

# Spot Safety Project Evaluation

Order # 41000014543

Spot Safety Project # 03-05-208

**Spot Safety Project Evaluation of the Traffic Signal Installation  
SR 2048 (Gordon Road) at SR 1328 (White Road)  
New Hanover County**

Documents Prepared By:

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

**Principal Investigator**



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Jason B. Schronce

10-5-2011

Date

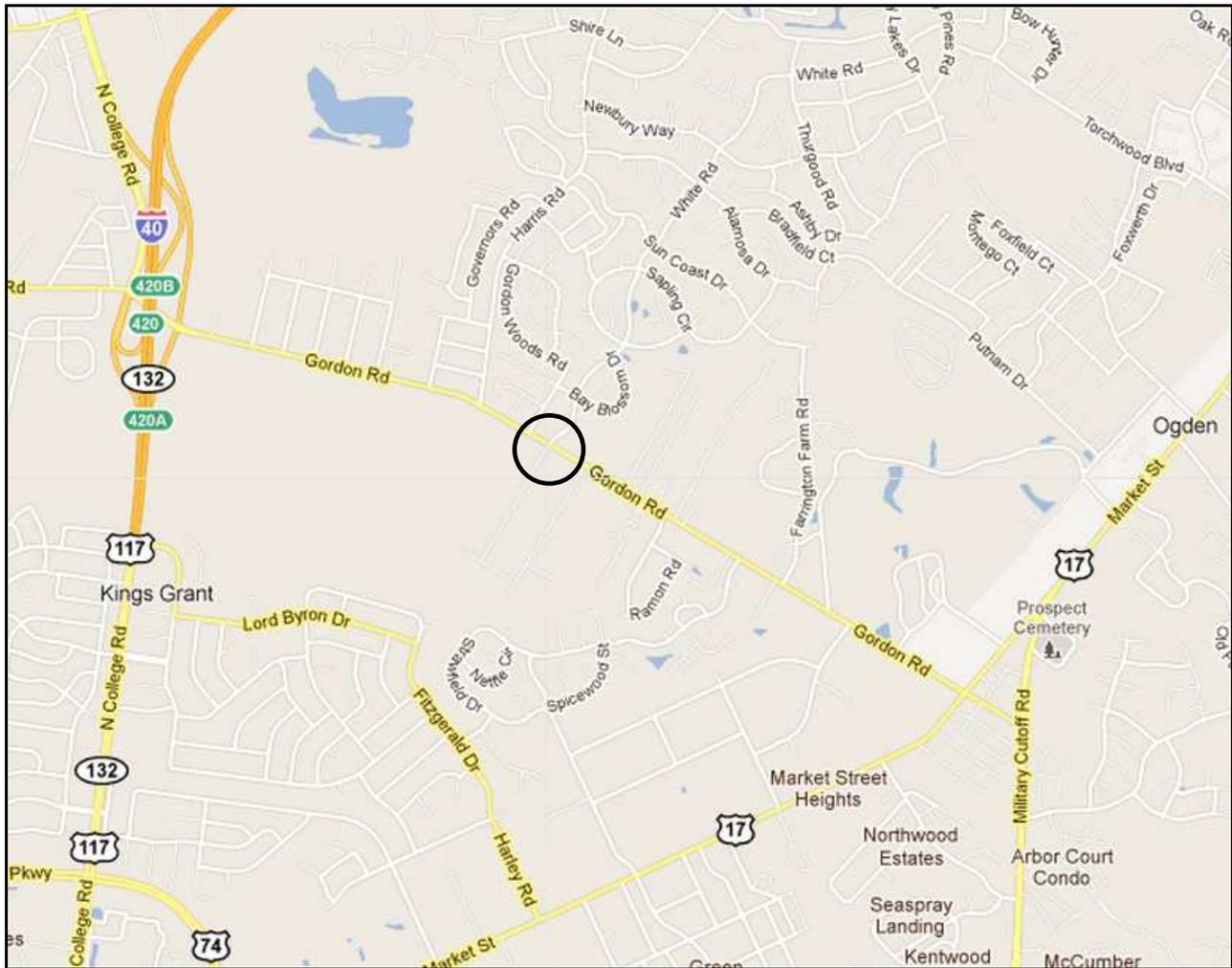
Traffic Safety Project Engineer

# Spot Safety Project Evaluation Documentation

## Subject Location

Evaluation of Spot Safety Project Number 03-05-208 located at the Intersection of SR 2048 (Gordon Road) and SR 1328 (White Road) in New Hanover County, north of the City of Wilmington.

