

Project Evaluation

Project Log # 200507192

**Project Evaluation, of the Four-Way Stop Sign Installation,
At the Intersection of SR 1924-Bud Smith Road and SR 1909-Purnell Road
Near Wake Forest, Wake County**

Documents Prepared By:

Safety Evaluation Group
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Principal Investigator

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08/04/2005
Date

Traffic Safety Project Engineer

Project Evaluation Documentation

Subject Location

The Intersection of SR 1924-Bud Smith Road at SR 1909-Purnell Road, near Wake Forest, Wake 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 and an Odds Ratio comparison analysis has been completed to measure the effectiveness of the improvement. 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

The project improvement countermeasure chosen for the subject location was the installation of a 4-way stop. The 4-way stop was installed and operational on August 7, 2002. Prior to the project improvement, the location was controlled by stop signs located on SR 1924-Bud Smith Road. Both SR 1924-Bud Smith Road and SR 1909-Purnell Road are two-lane facilities at the treatment intersection with a speed limit of 45 mph. The initial crash analysis for this location was completed from December 1, 1998 through November 30, 2001 with a total of fourteen correctable crashes. In addition, a fatal crash occurred on January 19, 2002.

Comparison Analysis

After reviewing all of the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from June 1, 2002 through September 30, 2002. The before period consisted of reported crashes from February 1, 2000 through May 31, 2002 (2 Years, 4 Months) and the after period consisted of reported crashes from October 1, 2002 through January 31, 2005 (2 Years, 4 Months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The analysis also consisted of two different sets of data, the treatment and the comparison data. The treatment data consisted of all crashes within 150 feet of the subject intersection. The comparison data consisted of all crashes within a 150 feet Y-line of SR 1909-Purnell Road, from MP 2.0 to MP 4.0. Please see attached *Location Map* for further detail. The following data table depicts the Naive Before and After Analysis for the treatment and comparison intersections. 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.

Treatment Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	12	5	- 58.3
Total Severity Index	11.02	5.44	- 50.6
Frontal Impact Crashes	12	4	- 66.7
Frontal Severity Index	11.02	4.70	- 57.4
Volume	6400	6200	- 3.1

Comparison Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	20	15	- 25.0
Total Severity Index	7.01	2.48	- 64.6
Frontal Impact Crashes	6	3	- 50.0
Volume	3700	3400	- 8.1

Odds Ratio: Treatment versus Comparison

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Treatment Total Crashes	12	5	---
Comparison Total Crashes	20	15	- 44.4 %

The naive before and after analysis at the treatment location resulted in a 58.3 percent decrease in Total Crashes and a 50.6 percent decrease in the Total Severity Index. The comparison locations experienced a 25.0 percent decrease in Total Crashes and a 64.6 percent decrease in the Total Severity Index. The before period ADT year was 2001 and the after period ADT year was 2003.

The Odds Ratio is used as another means of calculating the treatment effect. The total crashes in the before and after period from the Comparison Strip are used to calculate the percent reduction in total crashes for the Treatment Intersection. As shown in the previous table, using the Odds Ratio calculation, there is a 44.4 percent decrease in Treatment Intersection crashes.

The following Table depicts the Naive Before and After Analysis for the treatment information. The data consists of a crash type summary and an injury summary for the treatment intersection. Before period crash data, after period crash data, and the percent change in crashes from the before to the after period are included. As shown below, the number of Angle Crashes decreased by 72.7 percent from the before to the after period. In addition, the number of Total Injuries decreased by 70.0 percent.

Accident Type Summary	Before Period	After Period	Percent Change
Angle	11	3	-72.7
Backing Up	0	1	n/a
Left Turn, Different Roadways	1	1	0.0

Injury Summary	Before Period	After Period	Percent Change
Fatal Injuries	1	0	-100.0
Class A Injuries	0	0	n/a
Class B Injuries	2	0	-100.0
Class C Injuries	7	3	-57.1
Total Non-Fatal Injuries	9	3	-66.7
Total Injuries	10	3	-70.0

