

Spot Safety Project Evaluation

Order # 41000001995

Spot Safety Project # 14-03-205

Spot Safety Project Evaluation of the Right Turn Lane Installation US 441 at Smokey Mountain Elementary School Jackson 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

4-26-2010

Date

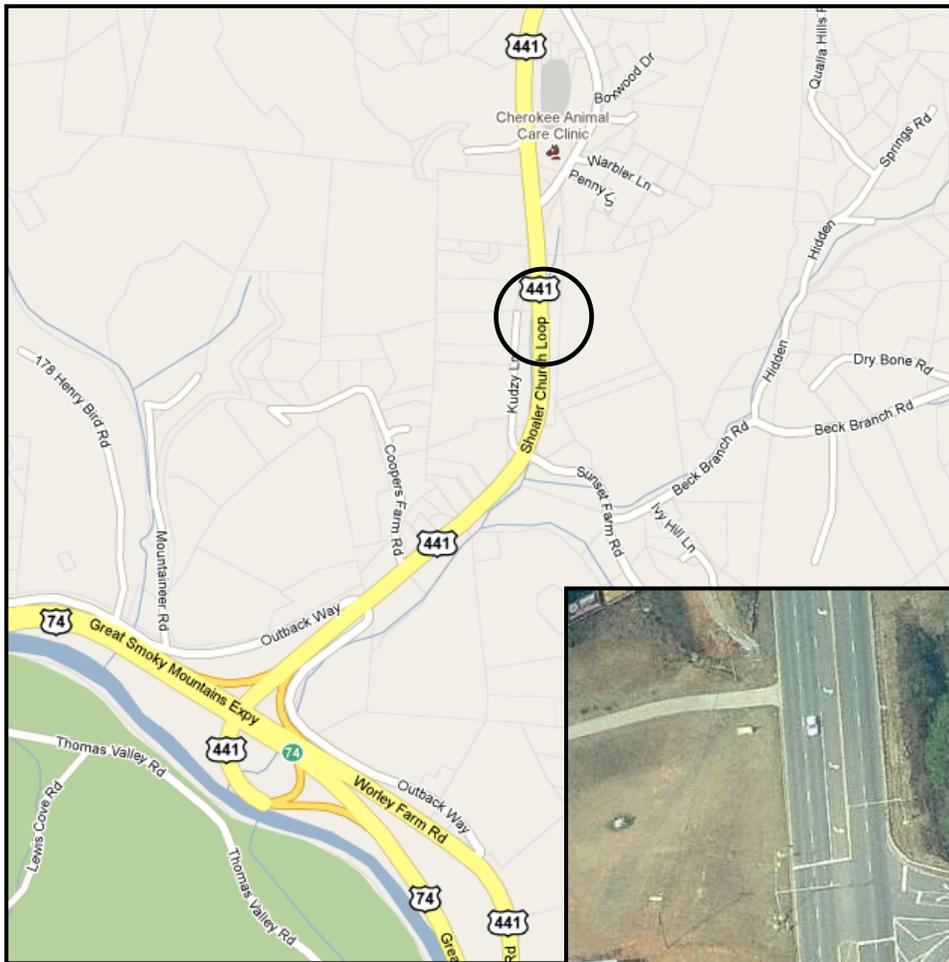
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 14-03-205 located at the Intersection of US 441 and the Smokey Mountain Elementary School Entrance / Exit in Jackson County, near the Town of Qualla.

The Sig ID is 14-1192 for the newly installed traffic signal under Small Construction Funds during the first half of 2007.



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 US 441 northbound right turn lane. US 441 is a five-lane curb and gutter type facility with a center turn lane and a 50 mph speed limit. The access road to Smokey Mountain Elementary School presents a left and right turn lane at the intersection. The subject location is a three-leg intersection, which was controlled by a stop sign on the school approach during the before and after periods. The intersection was upgraded to signal control with small construction funds during the first half of 2007.

The original statement of problem stated that vehicles waiting to turn right into the school created congestion issues on northbound US 441. The queuing created sight distance obstructions for vehicles turning out from the school and delay issues on the main thoroughfare. The intended purpose of the countermeasure was to alleviate the congestion and delay issue.

