

Spot Safety Project Evaluation

Project Log # 200906129

Spot Safety Project # 04-01-230

Spot Safety Project Evaluation of the Left Turn Lane Installation NC 97 at Coker-Wimberly Elementary School Edgecombe 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

8-17-2009

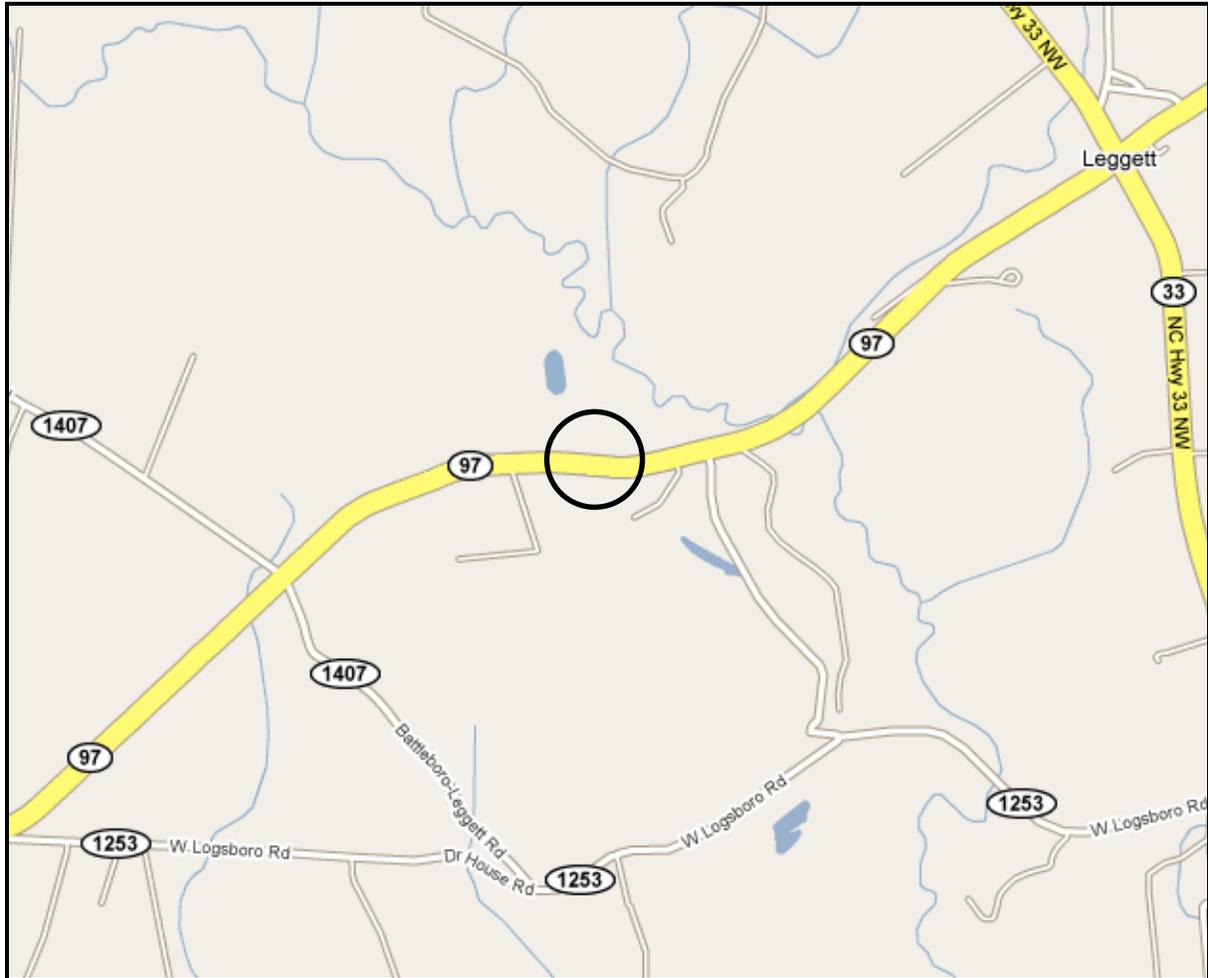
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 04-01-230 located at the entrance to Coker-Wimberly Elementary School on NC 97 (approximate Milepost 12.50) in Edgecombe County, west of the Town of Leggett.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of a NC 97 westbound left turn lane at the school entrance. NC 97 is two lane rural roadway with a 55 mph speed limit. Coker-Wimberly Elementary has a circular driveway with a one way entrance and exit approximately 500 feet apart.