Results and Discussion

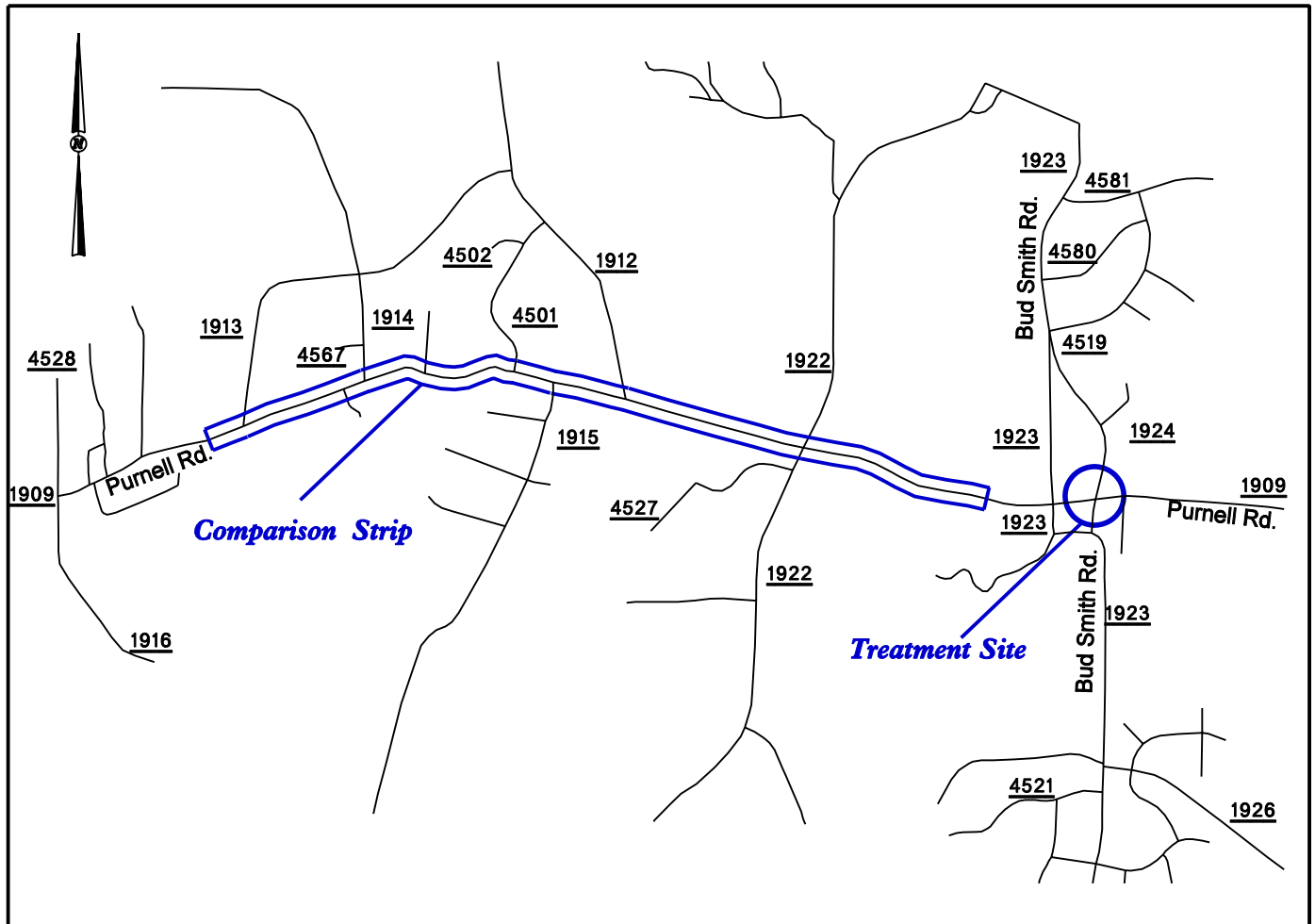
The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 58.3 percent decrease in Total Crashes and a 66.7 percent decrease in Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 44.4 percent decrease in Total Crashes at the Treatment Intersection. The summary results above demonstrate that the treatment location appears to have had a decrease in the number of crashes from the before to the after period when using both analysis methods.

The treatment location also experienced a substantial decrease in crash severity. The Severity Index for Total Crashes and Frontal Impact Crashes at the treatment intersection decreased by 50.6 percent and 57.4 percent, respectively. In the before period, crashes resulted in one Fatal Injury and nine Non-Fatal Injuries. In the after period, crashes accounted for only three Class C Injuries. Total Injuries decreased by 70.0 percent from the before to the after period.

Analysis of the crash data in the after period reveals that four out of the five crashes at the treatment intersection were caused by an eastbound travelling vehicle failing to yield the right of way to a vehicle travelling on SR 1924-Bud Smith Road. In addition, three of these crashes involved the eastbound vehicle running through the stop sign located on SR 1909-Purnell Road. Motorists travelling eastbound on SR 1909-Purnell Road may require additional help to better identify the existing traffic control.

The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of a 44.4 percent decrease to a 58.3 percent decrease in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection is a 66.7 percent decrease in crashes. As the Safety Evaluation Group completes additional reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors.

