

Spot Safety Project Evaluation

Project Log # 200408163

Spot Safety Project # 06-94-200

**Evaluation of the Traffic Signal Installation and Pavement Widening,
At the Intersection of SR 1997-Fayetteville Road and Farringdom Road-
Walmart Shopping Center Entrance in Lumberton, Robeson County**

Documents Prepared By:

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04/11/2005
Date

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Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 06-94-200 – the Intersection of SR 1997-Fayetteville Road and Farringdom Road-Walmart Shopping Center Entrance in Lumberton, Robeson County

Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naive before and after analysis has been completed to measure the effectiveness of the spot safety improvement. Additional analysis methods were not utilized for this evaluation because a suitable comparison group was unattainable. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

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 multi-phase traffic signal. The City of Lumberton widened both approaches on Farringdom Road and added a concrete median to the south leg of SR 1997-Fayetteville Road in conjunction with the signal installation. Ray Goff, Division Traffic Engineer, originally requested the spot safety project improvement. Prior to the improvement, Farringdom Road and the Walmart shopping center entrance were stop sign controlled. SR 1997-Fayetteville Road is a five-lane curb and gutter roadway with a center left turn lane. SR 1997-Fayetteville Road has a speed limit of 45 mph. Farringdom is a city street that intersects SR 1997-Fayetteville Road on the west side of the intersection. The commercial driveway that intersects SR 1997-Fayetteville Road on the east side of the intersection provides access to a shopping center that contained a Lowe's and a Walmart.

Expansion of the shopping center resulted in an increased traffic volume and a higher frequency of accidents and congestion. The improvement was installed to better facilitate movement along SR 1997-Fayetteville Road in the vicinity of the treatment intersection. The initial crash analysis for this location was completed from May 1, 1990 through April 30, 1994 with a total of 29 reported crashes. There were eleven Left-Turn crashes, ten Angle crashes, four Rear-End crashes, and four Random crashes. Ten class B and eleven class C injuries resulted. The final completion date for the spot safety improvement at the subject intersection was on February 25, 1997.

In early 2001 the Walmart and Lowe's located in the shopping center were closed. Because the spot safety project was chosen to facilitate the large traffic volumes accessing Walmart and Lowe's at the subject intersection, the project evaluation only contains crashes through December 2000. Smaller businesses still occupy some of the shopping center but the traffic volumes appear to have decreased since Walmart and Lowe's closed. Only several vehicles entered the shopping center entrance at the Treatment Intersection while performing the site investigation (on the morning of July 1, 2004).

Naïve 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, 1996 through April 30, 1997. The before period consisted of reported crashes from January 1, 1993 through August 31, 1996 (3 Years, 8 Months) and the after period consisted of reported crashes from May 1, 1997 through December 31, 2000 (3 Years, 8 Months). The ending date for this analysis was determined by the closing of Walmart and Lowe's, located within the shopping center at the treatment intersection.

The analysis consisted of two different sets of data, the Treatment Intersection data and the Treatment Area data. The Treatment Intersection data consisted of all crashes within a 150 feet Y-Line of the subject intersection. The Treatment Area consisted of all crashes within a 150 feet Y-line on SR 1997-Fayetteville Road, from 150 feet south of Dayalpur Street-Lowe's southernmost entrance to 150 feet north of Peterson Drive. The Treatment Area includes the intersections north and south of the Treatment Intersection on SR 1997-Fayetteville Road in order to account for crash migration and to include all traffic using the Walmart Shopping Center and Lowe's. Please see the attached *Location Map* and *Aerial Photograph* for further detail of the Treatment Area.

The attached data Tables 1 and 2 depict the Naive Before and After Analysis for the Treatment Intersection and the Treatment Area, respectively. Each Table consists of an overall crash summary and a crash type summary. The overall crash summary contains high level crashes, crash rates, and vehicle exposure statistics. The crash type summary contains crashes broken down by accident type. The before period ADT year was 1994, and the after period ADT year was 1999. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. These crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

As shown in Table 1, the naive before and after analysis at the Treatment Intersection resulted in a 19.0 percent decrease in Total Crashes, a 33.2 percent decrease in the Total Crash Rate, a 134.0 percent increase in the Severity Index, and a 21.0 percent increase in Average Daily Traffic (ADT). Analysis of the Treatment Intersection also resulted in an 87.5 percent decrease in Left Turn-Different Roadway Crashes, a 66.7 percent decrease in Angle Crashes, and a 68.4 percent decrease in Frontal Impact Crashes. The number of Rear End crashes increased from none in the before period to nine in the after period.

As shown in Table 2, the naive before and after analysis of the Treatment Area resulted in a 22.4 percent decrease in Total Crashes, a 36.0 percent decrease in the Total Crash Rate, a 44.7 percent increase in the Severity Index, and a 21.0 percent increase in ADT. Analysis of the Treatment Area also resulted in a 76.2 percent decrease in Left Turn-Different Roadway Crashes, a 61.9 percent decrease in Angle Crashes, a 56.0 percent decrease in Frontal Impact Crashes, and a 700.0 percent increase in Rear End-Slow or Stop crashes.

