

Spot Safety Project Evaluation

Project Log # 200806137

Spot Safety Project # 01-02-214

Spot Safety Project Evaluation of the Curve Warning Flashers At the Intersection of US 264 / NC 45 and SR 1138 / 1304 Hyde 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

9-9-2008
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 01-02-214 located at the Intersection of US 264 / NC 45 and SR 1138 (Rose Bay Loop Road) / SR 1304 (Turnpike Road) in Hyde County.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of actuated curve warning flashers. The warning flashers are solar powered, shoulder mounted, and installed on both approaches to the curve and intersection. US 264 and SR 1138 / 1304 are both two-way, two-lane facilities at the subject intersection with no turn lanes and speed limits of 55 mph. The subject location is a four-leg intersection, which is controlled by a stop signs on SR 1138 (Rose Bay Loop Road) and SR 1304 (Turnpike Road) with an overhead continuous flasher and a posted curve warning speed limit of 35 mph.

The original statement of problem was that motorists do not heed the existing warning signs and enter the curve and intersection at an unreasonable speed.

The initial crash analysis was completed from November 1, 1998 to October 31, 2001 with five (6) reported crashes, four (4) of which were deemed correctable including one fatality. The final completion date for the improvement at the subject intersection was on September 30, 2003 with a total cost of \$10,000.00.

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 September and October of 2003. The before period consisted of reported crashes from February 1, 1999 through August 31, 2003 (4 years and 7 months); and the after period consisted of reported crashes from November 1, 2003 through May 31, 2008 (4 years and 7 months). The ending date for this report was determined by the date of available crash data at the time of analysis.

The treatment data consisted of all crashes within 500 feet of the subject intersection to incorporate the entire roadway curve into the study. *Please see attached location 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 countermeasure. The Lane Departure Crash types considered are as follows: Ran-off Roadway, Straight; Ran-off Roadway, Left; Ran-off Roadway, Right; Sideswipe, Opposite Direction; and Head-on.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	7	3	- 57.14 %
Total Severity Index	13.94	1.00	- 92.83 %
Target Crashes	5	0	- 100.00 %
Target Crash Severity Index	17.64	0.00	- 100.00 %
Volume	2,950	2,460	- 16.61 %
<u>Injury Crash Summary - Total</u>			
Fatal injury Crashes	1	0	- 100.00 %
Class A injury Crashes	0	0	N/A
Class B injury Crashes	1	0	- 100.00 %
Class C Injury Crashes	1	0	- 100.00 %
Total Injury Crashes	3	0	- 100.00 %

The naive before and after analysis at the treatment location resulted in a 57 percent decrease in Total Crashes, total elimination of Target Crashes, and a 93 percent decrease in the Total Severity Index. The before period ADT year was 2001 and the after period ADT year was 2006.