The Sig ID is 03-0893 for this newly installed Traffic Signal.





Aerial Provided from BING 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 an intersection traffic signal. SR 2048 (Gordon Road) is a two-lane roadway with auxiliary left and right turn lanes westbound, a dedicated left turn lane in the eastbound direction, and a speed limit of 45-mph. SR 1328 (White Road) is residential connector street with a left turn lane at the intersection and a speed limit of 35-mph. The south leg (White Road) of the intersection is a two-lane dead-end street. The subject location is a four-leg intersection, which was previously controlled by a stop condition on the White Road approaches.

The original statement of problem was a severe number of left turn different roadway crashes involving vehicles leaving the Meadow Brook Subdivision (SR 1328) turning left onto Gordon Road. This location was listed in the 2003 Highway Improvement Safety Project as HSIP Project # 64I00296. The intersection met signal warrants 1, 2, and 3A.

The initial crash analysis was completed from March 1, 2000 to March 1, 2005 with thirty-seven (37) reported crashes, thirty (30) of which were left turn different roadway collisions. The final completion date for the improvement as seen by the police crash reports was during the last quarter of 2006 with a total cost of \$56,000.

## 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 September through December 2006. The before period consisted of reported crashes from March 1, 2002 through August 31, 2006 (4 years and 6 months); and the after period consisted of reported crashes from January 1, 2007 through June 30, 2011 (4 years and 6 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 Frontal Impact Crashes were the target crashes for the applied countermeasure. The Frontal Impact 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.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	42	21	- 50.0 %
Total Severity Index	8.13	3.82	- 53.0 %
Target Crashes	34	4	- 88.2 %
Target Crash Severity Index	7.36	2.85	- 61.3 %
Volume (2004, 2009)	26,700	26,000	- 2.6 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	2	0	- 100.0 %
Class B injury Crashes	2	0	- 100.0 %
Class C Injury Crashes	18	8	- 55.6 %
Total Injury Crashes	22	8	- 63.6 %

The naive before and after analysis at the treatment location resulted in a 50 percent decrease in Total Crashes, an 88 percent decrease in Target Crashes, and a 53 percent decrease in the Total Severity Index. The before period ADT year was 2004 and the after period ADT year was 2009.

## Results and Discussion

Referencing the *Collision Diagrams*, the before period presented a significant pattern of thirty (30) left turn crashes from SR 1328 (White Road) where the vehicle was struck by a westbound SR 2048 (Gordon Road) motorist. After the signal installation, this pattern was reduced to just one (1)

collision when a westbound vehicle ran the red light. However, with the signal installation, rear-end crashes have increased from one (1) to five (5) on the westbound Gordon Road approach and zero (0) to three (3) on the southbound White Road approach.

The calculated benefit to cost ratio for this project is **30.24 considering total crashes**. The benefit to cost ratio **considering only target crashes is 20.50**. 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*. Photos are provided from our field visit on September 29<sup>th</sup>, 2011 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