The initial crash analysis was completed from June 1, 2000 to May 31, 2003 with two (2) reported crashes. The final completion date for the improvement at the subject intersection was on August 9, 2004 with a total cost of \$71,500.

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 was split into the following time periods:

Before Period:	March 1, 2002 – June 30, 2004 (2.33 Years)
Construction of Right Turn Lane:	July – August 2004
After Period (Right Turn Ln):	September 1, 2004 – December 31, 2006 (2.33 Years)
Construction of Signal:	January – July 2007
Signal Period:	August 1, 2007 – November 30, 2009 (2.33 Years)

The beginning and ending date for this analysis was determined by the matching of evaluation time frames through the study. 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.*

Due to the condition that the countermeasure was installed for a congestion-delay issue, a specific Target Crash was not selected or evaluated. The ADT years were 2003, 2005, and 2008 for each time period.

<u>Treatment Information</u>	Before 2.33 Yrs	After 2.33 Yrs	Signal 2.33 Yrs
Total crashes	1	2	1
Total Severity Index	76.80	38.90	8.40
Volume (2003, 2005, 2008)	15,000	14,000	15,000

<u>Injury Crash Summary</u>	Before	After	Signal
Fatal injury Crashes	0	0	0
Class A injury Crashes	1	1	0
Class B injury Crashes	0	0	0
Class C Injury Crashes	0	0	1
Total Injury Crashes	1	1	1

Results and Discussion

Referencing the *Collision Diagrams*, the before period presented one (1) crash from a vehicle entering the school access road which resulted in an A-class injury crash. After the installation of the right turn lane, the intersection experienced two (2) left-turn same roadway crashes as motorists attempted to enter the school. The one (1) after period injury crash was also an A-injury collision. The fact that both the before and after period experienced a severe injury crash and total crashes rose from one to two through the analysis provided this project with a small negative benefit-cost ratio.

With the installation of a traffic signal at this location, the location did not experience an increase in collisions. The one (1) crash during this period was a northbound three vehicle high-speed rear-end collision resulting in seven (7) C-class injuries.

The calculated benefit to cost ratio for this project (before to after the right turn lane installation) is **(-0.15) considering total 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 *Treatment Site Photos*. Photos are provided from Google Street View for all three 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.

TREATMENT SITE PHOTOS



Traveling South on US 441 approaching intersection

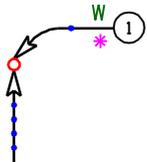


Looking North on US 441 at the Right Turn Lane



Looking East onto Smokey Mountain Elementary School Access Road
From US 441 Intersection

US 441
50 MPH



Smokey Mtn
Elementary School
Entrance / Exit
(MP 19.10)

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		SKIDSLOPE		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		TO AND UP		50 MPH TO 59		ICY OR SNOW
	REAR END		INJURY		60 MPH TO 69		FATALITY
	RAN OFF ROAD		SPEED UNKNOWN		9 MPH OR LESS		ONLY

