

# Spot Safety Project Evaluation

Order # 41000010563

Spot Safety Project # 04-01-220

**Spot Safety Project Evaluation of the Installation of a Center Turn Lane  
Along NC 581 (Arrington Bridge Road) near Uchiyama America, Inc.  
East of Fayetteville, In 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

01-12-2011

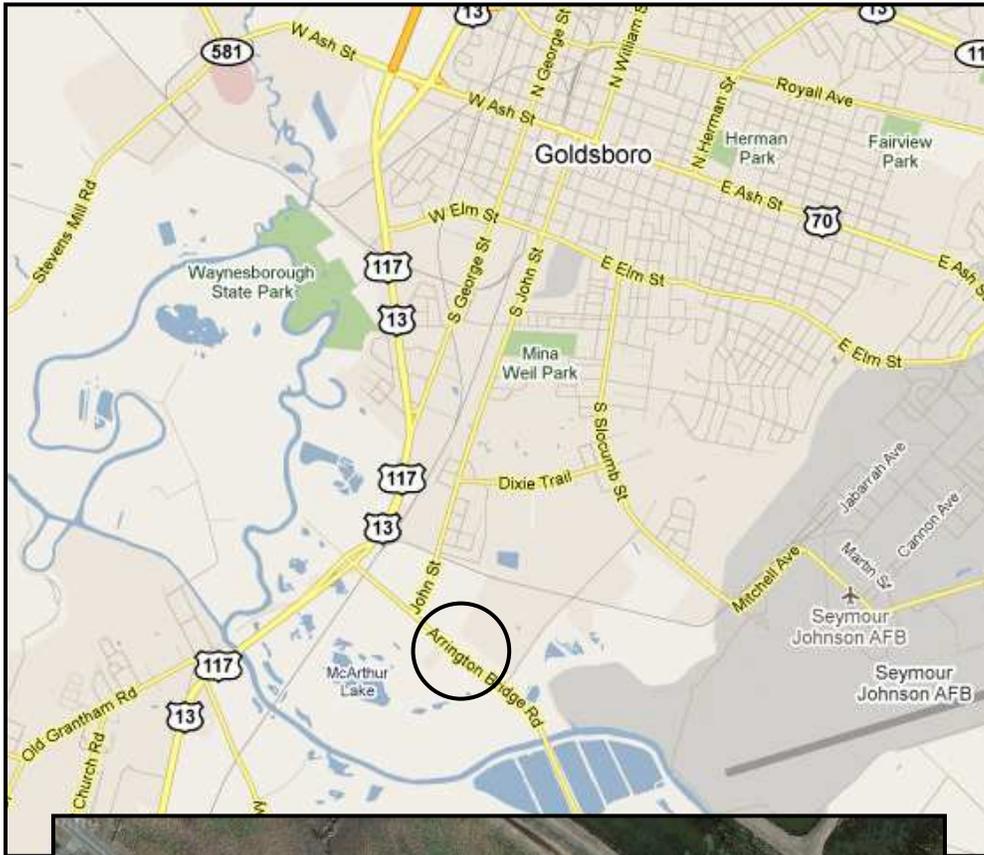
Date

Traffic Safety Project Engineer

# Spot Safety Project Evaluation Documentation

## Subject Location

Evaluation of Spot Safety Project Number 04-01-220 located along NC 581 (Arrington Bridge Road) near SR 1919 (Westbrook Road), south of Goldsboro, Wayne 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 a center left-turn lane along NC 581 (Arrington Bridge Road) west of SR 1919 (Westbrook Road). The center left-turn lane extends west from SR 1919 (Westbrook Road) along Uchiyama America, Inc.'s property frontage. NC 581 is a two-lane facility at the subject location with a speed limit of 45 mph for both approaches.

The original statement of problem was the traffic volume increase has required this roadway upgrade. The intention of the center left-turn lane is to remove left-turning vehicles from the traffic flow along NC 581 (Arrington Bridge Road).

The initial crash analysis was completed from June 30, 1997 to June 30, 2000 with twenty-two (22) reported crashes, of which three (3) were deemed correctable rear-end crashes. The final completion date for the improvement at the subject location was on May 30, 2006 with a total cost of \$150,000.00.