The original statement of problem was that congestion at school opening and dismissal times were impeding traffic flow at this location. The intended purpose of this project was to correct the congestion issues at the school.

The initial crash analysis was completed from January 1, 1998 to December 31, 2000 with two (2) reported crashes, one (1) of which was deemed correctable. The final completion date for the improvement at the subject intersection was on September 15, 2003 with a total cost of \$135,000.

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 2003. The before period consisted of reported crashes from December 1, 1997 through July 31, 2002 (5 years and 8 months); and the after period consisted of reported crashes from October 1, 2003 through May 31, 2009 (5 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 location. *Please see attached location map and aerial maps for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that NC 97 Westbound Rear-End Crashes were the target crashes for the applied countermeasure.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	2	1	- 50.0 %
Total Severity Index	4.70	1.00	- 78.7 %
Target Crashes	1	0	- 100.0 %
Target Crash Severity Index	8.40	0.00	- 100.0 %
Volume	3,300	3,700	12.1 %

<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	0	0	N/A
Class C Injury Crashes	1	0	- 100.0 %
Total Injury Crashes	1	0	- 100.0 %

The naive before and after analysis at the treatment location resulted in a 50 percent decrease in Total Crashes, complete elimination of Target Crashes, and a 79 percent decrease in the Total Severity Index. The before period ADT year was 2000 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 decrease in both Total Crashes and Target Crashes at the treatment location from the before to the after period.

Referencing the *Collision Diagrams*, the before period NC 97 westbound rear-end crash pattern at the intersection consisted of one (1) collision while a vehicle was waiting to turn left into the school. After the left turn lane installation, this pattern was completely eliminated. The crash data evaluation is not a clear representation of this location benefits due to congestion issues being the reason for the improvements.

The calculated benefit to cost ratio for this project is **0.15 considering total crashes and only target crashes**. 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 *Aerial Site Photos*. The photos were obtained from the Edgecombe County GIS website and show the school before and after the left turn lane was installed.

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.

SS# 04-01-230 – Edgecombe County



Before Countermeasure (2002)



After Countermeasure (2003)

BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes

LOCATION: NC 97 at Coker Elem		BY: JBS						
COUNTY: Edgecombe		DATE: 8/11/2009						
FILE NO.: SS 04-01-230		NOTES: Total Crashes						
DETAILED COST:	TYPE IMPROVEMENT - Left Turn Lane at School Entrance							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$135,000	10	0.149	\$20,119			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$135,000	10	0.149	\$20,119			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$400			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$20,519			
	TOTAL COST OF PROJECT=				\$135,000			
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	5.67	0	0.00	1	0.18	1	0.18	\$3,862
AFTER	5.67	0	0.00	0	0.00	1	0.18	\$688
						Annual Benefits from Crash Cost Savings		\$3,175
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	(\$17,344)		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	0.15		
TOTAL COST OF PROJECT		-	\$135,000	COMPREHENSIVE B/C RATIO		-	0.15	