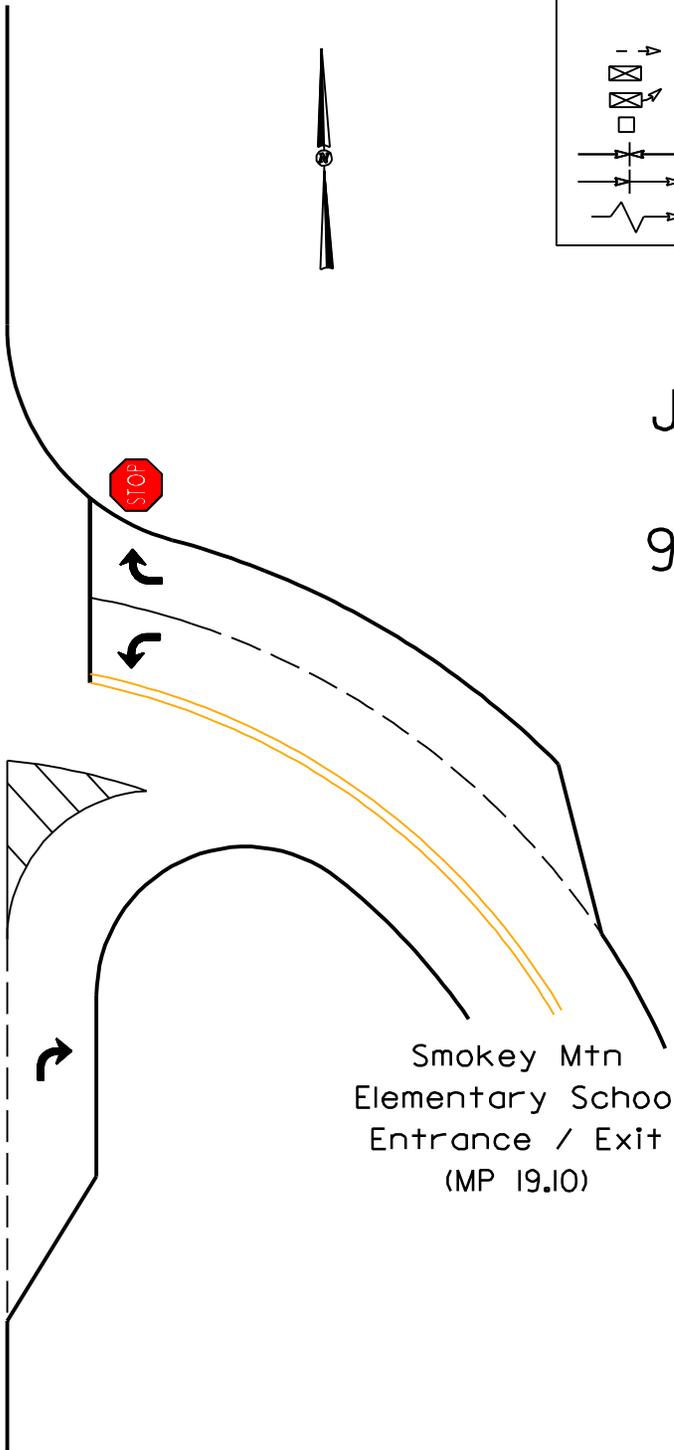
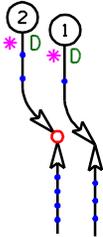
SS# 14-03-205
Jackson County
BEFORE Period
3/1/02 - 6/30/04
2.33 Years

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: M	AREA:
STUDY PERIOD: 3/1/2002 - 6/30/2004		
DISTANCE: Y-LINE + 150 FT		
ANALYSIS PREPARED BY: JBS		
ANALYSIS CHECKED BY: M/A		
DIAGRAM PREPARED BY: JBS		
DIAGRAM REVIEWED BY: ST		
SCALE: NOT TO SCALE		
DATE: 4-23-200		
LOG NUMBER: SS* 14-03-205 BEFORE		

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

US 441
50 MPH



Smokey Mtn
Elementary School
Entrance / Exit
(MP 19.10)

