

Spot Safety Project Evaluation

Order # 41000025426

Spot Safety Project # 08-05-204

**Spot Safety Project Evaluation of the Directional Crossover with Median U-Turns Installation
US 74 at SR 1321 (Elmore Road/Laurel Hill Church Road)
Scotland County**

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
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Principal Investigator



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7-16-2013

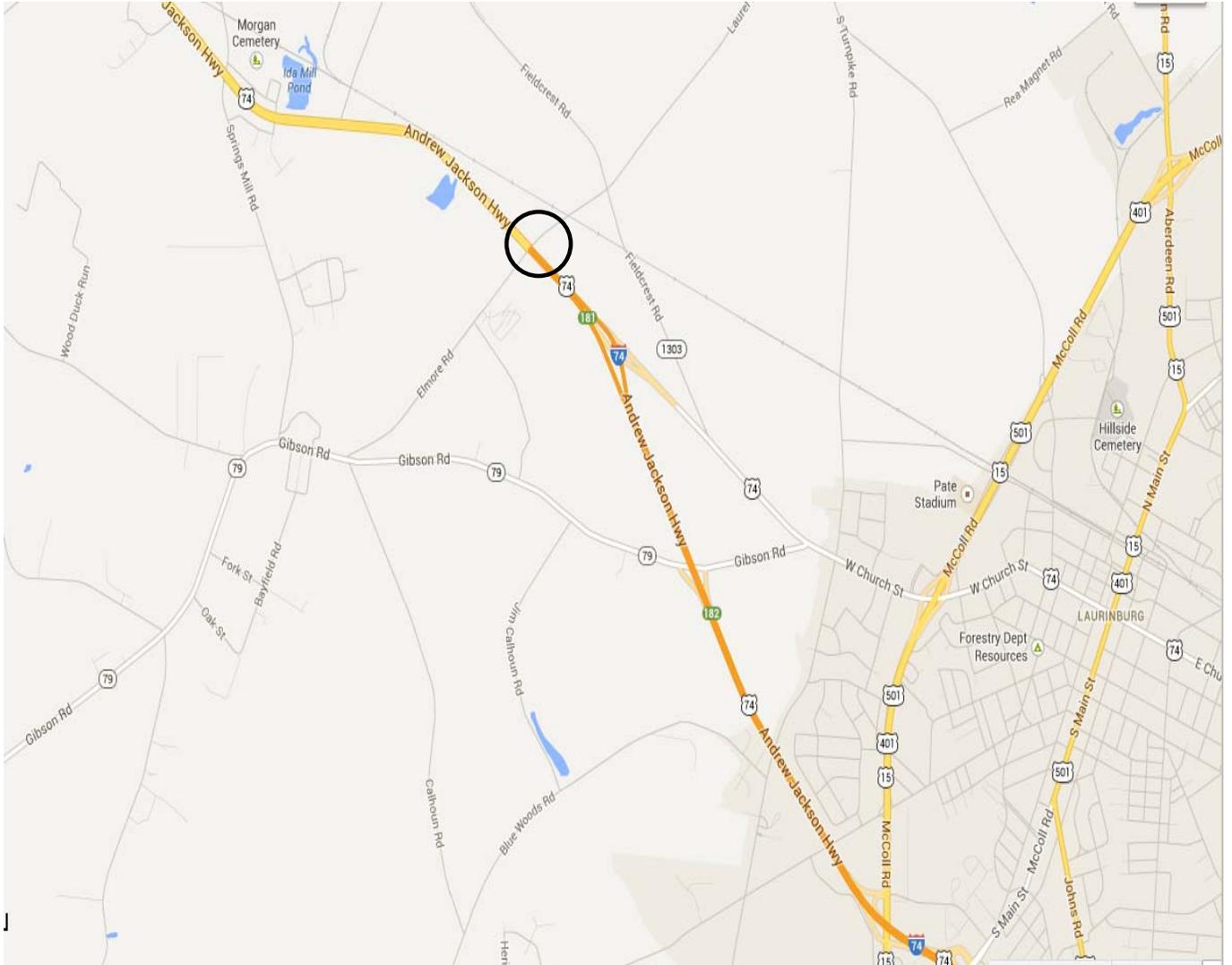
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 08-05-204 located at the Intersection of US 74 at SR 1321 (Elmore Road/Laurel Hill Church Road) in Scotland County, West of Laurinburg.





Before Period

Aerial Photo provided from Scotland County GIS Web Map



After Period

Aerial Photo provided from Google Maps

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 limited movement directional crossover with median U-Turn concrete dividers. US 74 is a four-lane divided facility under partial control access. SR 1321 is a two lane roadway under stop sign control which intersects US 74 at grade. The speed limit on US 74 and SR 1321 is 55 mph.

The original statement of problem stated that vehicles traveling across US 74 from SR 1321 are being struck while crossing the last two lanes of US 74. A high number of angle crashes also was specified in the statement of problem. The intended purpose of the crossover improvement was to help alleviate the occurrence and severity of collisions.

