

Spot Safety Project Evaluation

Order # 41000010880

Spot Safety Project # 02-04-205

**Spot Safety Project Evaluation of the Paved Shoulders Installation
SR 1176 (20th Street) between Bridges Street and SR 1179
Morehead City, Carteret 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

6-16-2011

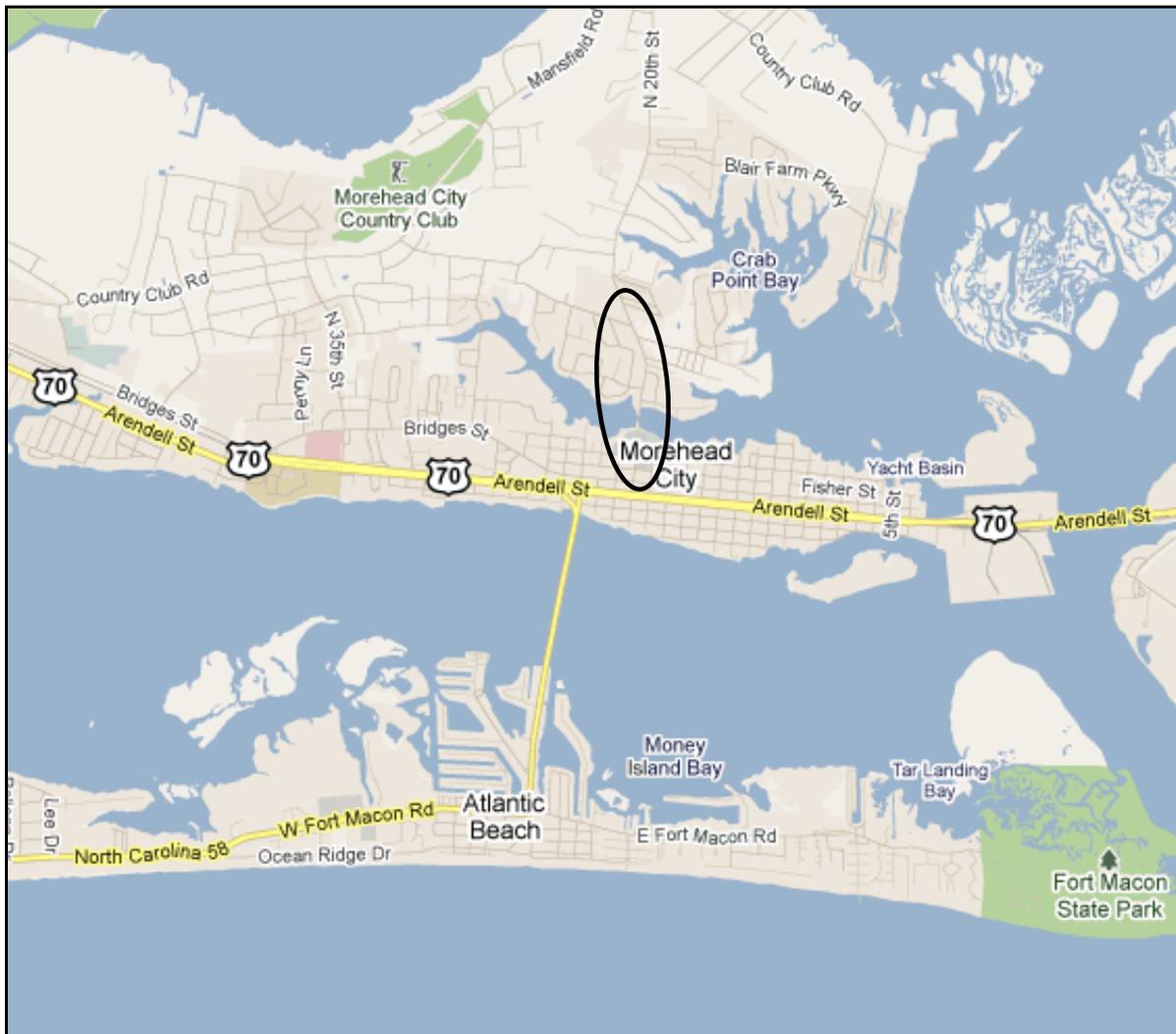
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 02-04-205 located along the segment of SR 1176 (North 20th Street) from the intersection of SR 1627 (Bridges Street) to the intersection of SR 1179 (Mayberry Loop Road) in Carteret County, Town of Morehead City. The milepost study limits are from 1.84 (SR 1627) to 2.60 (SR 1179); total segment length is 0.76 mile.





Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the shoulder improvement by widening on both sides of SR 1176 (North 20th Street). This segment is a two-lane roadway with variable widths, one significant horizontal curve, and numerous intersections or private driveways. The speed limit is 35-mph with a sand/silt soil shoulder material.