SS# 14-03-205
Jackson County
AFTER Period
9/1/04 - 12/31/06
2.33 Years

Countermeasure:
New Right Turn
Lane at School

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

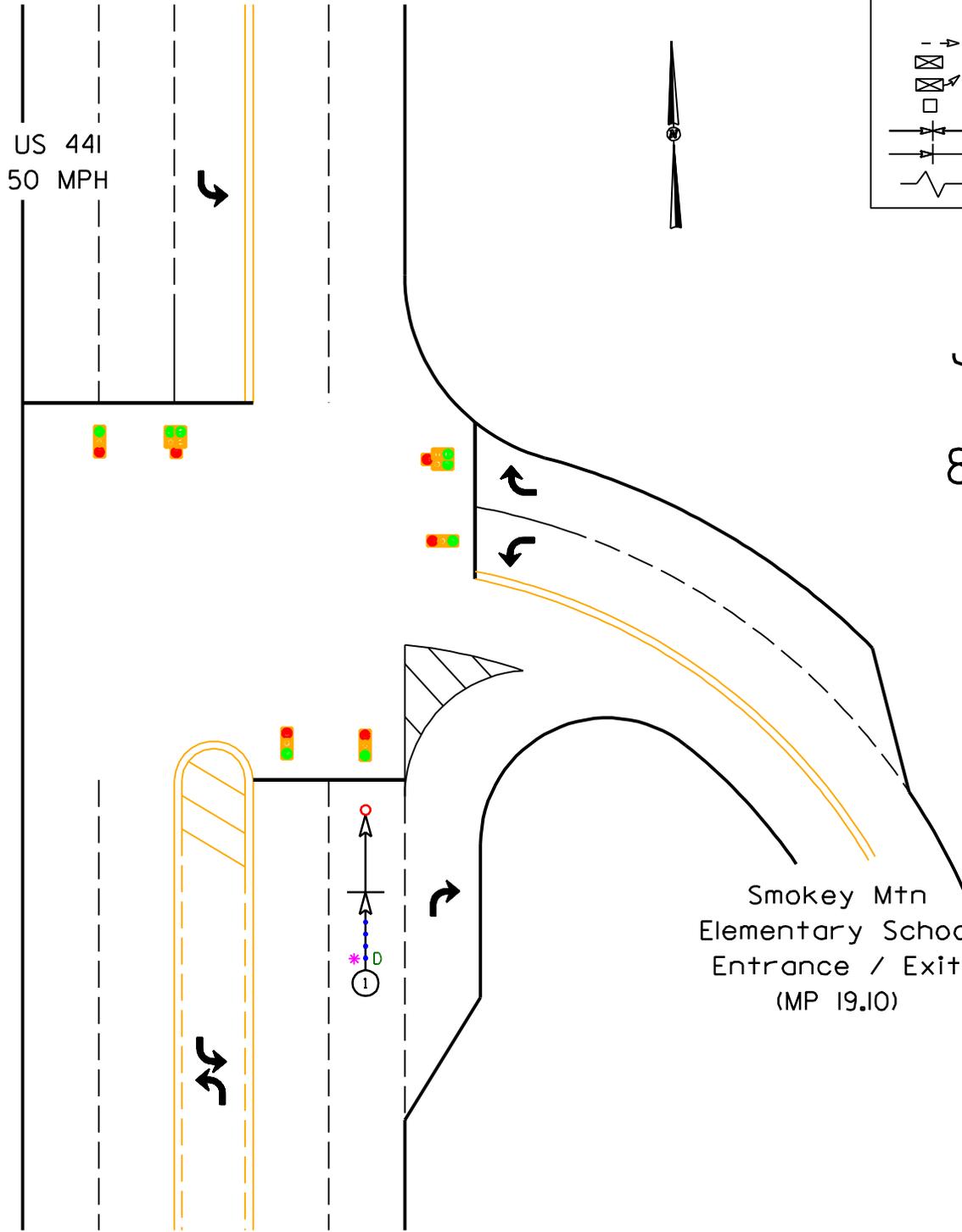
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT



COLLISION DIAGRAM	
DIVISION: M	AREA:
STUDY PERIOD: 9/1/2004 - 12/31/2006	
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: 4-23-200	
LOG NUMBER: SS* 14-03-205 AFTER	

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

US 441
50 MPH



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		TO AND LP		50 MPH TO 59		ICY OR SNOW
	REAR END		INJURY		60 MPH TO 69		SPEED UNKNOWN
	RAN OFF ROAD		FATALITY		70 MPH TO 79		ONLY

SS# 14-03-205
Jackson County
Signal Period
8/1/07 - 11/30/09
2.33 Years



New Traffic Signal
Sig ID 14-1192
Installed with Small
Construction Funds

Smokey Mtn
Elementary School
Entrance / Exit
(MP 19.10)

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: M	AREA:
	STUDY PERIOD: 8/1/2007 - 11/30/2009	
	DISTANCE: Y-LINE + 150 FT	
	ANALYSIS PREPARED BY: JBS	
	ANALYSIS CHECKED BY: M/A	
DIAGRAM PREPARED BY: JBS		
DIAGRAM REVIEWED BY: ST		
SCALE: NOT TO SCALE		
DATE: 4-23-2010		
LOG NUMBER: SS* 14-03-205 Signal		

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