**Travelling South on SR 1328 (White Road) approaching intersection**



**Travelling East on SR 2048 (Gordon Road)**



**Travelling West on SR 2048 (Gordon Road)**



**Travelling North on White Road – Dead End Approach**

**BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes**

LOCATION: <b>Gordon at White</b>		BY: <b>JBS</b>						
COUNTY: <b>New Hanover</b>		DATE: <b>10/3/2011</b>						
FILE NO.: <b>SS 03-05-208</b>								
DETAILED COST:	TYPE IMPROVEMENT -	<b>New Traffic Signal</b>						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	<b>Construction</b>	<b>\$56,000</b>	<b>10</b>	<b>0.149</b>	<b>\$8,346</b>			
		<b>\$0</b>	<b>0</b>	<b>0.000</b>	<b>\$0</b>			
	<b>Right-of-Way</b>	<b>\$0</b>	<b>0</b>	<b>0.000</b>	<b>\$0</b>			
	TOTALS	<b>\$56,000</b>	<b>10</b>	<b>0.149</b>	<b>\$8,346</b>			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				<b>\$2,000</b>			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				<b>\$900</b>			
	TOTAL ANNUAL COST=				<b>\$11,246</b>			
	TOTAL COST OF PROJECT=				<b>\$56,000</b>			
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
<b>BEFORE</b>	<b>4.50</b>	<b>2</b>	<b>0.44</b>	<b>20</b>	<b>4.44</b>	<b>20</b>	<b>4.44</b>	<b>\$388,000</b>
<b>AFTER</b>	<b>4.50</b>	<b>0</b>	<b>0.00</b>	<b>8</b>	<b>1.78</b>	<b>13</b>	<b>2.89</b>	<b>\$47,978</b>
							<b>Annual Benefits from Crash Cost Savings</b>	<b>\$340,022</b>
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST				=	<b>\$328,777</b>		
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST				=	<b>30.24</b>		
	TOTAL COST OF PROJECT	-	<b>\$56,000</b>		COMPREHENSIVE B/C RATIO	-		<b>30.24</b>

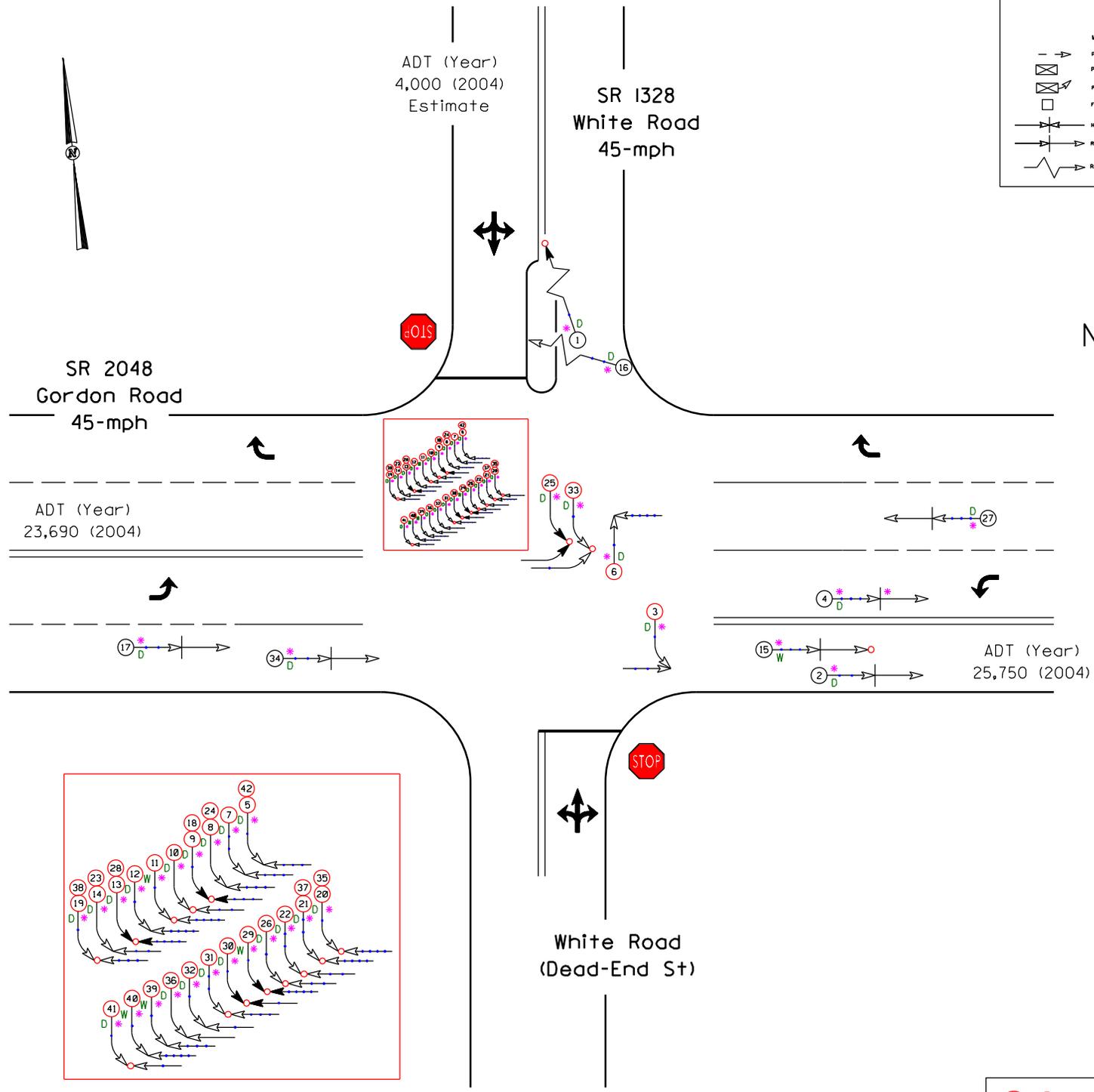
**BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes**

