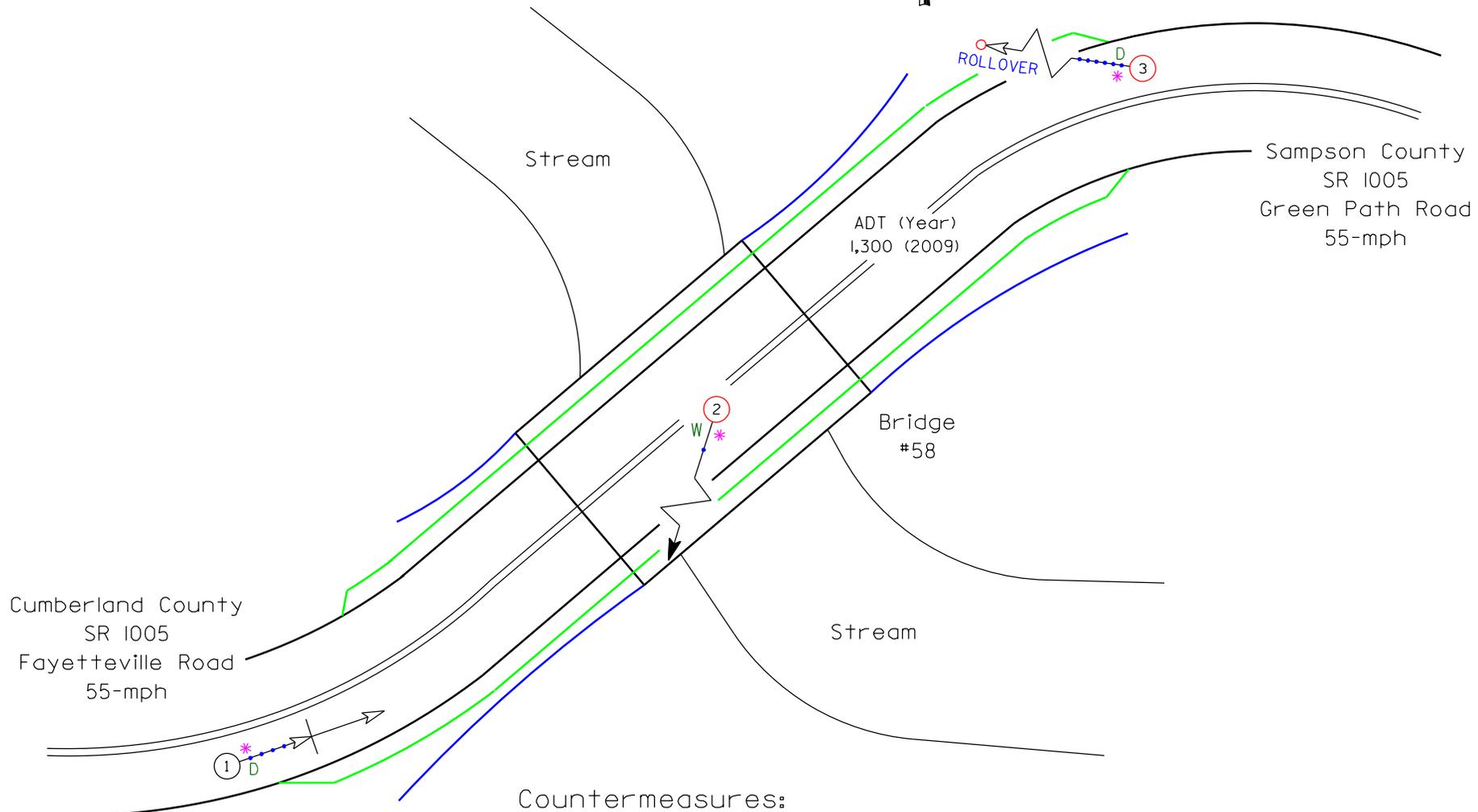
Date: 11-29-2011 Prepared By: J. Schronce

Lane Departure
 Target Crashes

SS# 06-04-222
 Order# 41000014264
 Cumberland/Sampson Counties
 AFTER Period
 10/1/07 - 7/31/11

LEGEND

| | | | | | | | |
|--|----------------|--|----------------|--|---------------|--|-----------------|
| | MOVING VEHICLE | | ANGLE | | 9 MPH OR LESS | | PEDESTRIAN |
| | PEDESTRIAN | | TURNING | | 10 MPH TO 19 | | TRAIN |
| | PAKED VEHICLE | | BACKING | | 20 MPH TO 29 | | DRIVER AT FAULT |
| | PAKED VEHICLE | | SIDESWIPE | | 40 MPH TO 49 | | DRY |
| | FIXED OBJECT | | OUT OF CONTROL | | 50 MPH TO 59 | | WET |
| | HEAD ON | | RAN OFF ROAD | | 60 MPH TO 69 | | ICE OR SNOW |
| | REAR END | | RAN OFF ROAD | | TO AND UP | | SPEED UNKNOWN |
| | RAN OFF ROAD | | RAN OFF ROAD | | RAN OFF ROAD | | RAN OFF ROAD |
| | RAN OFF ROAD | | RAN OFF ROAD | | RAN OFF ROAD | | RAN OFF ROAD |
| | RAN OFF ROAD | | RAN OFF ROAD | | RAN OFF ROAD | | RAN OFF ROAD |



- Countermeasures:
1. Add 2' Paved Shoulders Through Segment Area
 2. Extend Bridge Guardrail

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TRAFFIC SAFETY UNIT

Date: 11-29-2011 Prepared By: J. Schronce

Lane Departure Target Crashes