Results and Discussion

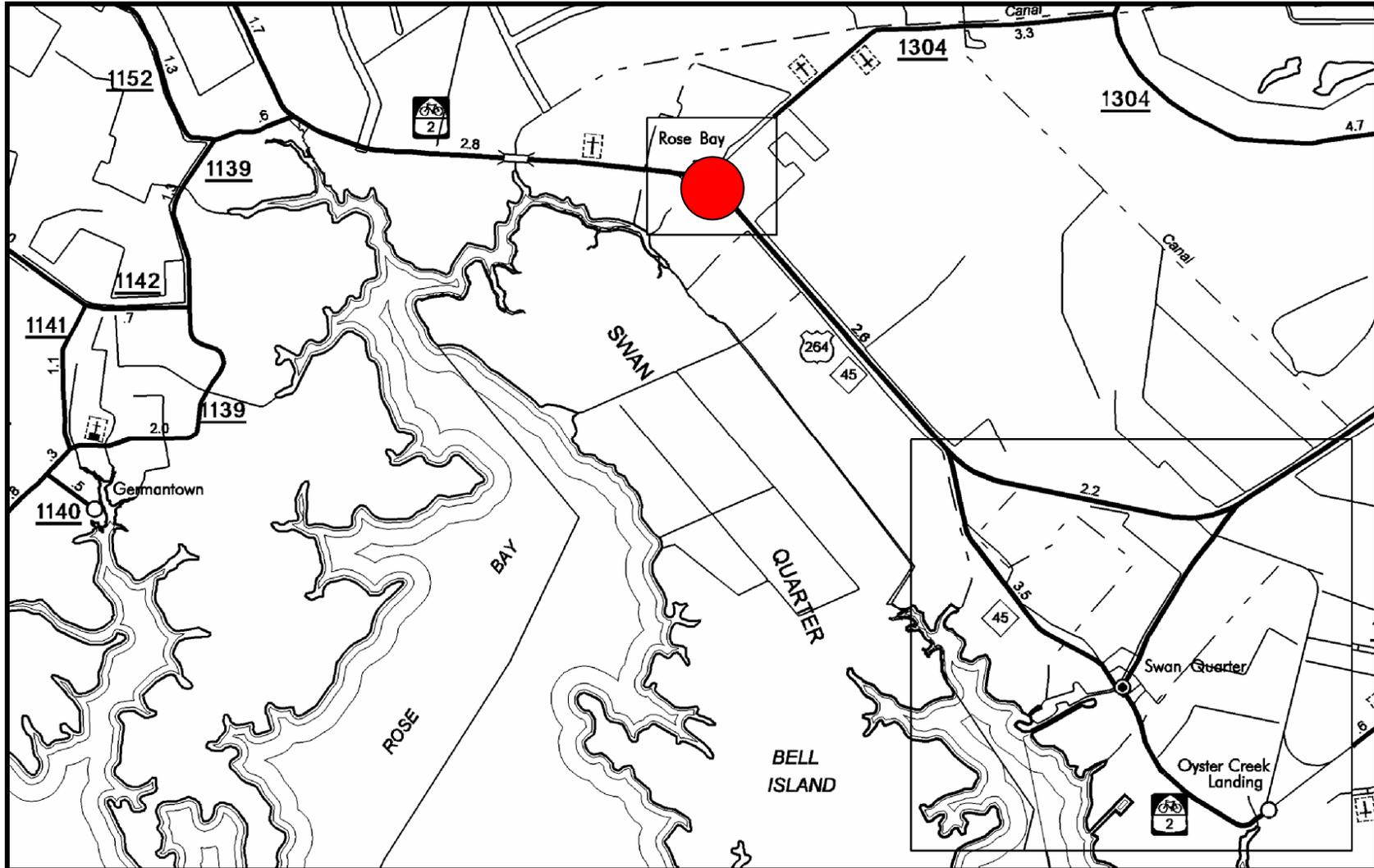
The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 57 percent decrease in Total Crashes and complete elimination of Target Crashes. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have decreased at the treatment location from the before to the after period.

Referencing the *Collision Diagrams*, a large portion of crashes at the intersection in the before period (5 of 7) were the result of a vehicle misjudging the curve and either running off the roadway or sideswiping an on-coming vehicle. This pattern included one fatality where the vehicle overturned into the adjacent canal. After the flasher installation, target crashes and high severity crashes were eliminated leading to a significant benefit-cost ratio as stated below.

The calculated benefit to cost ratio for this project is **49.32 considering total crashes**. The benefit to cost ratio considering only **target crashes is 48.39**. 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 for all approaches to the treatment intersection. 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.

