

Spot Safety Project Evaluation

Order # 41000009125

Spot Safety Project # 06-02-200

**Spot Safety Project Evaluation of the
Texas Longhorn Island Installation
SR 1403 (Reilly Road) at SR 1583 (Baldoon Drive)
Fayetteville, Cumberland 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

10/29/2010

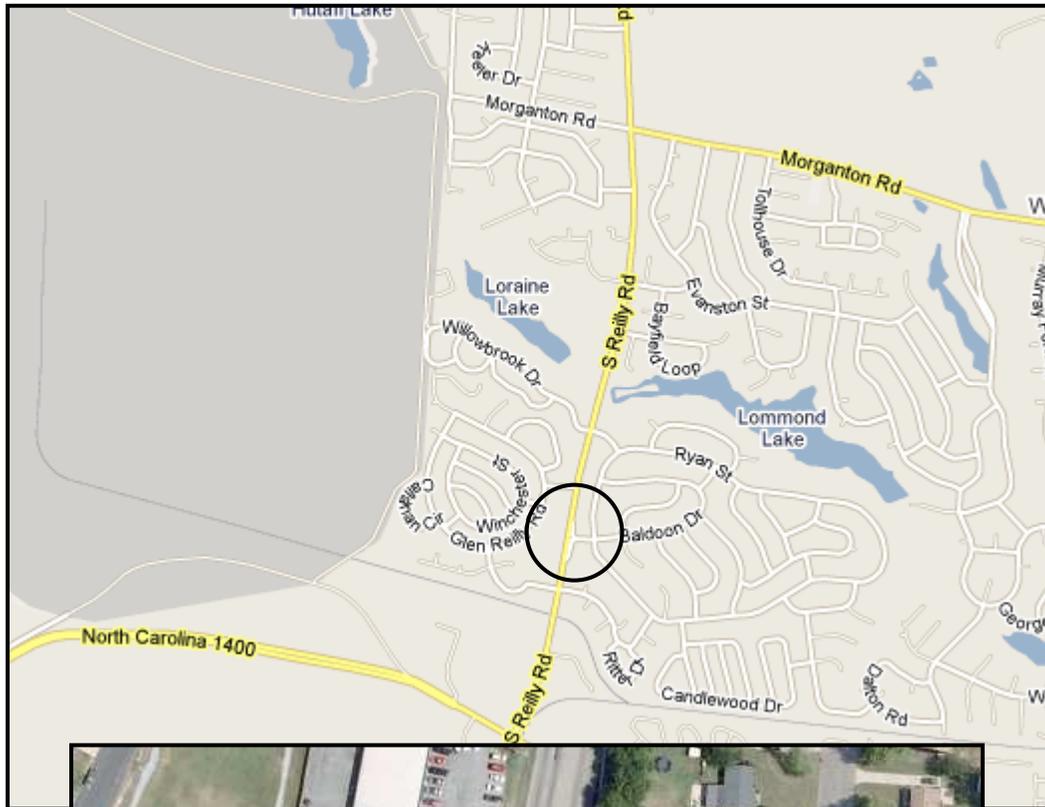
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 06-02-200 located at the intersection of SR 1403 (Reilly Road) and SR 1583 (Baldoon Drive) in Cumberland County, City of Fayetteville.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of raised Texas Longhorn Island, creating right-in / right-out (RIRO) access to SR 1583 (Baldoon Drive) from SR 1403 (Reilly Road). SR 1403 (Reilly Road) is a five-lane facility at the subject intersection with a center two-way-left-turn lane and a speed limit of 45 MPH. SR 1583 (Baldoon Drive) is a two-lane residential facility and has a speed limit of 25 MPH. The intersection is stop sign controlled with the SR 1583 (Baldoon Drive) approach encountering the stop sign.

The original statement of problem explained that there is an accident problem with motorists attempting to turn left into and out of the Loch Lommand Subdivision, through SR 1583 (Baldoon Drive).

