

Spot Safety Project Evaluation

Order # 41000010262

Spot Safety Project # 05-05-008

**Spot Safety Project Evaluation of the Signal Phasing Upgrade
At the Intersection of SR 1728 (Wade Avenue) and Faircloth Street / Ridgewood PVA
In Raleigh, Wake 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

12-21-2010

Date

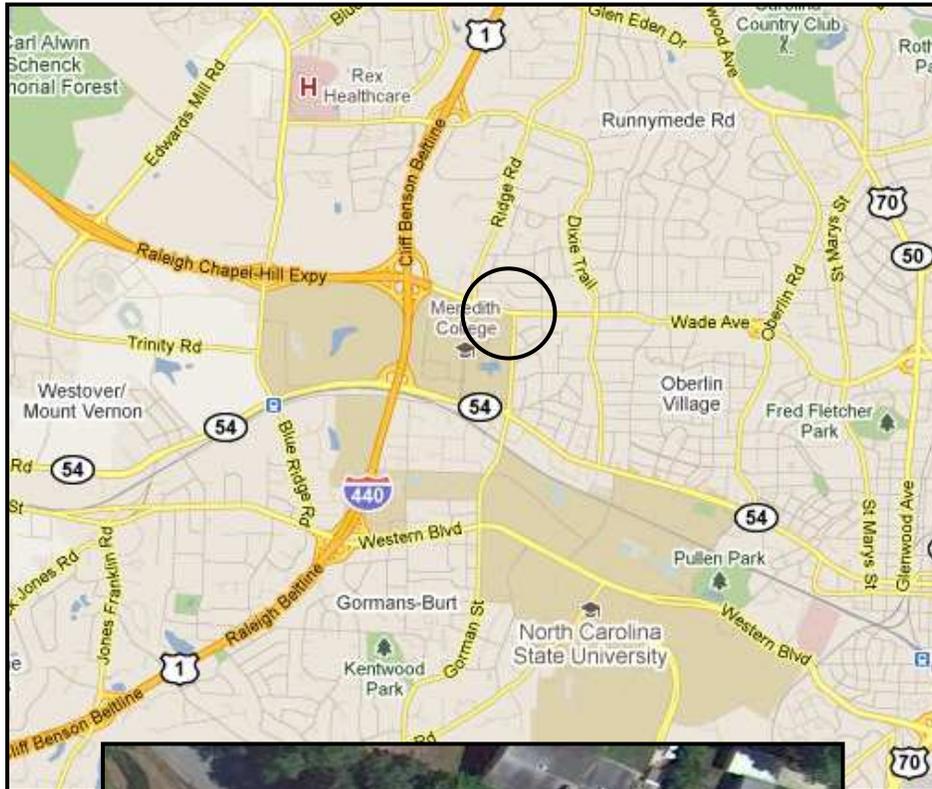
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 05-05-008 located at the intersection of SR 1728 (Wade Avenue) and Faircloth Street / Ridgewood PVA in Raleigh, Wake County.

The signal ID for the existing signal is 05-0387.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the signal phasing revision to include a northbound protected-permitted left turn phase. Also, during the phasing upgrade project, the signal cabinet was upgraded to bring the signal up to design standards. SR 1728 (Wade Avenue) is a four-lane facility at the subject intersection with speed limit of 45 mph for eastbound approach and 35 mph for the westbound approach. Faircloth Street is a two-lane facility with a speed limit of 35 mph for the northbound approach. Ridgewood PVA is a shopping center access with a posted speed limit of 25 mph. The subject location is a signalized four-leg intersection.

The original statement of problem was insufficient gaps in traffic for the northbound left-turning vehicles to safely maneuver through the intersection.

The initial crash analysis was completed from December 13, 1999 to December 12, 2004 with twelve (12) reported left turn – same roadway crashes. The final completion date for the improvement at the subject intersection was on July 7, 2005 with a total cost of \$23,000.00.