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 19.0 percent decrease in Total Crashes and a 68.4 percent decrease in Frontal Impact Crashes at the Treatment Intersection. Analysis of the entire Treatment Area offers similar results. The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 22.4 percent decrease in Total Crashes and a 56.0 percent decrease in Frontal Impact Crashes within the entire Treatment Area.

The summary results above demonstrate that the treatment location appears to have had a crash reduction in Total Crashes and Frontal Impact Crashes from the before to the after period. However, there is a significant increase in Rear-End Crashes from the before to the after period. The number of Rear End-Slow or Stop Crashes within the Treatment Area increased (by 700 percent) from two crashes in the before period to sixteen crashes in the after period. The severity index of the Treatment Area increased by 44.7 percent, which is attributed to a Class A injury accident in the after period. In this crash, a vehicle on Farringdom ran the red light in its direction, causing an Angle crash.

The countermeasure crash reduction for Total Crashes at the Treatment Intersection is a 19.0 percent decrease in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the Treatment Intersection is a 68.4 percent decrease in crashes. 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.

Further Information

As previously mentioned, the Walmart and Lowe's at the subject intersection were closed in early 2001. Analysis of the 2 Years, 10 Month period since the stores' closures (from January 1, 2001 through October 31, 2003) resulted in twenty reported crashes at the Treatment Intersection. Thirteen of these have been Rear End-Slow or Stop Crashes, while four have been Frontal Impact Crashes.

Table 1. Treatment Intersection Overall Crash Summary and Crash Type Summary

OVERALL CRASH SUMMARY	Before Period	After Period	Percent Change
Total Crashes	21	17	-19.0
Fatal Crashes	0	0	n/a
Non-Fatal Injury Crashes	8	9	12.5
Total Injury Crashes	8	9	12.5
PDO Crashes	13	8	-38.5
Night Crashes	0	4	n/a
Wet Crashes	2	2	0.0
Rate			
Total Crash Rate	63.24	42.26	-33.2
Fatal Crash Rate	0	0	n/a
Non Fatal Crash Rate	24.09	22.37	-7.1
Night Crash Rate	0	9.94	n/a
Wet Crash Rate	6.02	4.97	-17.4
ADT and Exposure			
Annual ADT	24800	30000	21.0
Total Vehicle Exposure	33.21	40.23	21.1
Severity Index	3.82	8.94	134.0

CRASH TYPE SUMMARY	Before Period	After Period	Percent Change
Angle	9	3	-66.7
Left Turn, Different Roadways	8	1	-87.5
Left Turn, Same Roadway	1	2	100.0
Overturn/Rollover	0	1	n/a
Ran Off Road - Right	1	1	0.0
Rear End, Slow or Stop	0	9	n/a
Right Turn, Different Roadways	1	0	-100.0
Sideswipe, Same Direction	1	0	-100.0