The initial crash analysis was completed from June 1, 1998 to March 31, 2001 with forty-one (41) reported crashes, twenty-two (22) of which were deemed correctable. The final completion date for the improvement at the subject intersection was on December 1, 2006 with a total cost of \$125,000.00.

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 October 2006 through December 2006. The before period consisted of reported crashes from February 1, 2003 through September 30, 2006 (3 years and 8 months); and the after period consisted of reported crashes from January 1, 2007 through August 31, 2010 (3 years and 8 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 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 Frontal Impact Crashes were the target crashes for the applied countermeasure. The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

| <u>Treatment Information</u> | Before | After | Percent Reduction (-) Percent Increase (+) |
|-------------------------------------|---------------|--------------|---|
| Total crashes | 44 | 17 | - 61.36 % |
| Total Severity Index | 3.69 | 3.61 | - 2.17 % |
| | | | |
| Target Crashes | 24 | 1 | - 95.83 % |
| Target Crash Severity Index | 3.69 | 8.40 | 127.64 % |
| | | | |
| Volume (2005, 2009) | 43,300 | 41,700 | - 3.70 % |

| <u>Injury Crash Summary</u> | Before | After | Percent Reduction (-) Percent Increase (+) |
|-----------------------------|---------------|--------------|---|
| Fatal injury Crashes | 0 | 0 | N/A |
| Class A injury Crashes | 0 | 0 | N/A |
| Class B injury Crashes | 3 | 2 | - 33.33 % |
| Class C Injury Crashes | 13 | 4 | - 69.23 % |
| Total Injury Crashes | 16 | 6 | - 62.50 % |

The naive before and after analysis at the treatment location resulted in a sixty-one (61) percent decrease in Total Crashes, a ninety-five (95) percent decrease in Target Crashes, and a two (2) 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 showed a left-turn, different roadway crash pattern for westbound vehicles exiting the Loch Lommand Subdivision. This crash pattern consisted of twenty-two (22) target crashes. This pattern was completely eliminated after the Texas Longhorn Island installation.

One noteworthy crash pattern in the after period is an illegal U-turn movement. Vehicles are following along the island to enter SR 1403 (Reilly Road) from SR 1583 (Baldoon Drive) and immediately conducting an illegal U-turn movement. This crash pattern did not exist in the before and consists of four (4) crashes in the after period. Also, there was one illegal U-turn, in the after period, from a vehicle traveling southbound along SR 1403 (Reilly Road) attempting to access SR 1583 (Baldoon Drive).

The calculated benefit to cost ratio for this project is **4.01 considering total crashes**. The benefit to cost ratio **considering only target crashes is 3.29**. 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 Google Street View for all three approaches. 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 North on SR 1403(Reilly Road)



Looking West on SR 1583 (Baldoon Drive)



Looking South on SR 1403 (Reilly Road)

BENEFIT-COST ANALYSIS WORKSHEET - TOTAL

| | | | | | | | | |
|---|---|------------------|----------------------------|-------------------------|----------------------------|----------------|---|-----------------|
| LOCATION: SR 1403 (Reilly Road) and SR 1583 (Baldoon Drive) | | BY: C Neilson | | | | | | |
| COUNTY: Cumberland | | DATE: 10/21/2010 | | | | | | |
| FILE NO.: SS 06-02-200 | | | | | | | | |
| DETAILED COST: | TYPE IMPROVEMENT - Texas Longhorn Island | | | | | | | |
| | ITEMS | TOTAL | SERVICE | CRF | ANNUAL COST | | | |
| | Construction | \$125,000 | 10 | 0.149 | \$18,629 | | | |
| | Right-of-Way | \$0 | 0 | 0.000 | \$0 | | | |
| | TOTALS | \$125,000 | 10 | 0.149 | \$18,629 | | | |
| | ESTIMATED INCREASE IN ANNUAL MAINT. COST = | | | | \$0 | | | |
| | ESTIMATED INCREASE IN ANNUAL UTILITY COST = | | | | \$0 | | | |
| | TOTAL ANNUAL COST= | | | | \$18,629 | | | |
| | TOTAL COST OF PROJECT= | | | | \$125,000 | | | |
| 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 | 3.66 | 0 | 0.00 | 16 | 4.37 | 28 | 7.65 | \$120,328 |
| AFTER | 3.66 | 0 | 0.00 | 6 | 1.64 | 11 | 3.01 | \$45,710 |
| | | | | | | | Annual Benefits from Crash Cost Savings | \$74,617 |
| | NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST | | | | = | \$55,989 | | |
| | BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST | | | | = | 4.01 | | |
| | TOTAL COST OF PROJECT | - | \$125,000 | COMPREHENSIVE B/C RATIO | - | | | 4.01 |