The original statement of problem was the presence of narrow roadway shoulders that have contributed to run-off roadway type crashes. The intended purpose of this improvement was to provide motorists with additional space to correct improper driving behaviors.

The initial crash analysis was completed from October 1, 2000 to September 30, 2003 with forty (40) reported crashes; five (5) that were deemed correctable with the proposed improvement. The final completion date for the improvement at the subject roadway section was on December 3, 2007 with a total cost of \$412,000; of which \$250,000 was provided through Spot Safety Funds while the remaining came from Small Urban and Discretionary Funds.

Location Photographs (provided by Google Street View)



Traveling North on 20th Street near Bay Street – approaching bridge



Traveling North on 20th Street near Davis Place approaching curve

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 through December 2007. The before period consisted of reported crashes from October 1, 2004 through September 30, 2007 (3 years); and the after period consisted of reported crashes from January 1, 2008 through December 31, 2010 (3 years). 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 the study limit mileposts (1.84 – 2.60) with a zero (0) foot y-line. *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: Fixed Object; Head-On; Overturn / Rollover; Pedestrian; Ran-off Roadway (Left / Right); and Sideswipe – Opposite Direction.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	13	17	30.8 %
Total Severity Index	3.85	2.74	- 28.8 %
Target Crashes – Lane Departure	4	4	0.0 %
Target Crash Severity Index	2.85	1.00	- 64.9 %
Volume (2006, 2009)	5,500	5,500	0.0 %

<u>Additional Information</u>	Before	After	Percent Reduction (-)/ Percent Increase (+)
Injuries			
Fatal Injury Crashes	0	0	N/A
Class-A Injury Crashes	0	0	N/A
Class-B Injury Crashes	2	1	- 50.0 %
Class-C Injury Crashes	3	3	0.0 %
Property Damage Only Crashes	8	13	62.5 %
Contributing Factors			
Total Night Crashes	4	5	25.0 %
Total Wet Road Crashes	0	2	100+ %
Total Alcohol Related Crashes	0	3	100+ %
Lane Departure Crash Types			
Fixed Object	1	2	100.0 %
Pedestrian	1	0	- 100.0 %
Ran Off Road (Left)	0	1	100.0 %
Ran Off Road (Right)	1	1	0.0 %
Sideswipe, Opposite Direction	1	0	-100.0 %

The naive before and after analysis at the treatment location resulted in an 31 percent increase in Total Crashes, a zero percent change in Target Crashes, but a 29 percent decrease in the Total Severity Index. The before period ADT year was 2006 and the after period ADT year was 2009.

Results and Discussion

Referencing the Tables above and the *Collision Diagrams*, both periods indicate similar lane departure crash patterns in the horizontal curve section between North Morris Road and Oglesby Road. The tables show a 31 percent increase in total crashes and a zero percent change in lane departure collisions through the evaluation. The before period saw two (2) run-off road crashes, one pedestrian crash when he was walking off the roadway, and one (1) sideswipe opposite direction crash. The after period experienced four (4) run-off roadway crashes. This countermeasure does not appear to have benefited this roadway segment significantly.

The calculated benefit to cost ratio for this project is **(-0.01) considering total crashes**. The benefit to cost ratio **considering only target crashes is 0.16**. 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.

Photos are provided from Google Street View for two different locations along the treatment section. 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 improvement.

BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes

LOCATION: SR 1176 (20th Street)		BY: JBS						
COUNTY: Carteret		DATE: 4/13/2011						
FILE NO.: SS 02-04-205								
DETAILED COST:	TYPE IMPROVEMENT -	Widen for Paved Shoulders						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$412,000	20	0.102	\$41,963			
		\$0	0	0.000	\$0			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$412,000	20	0.102	\$41,963			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				(\$200)			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$41,763			
	TOTAL COST OF PROJECT=				\$412,000			
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	3.00	0	0.00	5	1.67	8	2.67	\$44,800
AFTER	3.00	0	0.00	4	1.33	13	4.33	\$45,300
						Annual Benefits from Crash Cost Savings		(\$500)
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST			=	(\$42,263)			
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST			=	-0.01			
	TOTAL COST OF PROJECT	-	\$412,000	COMPREHENSIVE B/C RATIO	-			-0.01