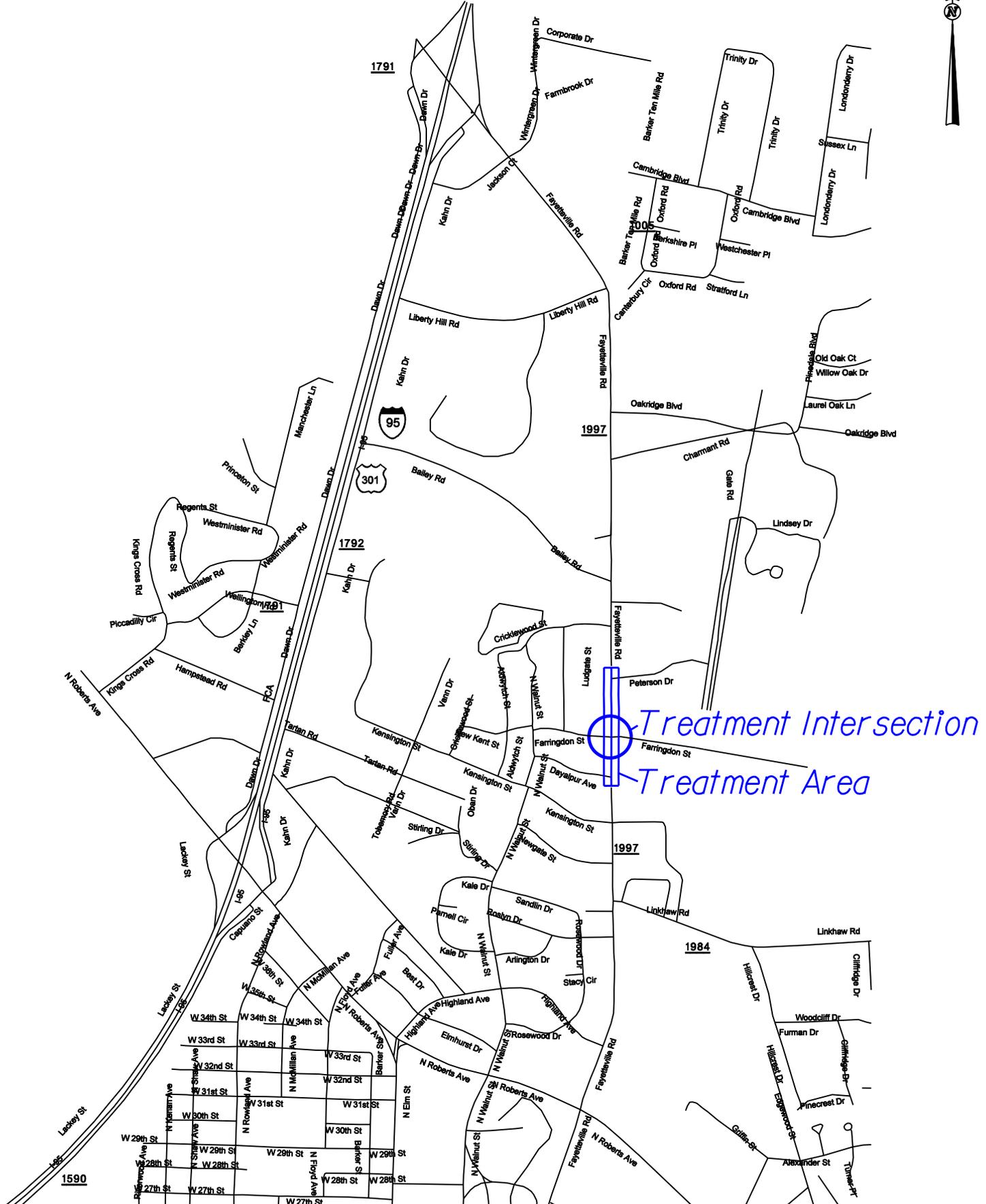


Table 2. Treatment Area Overall Crash Summary and Crash Type Summary

OVERALL CRASH SUMMARY	Before Period	After Period	Percent Change
Total Crashes	58	45	-22.4
Fatal Crashes	0	0	n/a
Non-Fatal Injury Crashes	29	26	-10.3
Total Injury Crashes	29	26	-10.3
PDO Crashes	29	19	-34.5
Night Crashes	2	9	350.0
Wet Crashes	7	8	14.3
Total Crash Rate	174.66	111.86	-36.0
Fatal Crash Rate	0	0	n/a
Non Fatal Crash Rate	87.33	64.63	-26.0
Night Crash Rate	6.02	22.37	271.6
Wet Crash Rate	21.08	19.89	-5.6
Annual ADT	24800	30000	21.0
Total Vehicle Exposure	33.21	40.23	21.1
Severity Index	4.7	6.8	44.7

CRASH TYPE SUMMARY	Before Period	After Period	Percent Change
Angle	21	8	-61.9
Fixed Object	0	1	n/a
Head On	1	0	-100.0
Left Turn, Different Roadways	21	5	-76.2
Left Turn, Same Roadway	4	8	100.0
Moveable Object	0	1	n/a
Other Collision With Vehicle	0	1	n/a
Overturn/Rollover	0	1	n/a
Parked Motor Vehicle	1	0	-100.0
Ran Off Road - Left	0	1	n/a
Ran Off Road - Right	2	1	-50.0
Rear End, Slow or Stop	2	16	700.0
Rear End, Turn	1	0	-100.0
Right Turn, Different Roadways	3	1	-66.7
Sideswipe, Same Direction	2	1	-50.0

Location Map, Lumberton, Robeson County
Spot Safety Project Number 06-94-200



Aerial Photograph



Treatment Site Location Photos (Taken on July 1, 2004)



**Looking East at the intersection of SR 1997-Fayetteville Road and Farringdom Road-
Walmart Shopping Center. Notice the location of the closed Walmart.**

Treatment Site Location Photos (Taken on July 1, 2004)



**Looking West at the intersection of SR 1997-Fayetteville Road and Farringdom Road-
Walmart Shopping Center**



**Looking North at the intersection of SR 1997-Fayetteville Road and Farringdom Road-
Walmart Shopping Center**

Treatment Site Location Photos (Taken on July 1, 2004)



**Looking South at the intersection of SR 1997-Fayetteville Road and Farringdom Road-
Walmart Shopping Center**

Treatment Site Location Photos (Taken on July 1, 2004)



**Looking North on SR 1997-Fayetteville Road
(Photo taken from Dayalpur Street)**



**Looking South on SR 1997-Fayetteville Road
(Photo taken from Peterson Drive)**