

Hazard Elimination Project Evaluation

Project Log # 200502112

Hazard Elimination Project W-3418

**Evaluation of Widening of US 70 from NC 42 / SR 1756 (Lombard) to SR 1563 (Boling),
Johnston County**

Documents Prepared By:

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Date

Hazard Elimination Project Evaluation Documentation

Subject Location

Evaluation of Hazard Elimination Project W-3418 – Widening of US 70 from NC 42 / SR 1756 (Lombard) to SR 1563 (Boling) in Johnston County to add an additional through lane in each direction.

Project Information and Background from the Project File Folder

The safety countermeasure chosen for the subject location was to widen existing US 70 to allow for an additional through travel lane from NC 42 / SR 1756 (Lombard) to SR 1563 (Boling). There is conflicting information in the project folder as to whether an additional lane was added in each direction or just in the eastbound direction. A review of the crash reports suggest that US 70 eastbound and westbound were both 2 lanes in the before period. It is possible that only the eastbound widening was funded with Hazard Elimination funds and the westbound widening was funded from another source. Lack of project documentation makes this unclear. The crash data in this evaluation will be broken down by direction to maximize its usefulness.

There was no information in the project folder regarding the crash history or development of this project. The project was let in December of 1997 and closed out in August of 1998 at an estimated cost of \$861,000.

Naïve Before and After Analysis

After reviewing the hazard elimination project file folder along with all the crashes at the subject locations, the crash data omitted from this analysis to consider for an adequate construction period was from December 1, 1997 through September 30, 1998. The before period consisted of reported crashes from May 1, 1990 through November 30, 1997 (7 Years, 7 Months) and the after period consisted of reported crashes from October 1, 1998 through April 30, 2006 (7 Years, 7 Months). The ending date for this analysis was determined by the available after period crash data.

The treatment data consisted of all crashes on the 0.81 mile strip of US 70 from NC 42 / SR 1756 (Lombard) to SR 1563 (Boling) with a 0 foot y-line. Please see the attached *Location Map* for further detail.

The following table depicts the Naïve Before and After Analysis for the Total Crashes and Target Crashes at the treatment location. Please note that Rear End and Sideswipe crash types were the target crashes for the applied countermeasure. Crashes that involved eastbound and westbound vehicles were counted in both categories. Also, crashes in which a direction of travel could not be determined due to conflicting or lack of information were excluded from the directional analysis.

<u>Treatment Information</u>	Eastbound			Westbound			Both Directions		
	Before	After	Percent Reduction (-)/ Percent Increase (+)	Before	After	Percent Reduction (-)/ Percent Increase (+)	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	125	254	103%	82	140	71%	203	381	88%
Total Severity Index	5.78	7.33	27%	7.02	4.73	-33%	5.52	6.38	16%
Total Target Crashes	61	75	23%	34	60	76%	97	136	40%
Target Severity Index	3.91	7.71	97%	6.06	4.73	-22%	4.68	6.29	34%
Volume	--	--	--	--	--	--	33,000	45,000	36%

<u>Target Crash Information</u>	Eastbound			Westbound			Both Directions		
	Before	After	Percent Reduction (-)/ Percent Increase (+)	Before	After	Percent Reduction (-)/ Percent Increase (+)	Before	After	Percent Reduction (-)/ Percent Increase (+)
<i>Target Crashes - Injuries</i>									
Fatal Injury Crashes	0	0	N/A	0	0	N/A	0	0	N/A
Non-Fatal Injury Crashes	24	31	29%	14	21	50%	39	51	31%
Total Injury Crashes	24	31	29%	14	21	50%	39	51	31%
<i>Target Crashes - Contributing Factors</i>									
Night Crashes	18	7	-61%	4	4	0%	23	11	-52%
Wet Crashes	17	8	-53%	7	9	29%	26	17	-35%
<i>Target Crashes - Crash Types</i>									
Rear End	53	66	25%	33	40	21%	85	107	26%
Sideswipe, Same Direction	8	9	13%	3	20	567%	12	29	142%

The naïve before and after analysis at the treatment location resulted in an 88 percent increase in Total Crashes, a 40 percent increase in Target Crashes, and a 36 percent increase in Average Daily Traffic (ADT) when both directions of travel are considered. Further investigation shows there was a 16 percent increase in Severity Index for Total Crashes and a 34 percent increase in the Severity Index for Target Crashes. The before period ADT year was 1994 and the after period ADT year was 2002.

