

Spot Safety Project Evaluation

Work Order #41000013145

Spot Safety Project # 02-07-201

**Spot Safety Project Evaluation of the Extension of the Existing Grass Median Island on
US 70 West of its Intersection with NC 58
Lenoir County**

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Transportation Mobility and Safety Division
North Carolina Department of Transportation

Principal Investigator



Brad Robinson, PE

8/12/2011

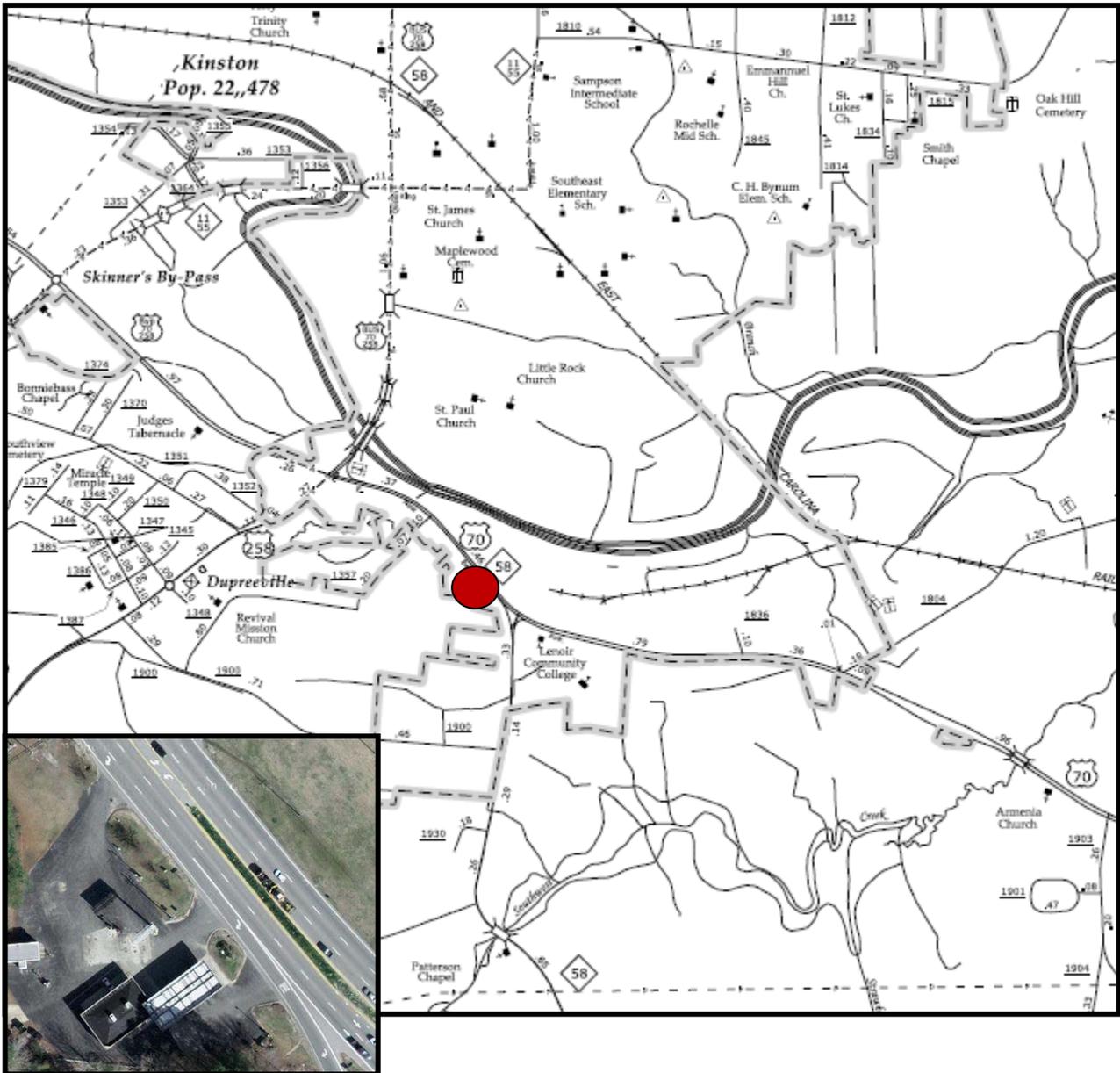
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 02-07-201 – Just west of the intersection of US 70 and NC 58 in Lenoir County.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was to extend the existing grassed median island to allow only right in-out access to the middle convenience store driveway.