### 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 March 2006 through June 2006. The before period consisted of reported crashes from October 1, 2001 through February 28, 2006 (4 years and 5 months); and the after period consisted of reported crashes from July 1, 2006 through November 30, 2010 (4 years and 5 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 from both ends of the center left-turn lane. For the purpose of this study, a zero (0) foot Y-Line was used. *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 Rear-end crashes (northbound vehicles, west of SR 1919) were the target crashes for the applied countermeasure.

<b><u>Treatment Information</u></b>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total Crashes	12	5	- 58.33 %
Total Crash Severity Index	5.32	3.96	- 25.56 %
Target Crashes	7	1	- 85.71 %
Target Crash Severity Index	5.23	1.00	- 80.88 %
Volume (2004, 2008)	6,900	7,200	4.35 %

<u>Injury Crash Summary</u>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	0	N/A
Class B injury Crashes	0	1	N/A
Class C Injury Crashes	7	1	- 85.71 %
Total Injury Crashes	7	2	- 71.43 %

The naive before and after analysis at the treatment location resulted in a fifty-eight (58) percent decrease in Total Crashes, eighty-five (85) percent decrease of Target Crashes, and a twenty-five (25) percent decrease in the Total Severity Index. The before period ADT year was 2004 and the after period ADT year was 2008.

### **Results and Discussion**

Referencing the *Collision Diagrams*, the before period presented seven (7) target crashes. One of the target crashes was categorized as a Ran-off Roadway, however the driver claimed to intentionally run off the roadway to avoid a rear-end crash. After the installation of the center left-turn lane, there was one (1) target crash.

The calculated benefit to cost ratio for this project is **1.61 considering total crashes**. The benefit to cost ratio **considering only target crashes is 1.31**. 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 were provided for this location by Google Street View for both approaches of this study location. 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.

## TREATMENT SITE PHOTOS



Looking North on NC 581 (Arrington Bridge Road)



Looking South on NC 581 (Arrington Bridge Road)

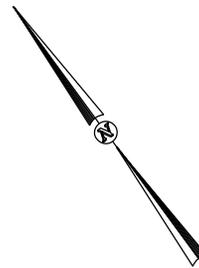
**BENEFIT-COST ANALYSIS WORKSHEET - TOTAL**

LOCATION: NC 581 (Arrington Bridge Road) near SR 1919		BY: C Neilson						
COUNTY: Wayne		DATE: 1/7/2011						
FILE NO.: SS 04-01-220								
DETAILED COST:	TYPE IMPROVEMENT -	Center Left Turn Lane						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$147,500	20	0.102	\$15,023			
		\$0	0	0.000	\$0			
	Right-of-Way	\$2,500	50	0.082	\$204			
	TOTALS	\$150,000	20	0.102	\$15,228			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$75			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$15,303			
	TOTAL COST OF PROJECT=				\$150,000			
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	4.42	0	0.00	7	1.58	5	1.13	\$36,538
AFTER	4.42	0	0.00	2	0.45	3	0.68	\$11,968
							Annual Benefits from Crash Cost Savings	\$24,570
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST						=	\$9,268
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST						=	1.61
	TOTAL COST OF PROJECT	-	\$150,000	COMPREHENSIVE B/C RATIO	-			1.61

**BENEFIT-COST ANALYSIS WORKSHEET - TARGET**

LOCATION: NC 581 (Arrington Bridge Road) near SR 1919		BY: C Neilson						
COUNTY: Wayne		DATE: 1/7/2011						
FILE NO.: SS 04-01-220								
DETAILED COST:	TYPE IMPROVEMENT -	Center Left Turn Lane						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$147,500	20	0.102	\$15,023			
		\$0	0	0.000	\$0			
	Right-of-Way	\$2,500	50	0.082	\$204			
	TOTALS	\$150,000	20	0.102	\$15,228			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$75			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$15,303			
	TOTAL COST OF PROJECT=				\$150,000			
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	4.42	0	0.00	4	0.90	3	0.68	\$21,018
AFTER	4.42	0	0.00	0	0.00	1	0.23	\$973
							Annual Benefits from Crash Cost Savings	\$20,045
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST						=	\$4,743
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST						=	1.31
	TOTAL COST OF PROJECT	-	\$150,000	COMPREHENSIVE B/C RATIO	-			1.31