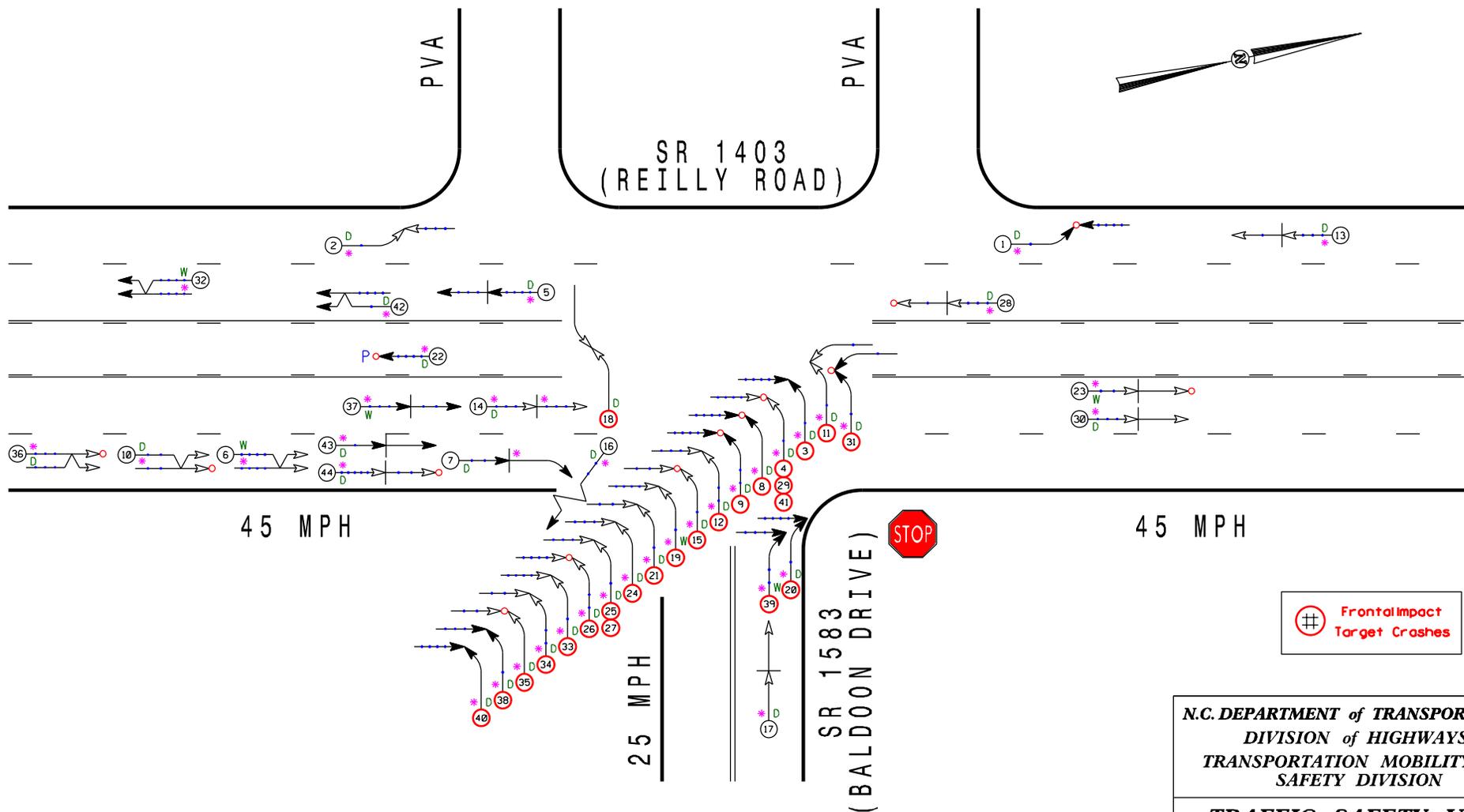
BENEFIT-COST ANALYSIS WORKSHEET - TARGET