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 June 2006 through August 2006. The before period consisted of reported crashes from April 1, 2002 through May 31, 2006 (4 years and 2 months); and the after period consisted of reported crashes from September 1, 2006 through October 31, 2010 (4 years and 2 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 northbound left turn, same roadway crashes were the target crashes for the applied countermeasure.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	52	43	- 17.31 %
Total Crash Severity Index	3.56	3.07	- 13.76 %
Target Crashes	10	2	- 80.00 %
Target Crash Severity Index	3.96	1.00	- 74.75 %
Volume (2004, 2008)	33,500	34,000	1.49 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	0	N/A
Class B injury Crashes	7	3	- 57.14 %
Class C Injury Crashes	11	9	- 18.18 %
Total Injury Crashes	18	12	- 33.33 %

The naive before and after analysis at the treatment location resulted in a seventeen (17) percent decrease in Total Crashes, eighty (80) percent decrease of Target Crashes, and a thirteen (13) 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 ten (10) target crashes. The target crashes for this project included only the northbound left-turn, same roadway crashes where the northbound vehicle was at fault. After the signal phasing upgrade, there were two (2) target crashes.

The calculated benefit to cost ratio for this project is **8.91 considering total crashes**. The benefit to cost ratio **considering only target crashes is 6.52**. 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 three approaches of this intersection. The Ridgewood PVA approach was unavailable. 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



Looking North on Faircloth Street



Looking West on SR 1728 (Wade Avenue)



Looking East on SR 1728 (Wade Avenue)

N/A

Looking South on Ridgewood PVA

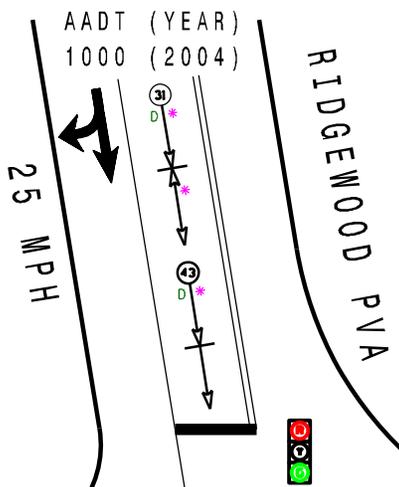
BENEFIT-COST ANALYSIS WORKSHEET - TOTAL

LOCATION: SR 1728 (Wade Ave) at Faircloth St / Ridgewood PVA		BY: C Neilson							
COUNTY: Wake		DATE: 12/16/2010							
FILE NO.: SS 05-05-008									
DETAILED COST:	TYPE IMPROVEMENT - Upgrade Signal Phasing								
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
	Construction	\$23,000	10	0.149	\$3,428				
		\$0	0	0.000	\$0				
	Right-of-Way	\$0	0	0.000	\$0				
	TOTALS	\$23,000	10	0.149	\$3,428				
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$0				
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$150				
	TOTAL ANNUAL COST=				\$3,578				
	TOTAL COST OF PROJECT=				\$23,000				
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	4.17	0	0.00	18	4.32	34	8.15	\$121,391	
AFTER	4.17	0	0.00	12	2.88	31	7.43	\$89,520	
							Annual Benefits from Crash Cost Savings	\$31,871	
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$28,293			
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	8.91			
TOTAL COST OF PROJECT		-	\$23,000	COMPREHENSIVE B/C RATIO		-	8.91		

BENEFIT-COST ANALYSIS WORKSHEET - TARGET

LOCATION: SR 1728 (Wade Ave) at Faircloth St / Ridgewood PVA		BY: C Neilson							
COUNTY: Wake		DATE: 12/16/2010							
FILE NO.: SS 05-05-008									
DETAILED COST:	TYPE IMPROVEMENT - Upgrade Signal Phasing								
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
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		\$0	0	0.000	\$0				
	Right-of-Way	\$0	0	0.000	\$0				
	TOTALS	\$23,000	10	0.149	\$3,428				
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$0				
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$150				
	TOTAL ANNUAL COST=				\$3,578				
	TOTAL COST OF PROJECT=				\$23,000				
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	4.17	0	0.00	4	0.96	6	1.44	\$25,372	
AFTER	4.17	0	0.00	0	0.00	2	0.48	\$2,062	
							Annual Benefits from Crash Cost Savings	\$23,309	
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$19,732			
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	6.52			
TOTAL COST OF PROJECT		-	\$23,000	COMPREHENSIVE B/C RATIO		-	6.52		