SS# 04-01-220  
 Order# 41000010563  
 Wayne County  
 BEFORE Period  
 10/1/01 - 2/28/06



**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		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		TO AND LIP
	RAN OFF ROAD		SPEED UNKNOWN		SPEED UNKNOWN		ONLY

NOTE : CRASH #9  
 RAN-OFF ROAD TO AVOID  
 REAR-END CRASH

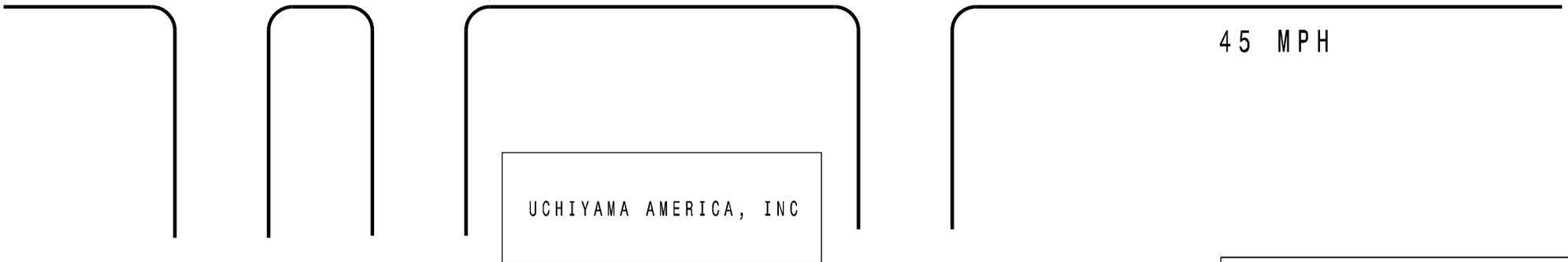
NC 581 (ARRINGTON BRIDGE ROAD)

M.P. - 5.165

M.P. - 4.952

AADT (YEAR)  
 6900 (2002)

AADT (YEAR)  
 6900 (2002)



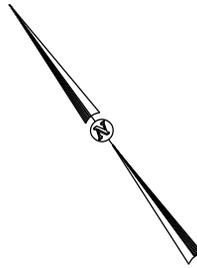
Rear-end Target Crashes

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

**TRAFFIC SAFETY UNIT**

Date: 01-07-2010      Prepared By: C Neilson

SS# 04-01-220  
 Order# 41000010563  
 Wayne County  
 AFTER Period  
 7/1/06 - 11/30/10



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		TO AND LIP
	RAN OFF ROAD		SPEED UNKNOWN		9 MPH OR LESS		ONLY

M.P. - 5.165

COUNTERMEASURE

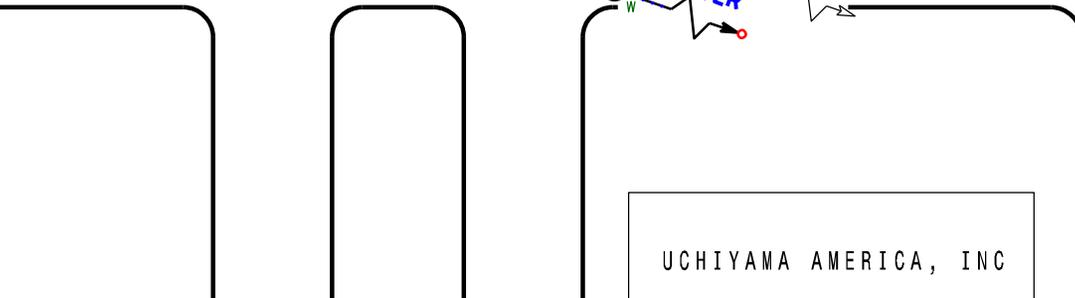
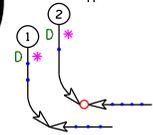
NC 581 (ARRINGTON BRIDGE ROAD)

SR 1919  
 (WESTBROOK ROAD)

M.P. - 4.952

AAADT (YEAR)  
 7200 (2002)

AAADT (YEAR)  
 7200 (2002)



45 MPH

UCHIYAMA AMERICA, INC

Rear-end Target Crashes

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

**TRAFFIC SAFETY UNIT**

Date: 01-07-2010      Prepared By: C Neilson