In the vicinity of the subject location, US 70 is a five-lane roadway with a center turn lane and a speed limit of 45 mph. The convenience store is located on the southern side of the roadway and has three driveways onto US 70. The subject location is approximately 450 feet west of the US 70 intersection with NC 58. A median island already existed from the intersection up to a point between the eastern-most driveway and the middle driveway. A free flowing right turn lane is located in front of the convenience store driveways for eastbound US 70 vehicles turning right onto NC 58.

The original statement of problem was that westbound motorists were attempting to turn left into the middle driveway of the convenience store in front of stopped thru-traffic without realizing that the outer lane free-flows onto NC 58 south.

On the field investigation it was noted that the western-most driveway is currently closed to traffic with bollards at the driveway entrance and a fence in the parking lot.

The initial crash analysis was conducted from December 1, 2001 to November 30, 2006 with a total of six reported crashes. The final completion date for the improvements at the subject location was on October 23, 2007 with a total cost of \$6,000.00.

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 was from September 1, 2007 to November 30, 2007. The before period consisted of reported crashes from February 1, 2004 through August 31, 2007 (3 years and 7 months) and the after period consisted of reported crashes from December 1, 2007 through June 30, 2011 (3 years and 7 months). The ending date for this analysis was limited by the available crash data at the time the analysis was conducted.

The treatment data consisted of all reported crashes within 150 feet of the subject location. The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that crashes involving vehicles turning left either into or out of the middle convenience store driveway were the target crashes for the applied countermeasure. The target crashes are clearly identified in the before and after period collision diagrams.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	6	3	-50.0
Total Severity Index	18.57	5.93	-68.1
Target Crashes			
Target Crashes	5	0	-100.0
Target Severity Index	22.08	0	-100.0
Volume			
Volume	30,000	25,000	-16.7
<u>Target Crash Severity Summary</u>			
Fatal Crashes	1	0	-100.0
Class A Crashes	0	0	N/A
Class B Crashes	0	0	N/A
Class C Crashes	4	0	-100.0
PDO Crashes	0	0	N/A

Results and Discussion

The naive before and after analysis at the treatment location resulted in a 50 percent decrease in total crashes, a 100 percent decrease in target crashes, and a 16 percent decrease in average daily traffic (ADT). The before period ADT year was 2005 and the after period ADT year was 2009.

In the before period there were five target crashes. Four were left turn-same roadway crashes involving westbound US 70 vehicles turning into the middle driveway. In all four crashes, eastbound US 70 thru-traffic was stopped for the signal ahead and the left turning vehicle attempted to pass through a gap in the vehicles only to be hit by a free-flowing vehicle in the right turn lane. One of the crashes in this pattern resulted in a fatality. The fifth target crash involved a vehicle that attempted to turn left from the driveway onto westbound US 70 and was hit by an eastbound vehicle. There were no target crashes in the after period.

The calculated benefit to cost ratio for this project is 132.63 considering total crashes. The benefit to cost ratio considering only target crashes is 140.54. 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*. 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.

BENEFIT-COST ANALYSIS WORKSHEET - TOTAL

LOCATION: US 70 at pva west of NC 56		BY: bdr						
COUNTY: Lenoir		DATE: 8/8/2011						
FILE NO.: SS 02-07-201								
DETAILED COST:	TYPE IMPROVEMENT - Raised Median Channelization							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$0	0	0.000	\$0			
	Right-of-Way	\$6,000	20	0.102	\$611			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$6,000	20	0.102	\$611			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$800			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$1,411			
	TOTAL COST OF PROJECT=				\$6,000			
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	3.58	1	0.28	4	1.12	1	0.28	\$199,525
AFTER	3.58	0	0.00	2	0.56	1	0.28	\$12,374
							Annual Benefits from Crash Cost Savings	\$187,151
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST						=	\$185,740	
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST						=	132.63	
TOTAL COST OF PROJECT		-	\$6,000	COMPREHENSIVE B/C RATIO		-	132.63	