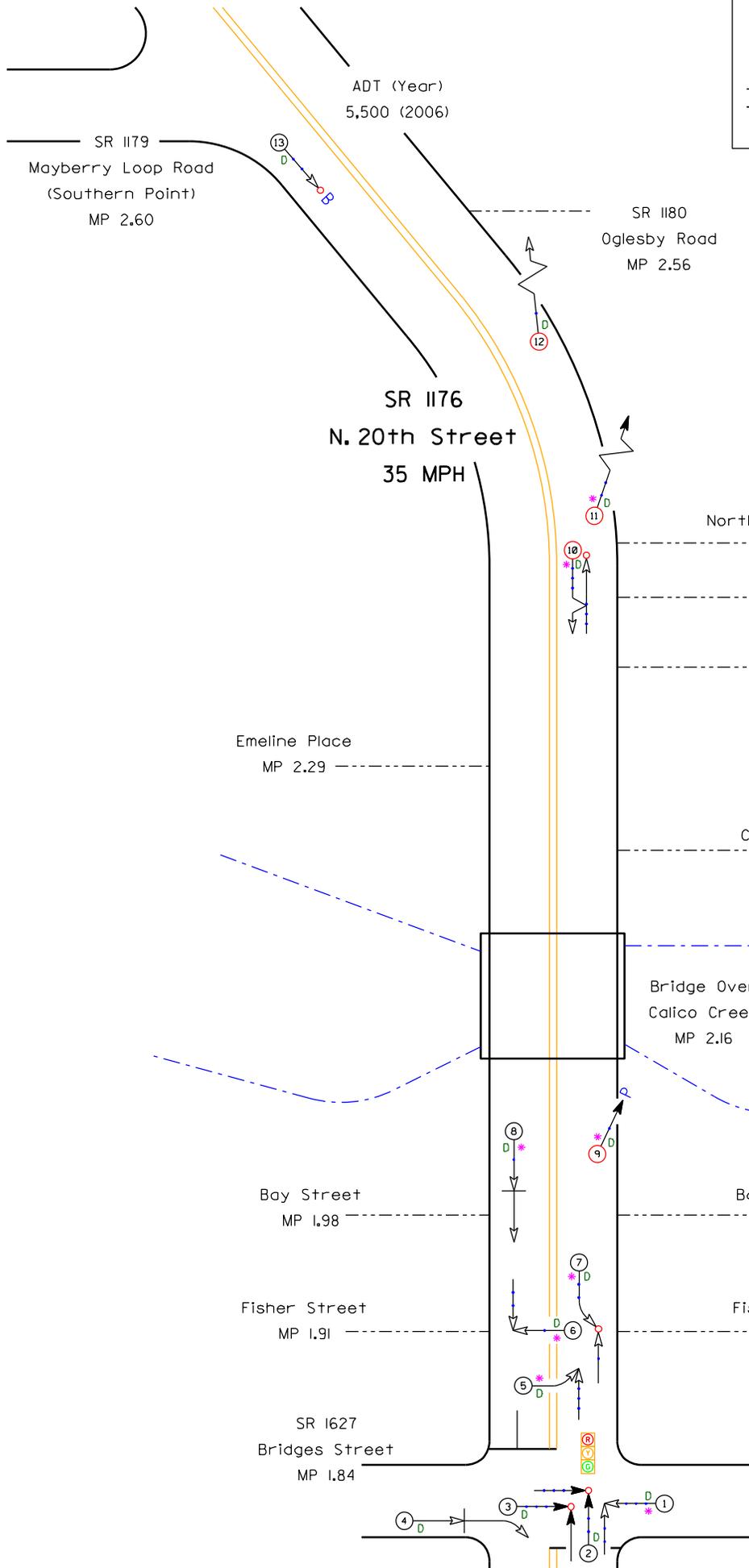
BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes

LOCATION: SR 1176 (20th Street)		BY: JBS						
COUNTY: Carteret		DATE: 4/13/2011						
FILE NO.: SS 02-04-205		Lane Departure Crashes Only						
DETAILED COST:	TYPE IMPROVEMENT -	Widen for Paved Shoulders						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$412,000	20	0.102	\$41,963			
		\$0	0	0.000	\$0			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$412,000	20	0.102	\$41,963			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				(\$200)			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$41,763			
	TOTAL COST OF PROJECT=				\$412,000			
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	3.00	0	0.00	1	0.33	4	1.33	\$12,400
AFTER	3.00	0	0.00	0	0.00	4	1.33	\$5,733
						Annual Benefits from Crash Cost Savings		\$6,667
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST			=	(\$35,096)			
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST			=	0.16			
	TOTAL COST OF PROJECT	-	\$412,000	COMPREHENSIVE B/C RATIO	-			0.16

LEGEND

	MOVING VEHICLE		ANGLE		1 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PAKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PAKED VEHICLE		SHOULDER		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		FAULT		50 MPH TO 59		ICE OR SNOW
	NEAR END		FATALITY		60 MPH TO 69		TO AND UP
	RAN OFF ROAD		SPEED UNKNOWN		70 MPH TO 79		ONLY