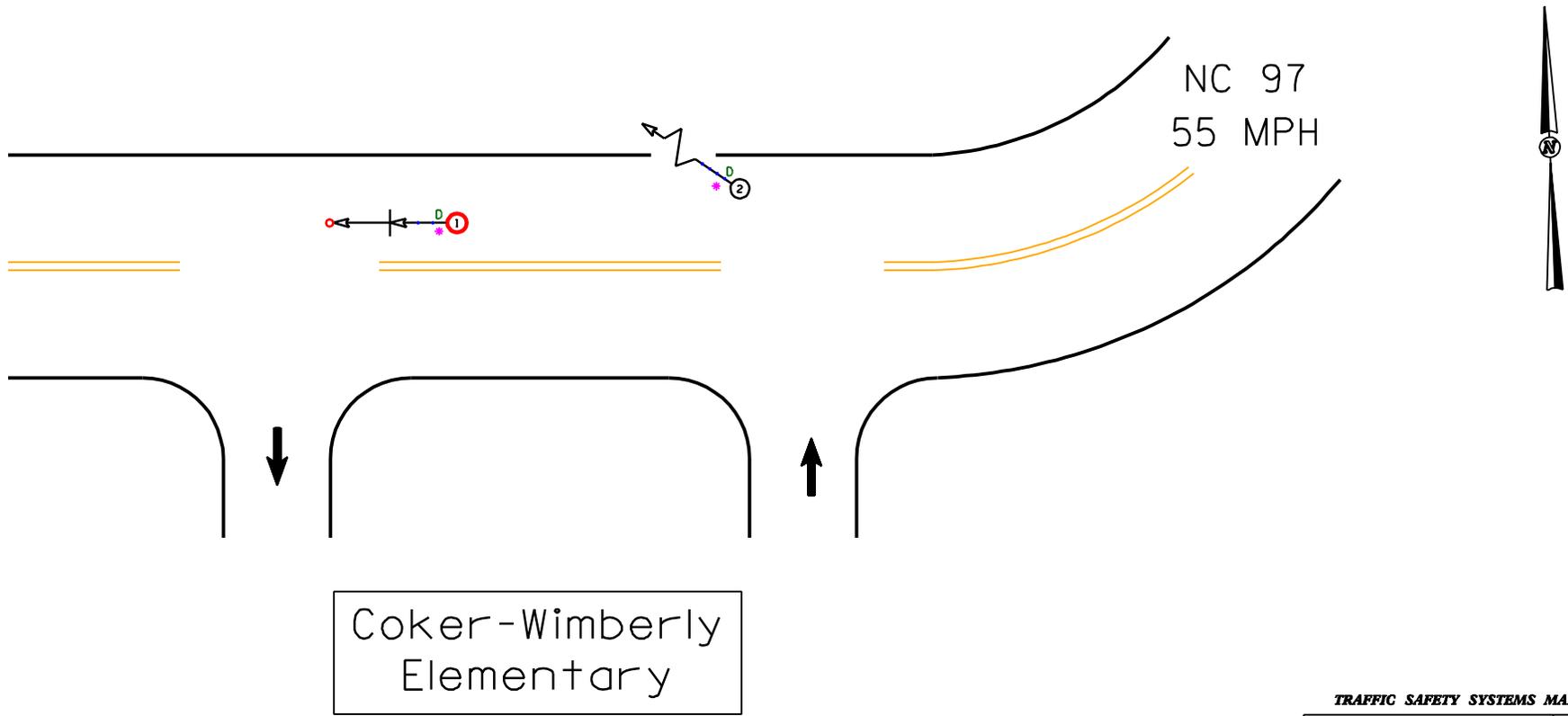
BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes

LOCATION: NC 97 at Coker Elem		BY: JBS						
COUNTY: Edgecombe		DATE: 8/11/2009						
FILE NO.: SS 04-01-230		NOTES: Target Crashes - WB NC-97 Rear-Ends						
DETAILED COST:	TYPE IMPROVEMENT - Left Turn Lane at School Entrance							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$135,000	10	0.149	\$20,119			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$135,000	10	0.149	\$20,119			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$400			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$20,519			
	TOTAL COST OF PROJECT=				\$135,000			
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	5.67	0	0.00	1	0.18	0	0.00	\$3,175
AFTER	5.67	0	0.00	0	0.00	0	0.00	\$0
						Annual Benefits from Crash Cost Savings		\$3,175
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	(\$17,344)		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	0.15		
TOTAL COST OF PROJECT		-	\$135,000	COMPREHENSIVE B/C RATIO		-	0.15	

SS# 04-01-230
 Edgecombe County
 BEFORE Period
 12/1/97 - 7/31/03

LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAM
	PAKED 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		HURRY		50 MPH TO 59		ICY OR SNOW
	REAR END		FATALITY		70 AND UP		SPEED UNKNOWN
	RAN OFF ROAD				80 MPH TO 89		