BENEFIT-COST ANALYSIS WORKSHEET - TARGET

LOCATION: US 70 at pva west of NC 56		BY: bdr						
COUNTY: Lenoir		DATE: 8/8/2011						
FILE NO.: SS 02-07-201								
DETAILED COST:	TYPE IMPROVEMENT - Raised Median Channelization							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$0	0	0.000	\$0			
	Right-of-Way	\$6,000	20	0.102	\$611			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$6,000	20	0.102	\$611			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$800			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$1,411			
	TOTAL COST OF PROJECT=				\$6,000			
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	3.58	1	0.28	4	1.12	0	0.00	\$198,324
AFTER	3.58	0	0.00	0	0.00	0	0.00	\$0
							Annual Benefits from Crash Cost Savings	\$198,324
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST						=	\$196,913	
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST						=	140.54	
TOTAL COST OF PROJECT		-	\$6,000	COMPREHENSIVE B/C RATIO		-	140.54	

Treatment Site Photos Taken June 15, 2011



Traveling eastbound on US 70, approaching raised median



Traveling eastbound on US 70, approaching raised median



Looking at median from gas station driveway

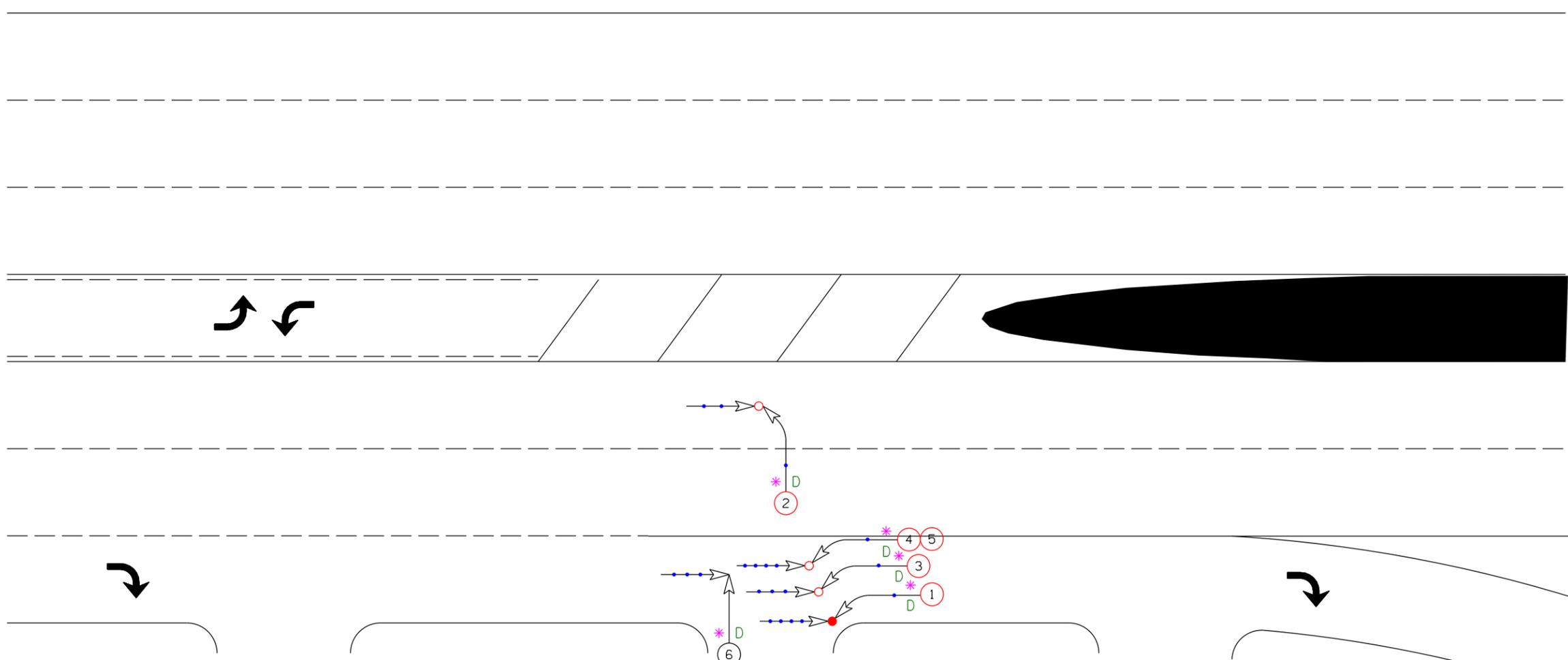


Looking at third driveway in gas station parking lot (currently closed off to traffic)

SS# 02-07-201
 Order# 41000013145
 Lenoir County
 BEFORE Period
 2/1/2004-8/31/2007

LEGEND			
	MOVING VEHICLE		ANGLE
	PEDESTRIAN		9 MPH OR LESS
	PARKED VEHICLE		10 MPH TO 19
	PARKING VEHICLE		20 MPH TO 29
	FIXED OBJECT		30 MPH TO 39
	HEAD ON		40 MPH TO 49
	REAR END		50 MPH TO 59
	RAN OFF ROAD		60 MPH TO 69