LOCATION: <b>Gordon at White</b>		BY: <b>JBS</b>						
COUNTY: <b>New Hanover</b>		DATE: <b>10/3/2011</b>						
FILE NO.: <b>SS 03-05-208</b>		Frontal Impact Target Crashes						
DETAILED COST:	TYPE IMPROVEMENT -	<b>New Traffic Signal</b>						
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	<b>Construction</b>	<b>\$56,000</b>	<b>10</b>	<b>0.149</b>	<b>\$8,346</b>			
		<b>\$0</b>	<b>0</b>	<b>0.000</b>	<b>\$0</b>			
	<b>Right-of-Way</b>	<b>\$0</b>	<b>0</b>	<b>0.000</b>	<b>\$0</b>			
	TOTALS	<b>\$56,000</b>	<b>10</b>	<b>0.149</b>	<b>\$8,346</b>			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				<b>\$2,000</b>			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				<b>\$900</b>			
	TOTAL ANNUAL COST=				<b>\$11,246</b>			
	TOTAL COST OF PROJECT=				<b>\$56,000</b>			
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
<b>BEFORE</b>	<b>4.50</b>	<b>1</b>	<b>0.22</b>	<b>19</b>	<b>4.22</b>	<b>14</b>	<b>3.11</b>	<b>\$237,822</b>
<b>AFTER</b>	<b>4.50</b>	<b>0</b>	<b>0.00</b>	<b>1</b>	<b>0.22</b>	<b>3</b>	<b>0.67</b>	<b>\$7,311</b>
							<b>Annual Benefits from Crash Cost Savings</b>	<b>\$230,511</b>
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST				=	<b>\$219,265</b>		
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST				=	<b>20.50</b>		
	TOTAL COST OF PROJECT	-	<b>\$56,000</b>		COMPREHENSIVE B/C RATIO	-		<b>20.50</b>

**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
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		INJURY		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		ICY OR SNOWY
	RAN OFF ROAD		SPEED UNKNOWN		70 AND UP		ONLY

SS# 03-05-208  
 Order# 41000014543  
 New Hanoer County  
 BEFORE Period  
 3/1/02 - 8/31/06



Frontal Impact  
Target Crashes

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

**TRAFFIC SAFETY UNIT**

Date: 9-30-2011

Prepared By: J. Schronce

**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
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		INJURY		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		L AND UP
	RAN OFF ROAD		SPEED UNKNOWN		70 AND UP		ONLY

SS# 03-05-208  
 Order# 41000014543  
 New Hanoer County  
 AFTER Period  
 1/1/07 - 6/30/11

New  
 Traffic Signal  
 Sig ID 03-0893

Frontal Impact  
 Target Crashes

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

**TRAFFIC SAFETY UNIT**

Date: 9-30-2011 Prepared By: J. Schronce