**Location Map
Hyde County
Evaluation of Spot Safety Project # 01-02-214**



Treatment Location: US 264 / NC 45 at SR 1304 (Turnpike Rd) / SR 1138 (Rose Bay Loop Rd)

TREATMENT SITE PHOTOS TAKEN 8/6/2008



Traveling North on SR 1138 (Rose Bay Loop Road)



Traveling South on SR 1304 (Turnpike Road)



Traveling West on US 264 – Installed Countermeasure



Traveling West on US 264



Traveling East on US 264



Traveling East on US 264

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: US 264 at SR 1304
 COUNTY: Hyde
 FILE NO.: SS 01-02-214

BY: JBS
 DATE: 9/3/2008
 NOTES: Total Crashes

DETAILED COST: TYPE IMPROVEMENT - **Flashers on Curve Warning Signs**

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$10,000	10	0.149	\$1,490
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$10,000	10	0.149	\$1,490

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$200
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$700
 TOTAL ANNUAL COST= \$2,390
 TOTAL COST OF PROJECT= \$10,000

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	4.58	1	0.22	2	0.44	4	0.87	\$120,437
AFTER	4.58	0	0.00	0	0.00	3	0.66	\$2,555

Annual Benefits from Crash Cost Savings \$117,882

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$115,492

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 49.32

TOTAL COST OF PROJECT - \$10,000 COMPREHENSIVE B/C RATIO - 49.32

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: US 264 at SR 1304
 COUNTY: Hyde
 FILE NO.: SS 01-02-214

BY: JBS
 DATE: 9/3/2008
 NOTES: Target Crashes - Lane Departure

DETAILED COST: TYPE IMPROVEMENT - **Flashers on Curve Warning Signs**

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
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 TOTAL ANNUAL COST= \$2,390
 TOTAL COST OF PROJECT= \$10,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

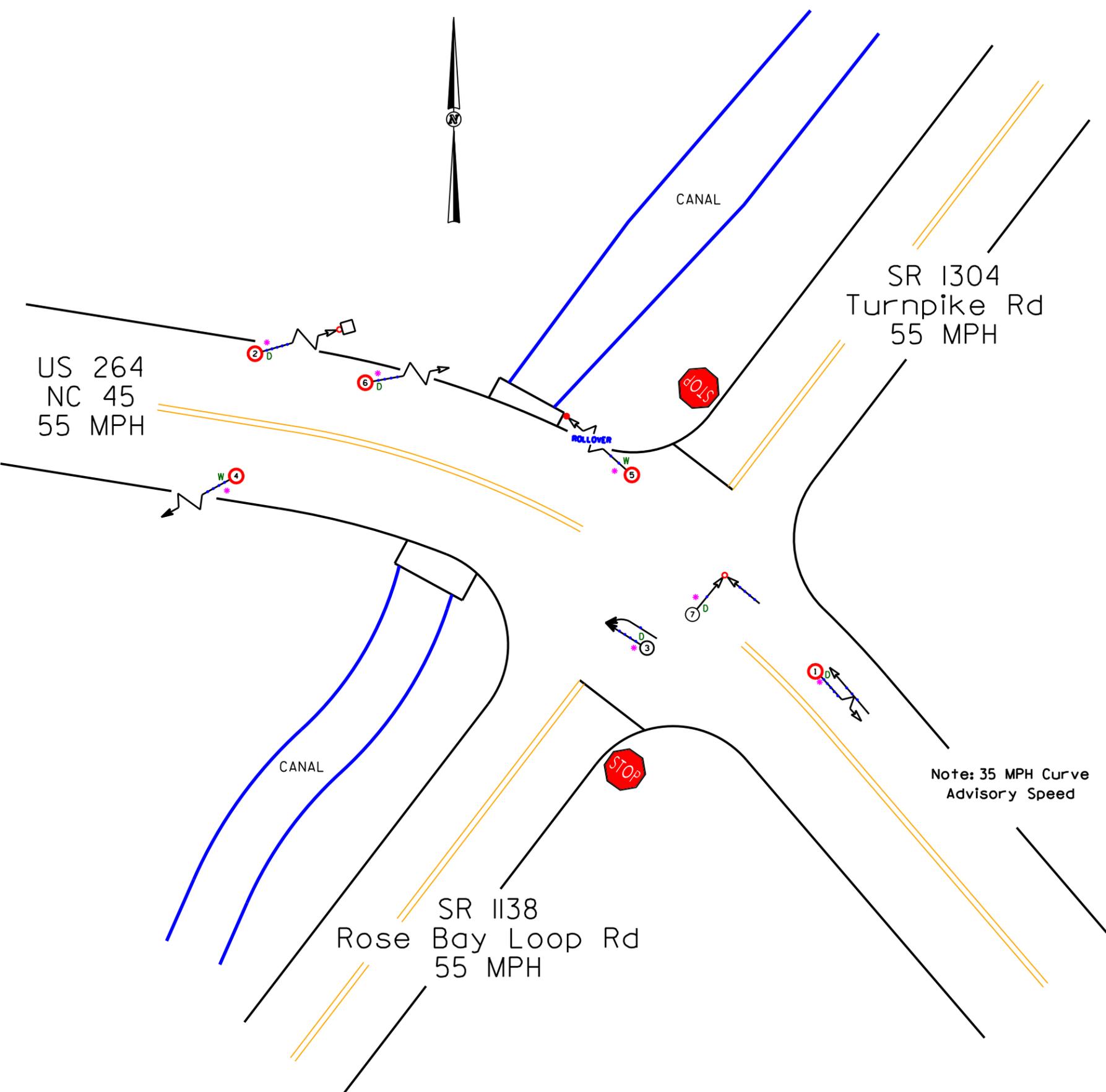
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	4.58	1	0.22	1	0.22	3	0.66	\$115,655
AFTER	4.58	0	0.00	0	0.00	0	0.00	\$0