SS# 05-05-008
 Order# 41000010262
 Wake County
 BEFORE Period
 4/1/02 - 5/31/06



LEGEND

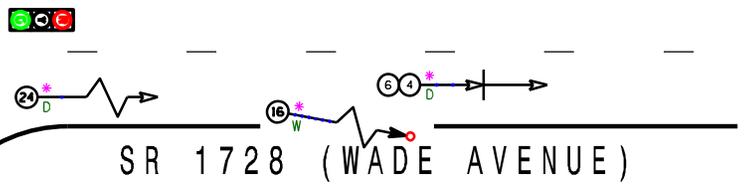
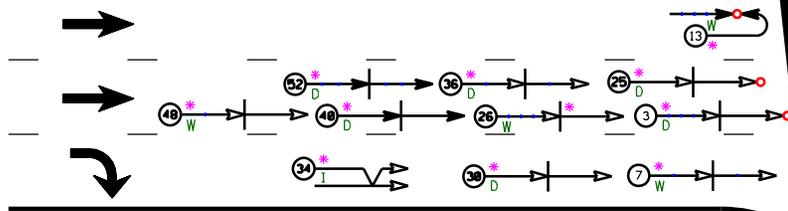
	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PARKED VEHICLE		BACKING		20 MPH TO 29		* DRIVER AT FAULT
	PARKED VEHICLE		SIDESWIPE		30 MPH TO 39		D DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		W WET
	HEAD ON		INJURY		50 MPH TO 59		I ICY OR SNOWY
	REAR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

SR 1728 (WADE AVENUE)

35 MPH

AADT (YEAR)
29100 (2004)

AADT (YEAR)
27000 (2004)



45 MPH

SR 1728 (WADE AVENUE)



SIGNAL ID : 05-0387

35 MPH

FAIRCLOTH STREET

AADT (YEAR)
9700 (2004)

NOTE # 24 - CRASHED INTO OVERHEAD WIRE

Frontal Impact Target Crashes

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

TRAFFIC SAFETY UNIT

Date: 12-15-2010 Prepared By: C Neilson

SS# 05-05-008
 Order# 41000010262
 Wake County
 AFTER Period
 9/1/06 - 10/31/10

AAADT (YEAR)
 1000 (2008)
 RIDGEMOOD PVA
 25 MPH

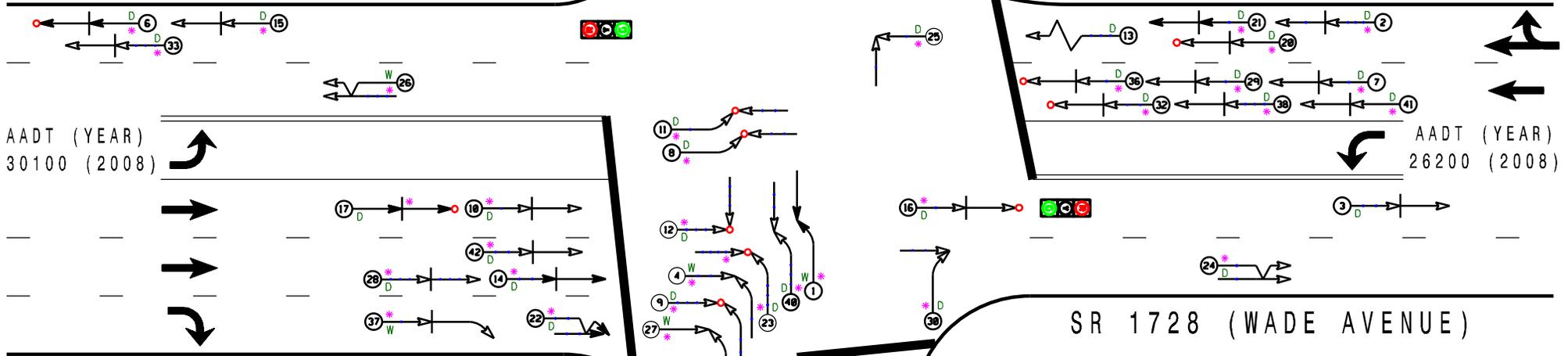
LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
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	FIXED OBJECT		SIDESWIPE		30 MPH TO 39		DRY
	HEAD ON		OUT OF CONTROL		40 MPH TO 49		WET
	REAR END		INJURY		50 MPH TO 59		ICY OR SNOWY
	RAN OFF ROAD		FATALITY		60 MPH TO 69		SPEED UNKNOWN
					TO AND LIP		ONLY

NOTE # 13 - CRASHED INTO OVERHEAD WIRE

SR 1728 (WADE AVENUE)

35 MPH



AAADT (YEAR)
 30100 (2008)

AAADT (YEAR)
 26200 (2008)

45 MPH

SR 1728 (WADE AVENUE)

35 MPH

FAIRCLOTH STREET

AAADT (YEAR)
 10700 (2008)



SIGNAL ID : 05-0387



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

TRAFFIC SAFETY UNIT

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