Results and Discussion

The naïve before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in an 88 percent increase in Total Crashes and a 40 percent increase in Target Crashes. Further investigation shows that the Severity Index of Total Crashes and Target Crashes appear to have increased 16 and 34 percent respectively using naïve methodologies. The summary results above demonstrate that the treatment location appears to have had an increase in both Total and Target Crashes and an increase in the Severity Index from the before to the after period.

The directional analysis is shown in the above charts for completeness. The data generally follows the same trend as the analysis for both directions. Night and Wet crashes decreased significantly for Target Crashes in the eastbound lanes and the Severity Index decreased for Total and Target Crashes in the westbound lanes.

It appears that the majority of crashes along this section are intersection related. The chart below shows crash totals by intersection for the before and after periods. Approximately 85% of the crashes occurred at an intersection with a full movement crossover. Also note the significant increase in crashes at the unsignalized, full movement intersections. Crashes at all three of these locations increased by over 100 percent. This is likely due to the increase in congestion and the decreased number of acceptable gaps presented to drivers at these locations. The Durham Road

intersection experienced the largest increase in crashes at 278 percent. Seventy-two percent of the crashes at this intersection in the after period are crossing pattern crashes. Crashes at the signalized intersections seemed to remain fairly stable.

Begin MP	End Mp	Feature	Comments	Before Period Crashes	After Period Crashes	Percent Change
3.28	3.45	Strip (Includes NC 42 / Lombard Partial Interchange)		14	25	79%
3.46	3.51	Smith Intersection	Full Movement / No Signal	16	41	156%
3.52	3.60	Strip (Includes O'Hara and Compton Intersections - No Median Breaks)		3	16	433%
3.61	3.67	John Intersection	Full Movement / No Signal	16	33	106%
3.68	3.76	Strip		2	5	150%
3.77	3.83	Durham Intersection	Full Movement / No Signal	27	102	278%
3.84	3.92	Strip		10	12	20%
3.93	4.00	Main Intersection	Full Movement / Signalized	64	65	2%
4.01	4.05	Strip		0	1	N/A
4.06	4.09	SR 1563 / Boling	Full Movement / Signalized	81	81	0%
Total Strip Crashes -->				29 (12%)	59 (15%)	
Total Intersection Crashes -->				204 (88%)	322 (85%)	
Total Crashes -->				233	381	

It should be noted that the naïve before and after methodologies do not take into account the significant change in volume that occurred at this location. The 36 percent increase in traffic is even more significant considering the heavy volumes that were present in the before period. This analysis also does not control for any other improvements that were made to this corridor during the analysis periods. There was no documentation regarding changes that were made, but it is likely that signal timings and phasing have been adjusted since the analysis period spans 16 years.

As the Safety Evaluation Group completes additional reviews for this type of countermeasure, we will be able to provide more objective and definite information regarding actual crash reduction factors.

Treatment Site Photos (Taken on November 17, 2005)



Driving East on US 70 at NC 42 (Lombard) Overpass



Looking East on US 70 at Durham Intersection

Treatment Site Photos (Taken on November 17, 2005)



Driving East on US 70 Towards Main Intersection



Looking East on US 70 Towards SR 1563 (Boling) Intersection

Treatment Site Photos (Taken on November 17, 2005)



Driving West on US 70 Towards SR 1563 (Boling) Intersection



Driving West on US 70 Towards Main Intersection