Annual Benefits from Crash Cost Savings \$115,655

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$113,265

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 48.39

TOTAL COST OF PROJECT - \$10,000 COMPREHENSIVE B/C RATIO - 48.39



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		SPEED UNKNOWN
	RAN OFF ROAD				70 AND UP		OILY

SS# 01-02-214
 Hyde County
 BEFORE Period
 2/1/99 - 8/31/03
 US 264 at SR 1304

US 264
 Approaches

SR 1304 / SR 1138
 Approaches

Note: 35 MPH Curve
Advisory Speed

Target Crashes
 Lane Departure

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

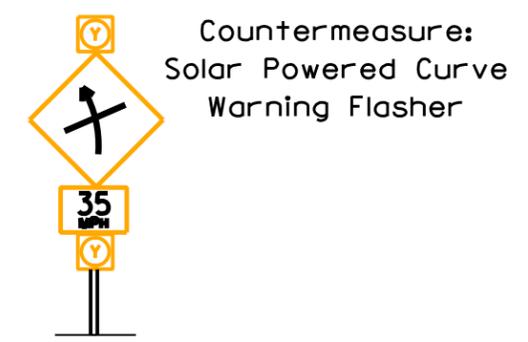
	COLLISION DIAGRAM	
	DIVISION: I	AREA: 1
	STUDY PERIOD: 2/1/1999 - 8/31/2003	
	DISTANCE: Y-LINE = 500 FT	
ANALYSIS PREPARED BY: JBS		
ANALYSIS CHECKED BY: N/A		
DIAGRAM PREPARED BY: JBS		
DIAGRAM REVIEWED BY: ST		
SCALE: NOT TO SCALE		
DATE: 9-3-2008		
LOG NUMBER: SS* 01-02-214		

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH

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		ONLY
	RAN OFF ROAD		70 AND UP		SPEED UNKNOWN		

SS# 01-02-214
 Hyde County
 AFTER Period
 11/1/03 - 5/31/08
 US 264 at SR 1304



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: I	AREA: 1
	STUDY PERIOD: 11/1/2003 - 5/31/2008	
	DISTANCE: Y-LINE = 500FT	
ANALYSIS PREPARED BY: JBS		
ANALYSIS CHECKED BY: N/A		
DIAGRAM PREPARED BY: JBS		
DIAGRAM REVIEWED BY: ST		
SCALE: NOT TO SCALE		
DATE: 9-3-2008		
LOG NUMBER: SS* 01-02-214		

N.C. DEPARTMENT of TRANSPORTATION
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Target Crashes
Lane Departure

Note: 35 MPH Curve
Advisory Speed