The initial crash analysis was completed from November 1, 1992 to October 31, 2002 and identified by HSIP (PH# 82I00004) as “chronic crossing” location. There were twenty-nine (29) total reported crashes in the ten year analysis period. The final completion date for the improvement at the subject intersection was on September 17, 2008 with a total cost of \$250,000.

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 June 2008 through September 2008. The before period consisted of reported crashes from October 1, 2003 through May 31, 2008 (4 years and 8 months); and the after period consisted of reported crashes from October 1, 2008 through May 31, 2013 (4 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 intersection. *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 Crossover Crashes were the target crashes for the applied countermeasure. The Crossover Crash types considered are as follows: Left turn, different roadways and Angle.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	16	10	- 37.5 %
Total Severity Index	13.71	3.22	- 76.5 %
Target Crashes	8	0	- 100.0 %
Target Crash Severity Index	13.25	0.00	- 100.0 %
Intersection ADT Volume (2006,2011)	19,500	23,200	19.0 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	1	0	- 100.0 %
Class A injury Crashes	1	0	- 100.0 %
Class B injury Crashes	10	1	- 90.0 %
Class C Injury Crashes	10	3	- 70.0 %
Total Injuries	22	4	- 81.8 %

The naive before and after analysis at the treatment location resulted in a 38 percent decrease in Total Crashes, a 100 percent removal of Target Crashes, and a 77 percent decrease in the Total Severity Index. The before period ADT year was 2006 and the after period ADT year was 2011.

Results and Discussion

Referencing the *Collision Diagrams*, the before period indicated eight (8) angle roadway crashes at the studied intersection including a fatality crash in August 2006. After the crossover installation all of these crashes were eliminated by the removal of the through movement option at the intersection for SR 1321 motorists.

The before period included Crash 4 (ID- 101067533) where vehicle 1 traveling Eastbound on US 74 ran off the roadway to the right in avoidance of vehicle 2 traveling Southbound on SR 1321. This was a non-contact collision which follows the target angle crash pattern. Three (3) other crashes in the before period follow this crash pattern. The other angle crash pattern discovered during the before period was, vehicles traveling Northbound on SR 1321 were colliding with vehicles traveling Westbound on US 74. It is conclusive that vehicles traveling Northbound/Southbound on SR 1321 failed to yield the right of way to vehicles traveling Eastbound/Westbound on US 74.

The after period did not yield any target angle or left-turn, different roadways crashes.

Typically, crossover installations occur on median divided roadways and the Safety Evaluation Group evaluates the closest u-turn locations for crash migration. However, with this installation, motorists have the ability to u-turn at the end of the concrete medians. A general search analyzing for u-turn related crashes was completed for the after period and no crashes were found.

Please see the attached *Treatment Site Photos*. Photos are provided from Google Street View for all four 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 (Google Street View)



Looking East on US-74 (Image Date: April 2013)



Looking West on US-74 (Image Date: August 2011)



Looking South onto SR 1321 (Elmore Road) (Image Date: April 2013)



Looking North onto SR 1321 (Laurel Hill Road) (Image Date: August 2011)



Western Most U-Turn on US 74 (Image Date: August 2011)



Eastern Most U-Turn on US 74 (Image Date: April 2013)