WB Rear-End
 Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

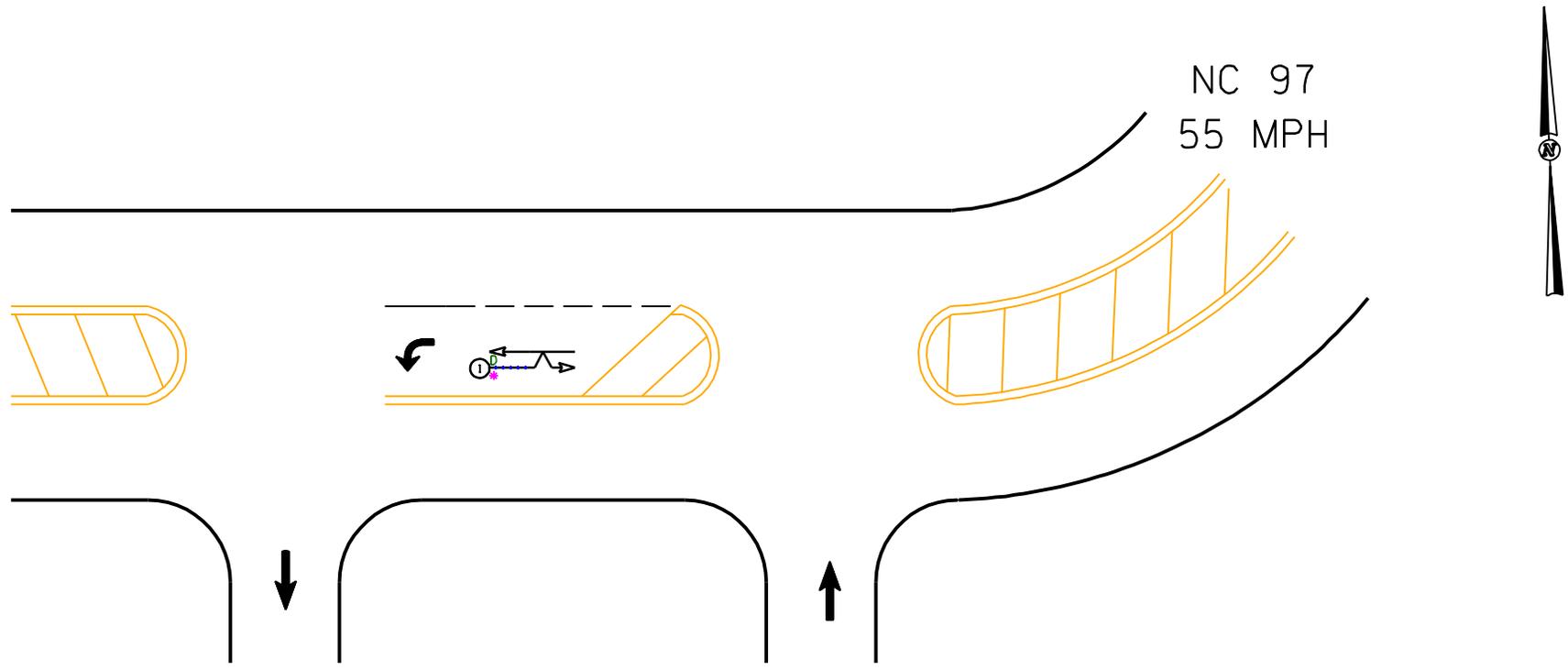
	COLLISION DIAGRAM
	DIVISION: 4
	STUDY PERIOD: 2/1/1997 - 7/31/2003
	DISTANCE: Y-LINE + 150 FT
	ANALYSIS PREPARED BY: JBS
ANALYSIS CHECKED BY: N/A	
DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE	
DATE: 8-8-2009	
LOG NUMBER: SS* 04-01-230 BEFORE	

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

SS# 04-01-230
 Edgecombe County
 AFTER Period
 10/1/03 - 5/31/09

LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAM
	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		HURRY		50 MPH TO 59		ICY OR SNOW
	REAR END		FATALITY		70 AND UP		SPEED UNKNOWN
	RAN OFF ROAD				0 ONLY		



WB Rear-End Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION 4	AREA:
	STUDY PERIOD: 10/1/2003 - 5/31/2009	
	DISTANCE: Y-LINE + 150 FT	
	ANALYSIS PREPARED BY: JBS	
	ANALYSIS CHECKED BY: N/A	
	DIAGRAM PREPARED BY: JBS	
	DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE		
DATE: 8-11-2009		
LOG NUMBER: SS* 04-01-230 AFTER		

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