| | | | | | | | | |
|---|---|------------------|----------------------------|-------------------------|----------------------------|----------------|---|-----------------|
| LOCATION: SR 1403 (Reilly Road) and SR 1583 (Baldoon Drive) | | BY: C Neilson | | | | | | |
| COUNTY: Cumberland | | DATE: 10/21/2010 | | | | | | |
| FILE NO.: SS 06-02-200 | | | | | | | | |
| DETAILED COST: | TYPE IMPROVEMENT - Texas Longhorn Island | | | | | | | |
| | ITEMS | TOTAL | SERVICE | CRF | ANNUAL COST | | | |
| | Construction | \$125,000 | 10 | 0.149 | \$18,629 | | | |
| | Right-of-Way | \$0 | 0 | 0.000 | \$0 | | | |
| | TOTALS | \$125,000 | 10 | 0.149 | \$18,629 | | | |
| | ESTIMATED INCREASE IN ANNUAL MAINT. COST = | | | | \$0 | | | |
| | ESTIMATED INCREASE IN ANNUAL UTILITY COST = | | | | \$0 | | | |
| | TOTAL ANNUAL COST= | | | | \$18,629 | | | |
| | TOTAL COST OF PROJECT= | | | | \$125,000 | | | |
| 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 | 3.66 | 0 | 0.00 | 9 | 2.46 | 15 | 4.10 | \$66,803 |
| AFTER | 3.66 | 0 | 0.00 | 1 | 0.27 | 0 | 0.00 | \$5,464 |
| | | | | | | | Annual Benefits from Crash Cost Savings | \$61,339 |
| | NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST | | | | = | \$42,710 | | |
| | BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST | | | | = | 3.29 | | |
| | TOTAL COST OF PROJECT | - | \$125,000 | COMPREHENSIVE B/C RATIO | - | | | 3.29 |

SS# 06-02-200
 Order# 41000009125
 Cumberland County
 BEFORE Period
 2/1/03 - 9/30/06

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 | | TO AND LIP | | 50 MPH TO 59 | | I ICY OR SNOW |
| | REAR END | | INJURY | | 60 MPH TO 69 | | SPEED UNKNOWN |
| | RAN OFF ROAD | | FATALITY | | 9 MPH OR LESS | | O ONLY |