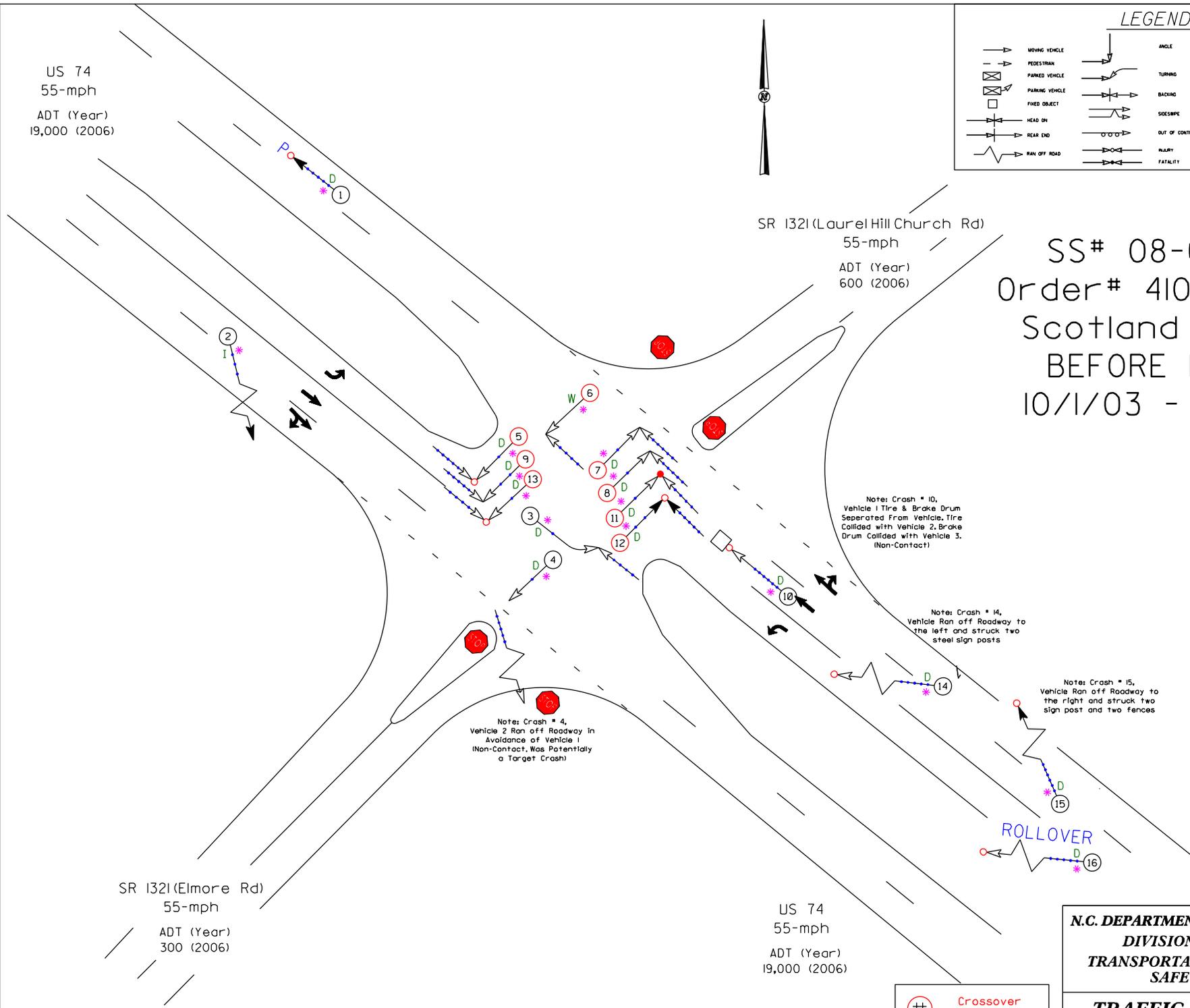
US 74
55-mph
ADT (Year)
19,000 (2006)



LEGEND							
	MOVING VEHICLE		ANGLE		5 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PARKING VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	FIXED OBJECT		SIDESWIPE		30 MPH TO 39		DRY
	HEAD ON		OUT OF CONTROL		40 MPH TO 49		WET
	REAR END		RAN OFF ROAD		50 MPH TO 59		ICY OR SNOWY
	RAN OFF ROAD		RAN OFF ROAD		60 MPH TO 69		ONLY
			MURDER		TO AND UP		
			FATALITY		SPEED UNKNOWN		

SR 1321 (Laurel Hill Church Rd)
55-mph
ADT (Year)
600 (2006)

SS# 08-05-204
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Scotland County
BEFORE Period
10/1/03 - 5/31/08



Note: Crash # 10,
Vehicle 1 Tire & Brake Drum
Separated From Vehicle. Tire
Collided with Vehicle 2, Brake
Drum Collided with Vehicle 3.
(Non-Contact)

Note: Crash # 14,
Vehicle Ran off Roadway to
the left and struck two
steel sign posts

Note: Crash # 4,
Vehicle 2 Ran off Roadway in
Avoidance of Vehicle 1
(Non-Contact, Was Potentially
a Target Crash)

Note: Crash # 15,
Vehicle Ran off Roadway to
the right and struck two
sign post and two fences

SR 1321 (Elmore Rd)
55-mph
ADT (Year)
300 (2006)

US 74
55-mph
ADT (Year)
19,000 (2006)

Crossover
Target Crashes

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

TRAFFIC SAFETY UNIT

Date: 7-16-2013
Prepared By: J. Green

US 74
55-mph
ADT (Year)
23,000 (2011)

SR 1321 (Laurel Hill Church Rd)
55-mph
ADT (Year)
290 (2011)

SR 1321 (Elmore Rd)
55-mph
ADT (Year)
185 (2011)

US 74
55-mph
ADT (Year)
23,000 (2011)

LEGEND

	MOVING VEHICLE		ANGLE		5 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PAVING VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	FIXED OBJECT		SIDESWIPe		30 MPH TO 39		DRY
	HEAD ON		OUT OF CONTROL		40 MPH TO 49		WET
	REAR END		RAN OFF ROAD		50 MPH TO 59		ICY OR SNOWY
	RAN OFF ROAD		BLURRY		60 MPH TO 69		ONLY
			FATALITY		TO AND UP		
			SPEED UNKNOWN				

Note: Crash # 6,
Vehicle Ran Off
Roadway To The Left
And Struck Sign in
Island

SS# 08-05-204
Order# 41000025426
Scotland County
AFTER Period
10/1/08 - 5/31/13

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

TRAFFIC SAFETY UNIT

Crossover
 Target Crashes

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