	TURNING		70 AND UP
	BACKING		INJURY
	SIDESWIPE		FATALITY
	OUT OF CONTROL		SPEED UNKNOWN
	PEDESTRIAN		P PEDESTRIAN
	TRAIN		T TRAIN
	DRIVER AT FAULT		* DRIVER AT FAULT
	DRY		D DRY
	WET		W WET
	ICY OR SNOWY		I ICY OR SNOWY
	OILY		O OILY

US 70
45 mph **ADT (YEAR)**
30,000 (2005)



Note: Crash #6 - Crash report does not say what direction the vehicle leaving the driveway was headed, therefore unable to determine if it was a target crash.

Note: In crash #s 1,3,4,5 the traffic in the two thru-lanes was stopped.



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DIVISION of HIGHWAYS
TRANSPORTATION MOBILITY and SAFETY DIVISION

TRAFFIC SAFETY UNIT

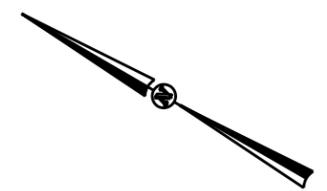
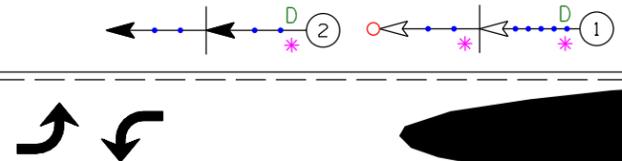
Date: August 2011

Prepared By:

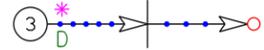
SS# 02-07-201
 Order# 41000013145
 Lenoir County
 AFTER Period
 12/1/2007-6/30/2011

US 70
45 mph **ADT (YEAR)**
 25,000 (2009)

		LEGEND	
	MOVING VEHICLE		ANGLE
	PEDESTRIAN		9 MPH OR LESS
	PARKED VEHICLE		10 MPH TO 19
	PARKING VEHICLE		20 MPH TO 29
	FIXED OBJECT		30 MPH TO 39
	HEAD ON		40 MPH TO 49
	REAR END		50 MPH TO 59
	RAN OFF ROAD		60 MPH TO 69
			OUT OF CONTROL
			INJURY
			FATALITY
			SPEED UNKNOWN
			P PEDESTRIAN
			T TRAIN
			* DRIVER AT FAULT
			D DRY
			W WET
			I ICY OR SNOWY
			O OILY



It was noticed during field investigation that bollards and a chain link fence were preventing vehicles from using the 3rd driveway. It is not known how long these have been in place.



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Date: August 2011

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