SS# 02-04-205
 Order# 41000010880
 Carteret County
 Morehead City
 BEFORE Period
 10/1/04 - 9/30/07



Lane Departure
Target Crashes

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

TRAFFIC SAFETY UNIT

Date: 4-12-2011

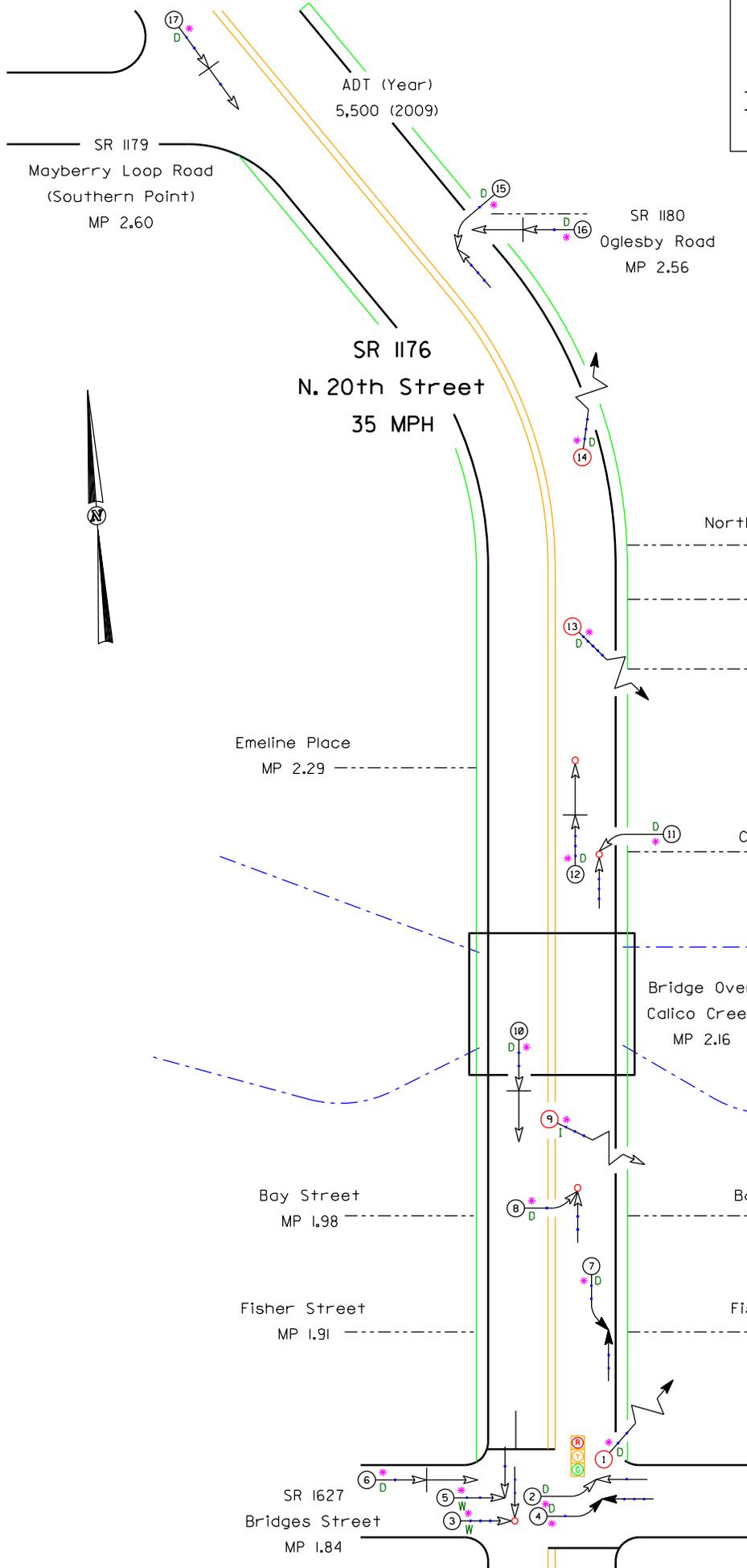
Prepared By: J. Schronce

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		SHOULDER		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		FAULT		50 MPH TO 59		ICE OR SNOW
	NEAR END		FATALITY		60 MPH TO 69		SPEED UNKNOWN
	RAN OFF ROAD		TO AND UP		70 MPH TO 79		ONLY

SS# 02-04-205
 Order# 41000010880
 Carteret County
 Morehead City
 AFTER Period
 1/1/08 - 12/31/10

Countermeasure:
 Widen Roadway for
 Paved Shoulders



Lane Departure
 Target Crashes

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

TRAFFIC SAFETY UNIT

Date: 4-12-2011

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