Frontal Impact
Target Crashes

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

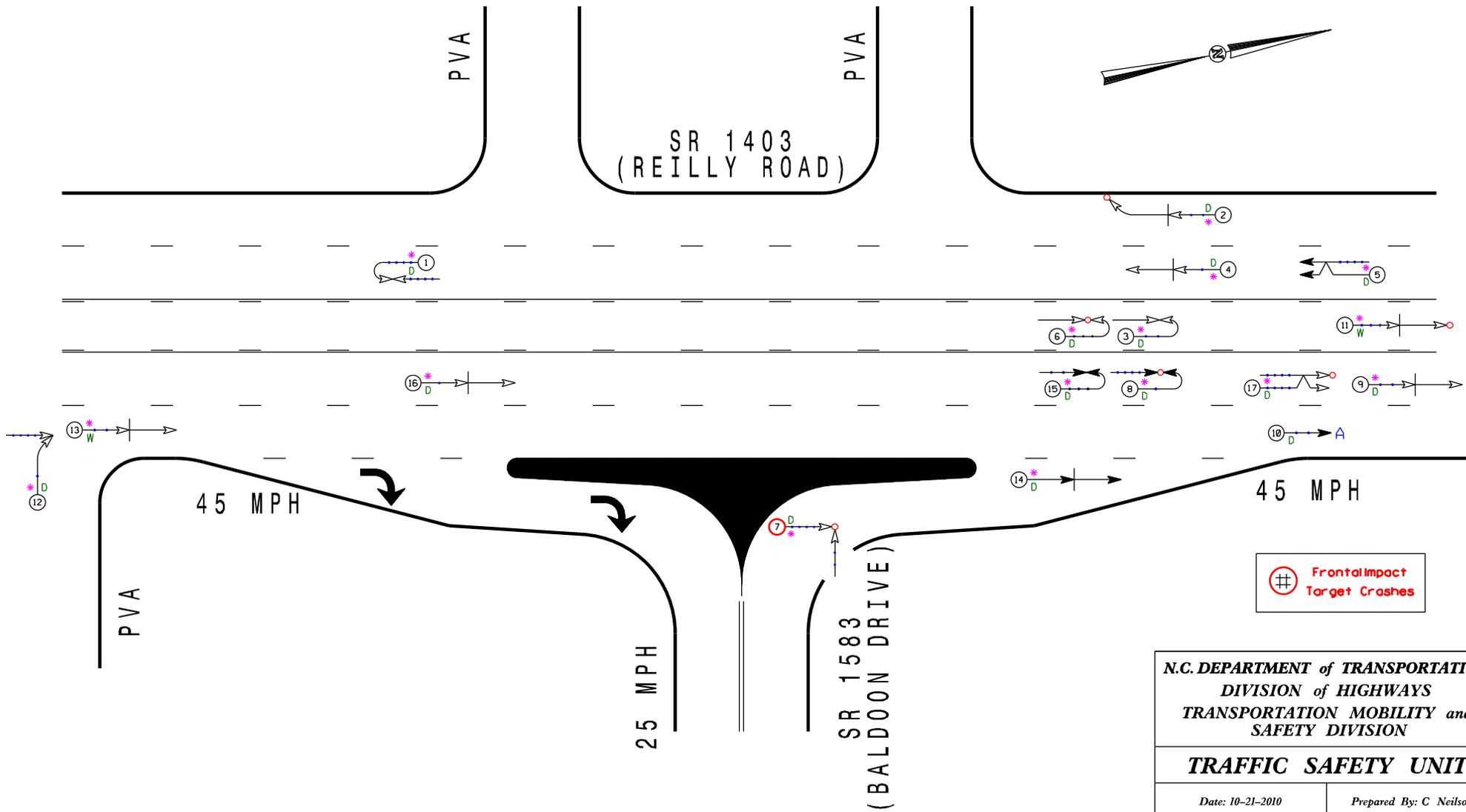
TRAFFIC SAFETY UNIT

Date: 10-21-2010 Prepared By: C Neilson

SS# 06-02-200
 Order# 41000009125
 Cumberland County
 AFTER Period
 1/1/07 - 8/31/10

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 SNOW |
| | REAR END | | FATALITY | | 60 MPH TO 69 | | SPEED UNKNOWN |
| | RAN OFF ROAD | | | | TO AND LIP | | ONLY |
| | U - TURN | | | | SPEED UNKNOWN | | |



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 DIVISION of HIGHWAYS
 TRANSPORTATION MOBILITY and
 SAFETY DIVISION

TRAFFIC SAFETY UNIT

Date: 10-21-2010 Prepared By: C Neilson