Location Map
Four-Way Stop Treatment
Near Wake Forest, Wake County



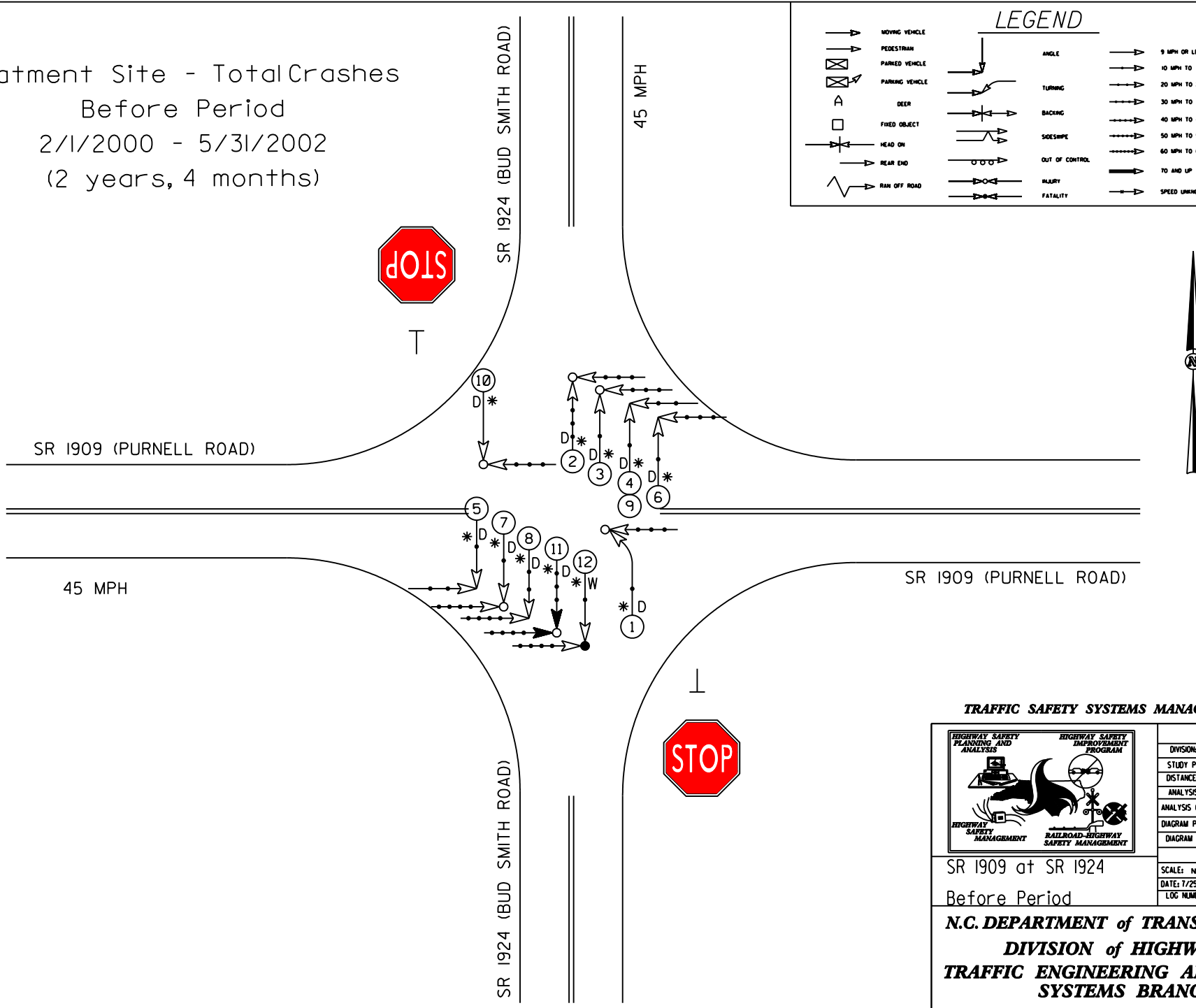
***Treatment Site: SR 1924–Bud Smith Road at
SR 1909–Purnell Road***

***Comparison Strip: On SR 1909–Purnell Road,
From MP 2.0 to MP 4.0***

Treatment Site - TotalCrashes
 Before Period
 2/1/2000 - 5/31/2002
 (2 years, 4 months)

LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PAKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PAKED VEHICLE		SLOESHPE		30 MPH TO 39		DRY
	DEER		OUT OF CONTROL		40 MPH TO 49		WET
	FIXED OBJECT		INJURY		50 MPH TO 59		ICE OR SNOW
	HEAD ON		FATALITY		60 MPH TO 69		TO AND UP
	REAR END		SPEED UNKNOWN		TO AND UP		ONLY
	RAN OFF ROAD						



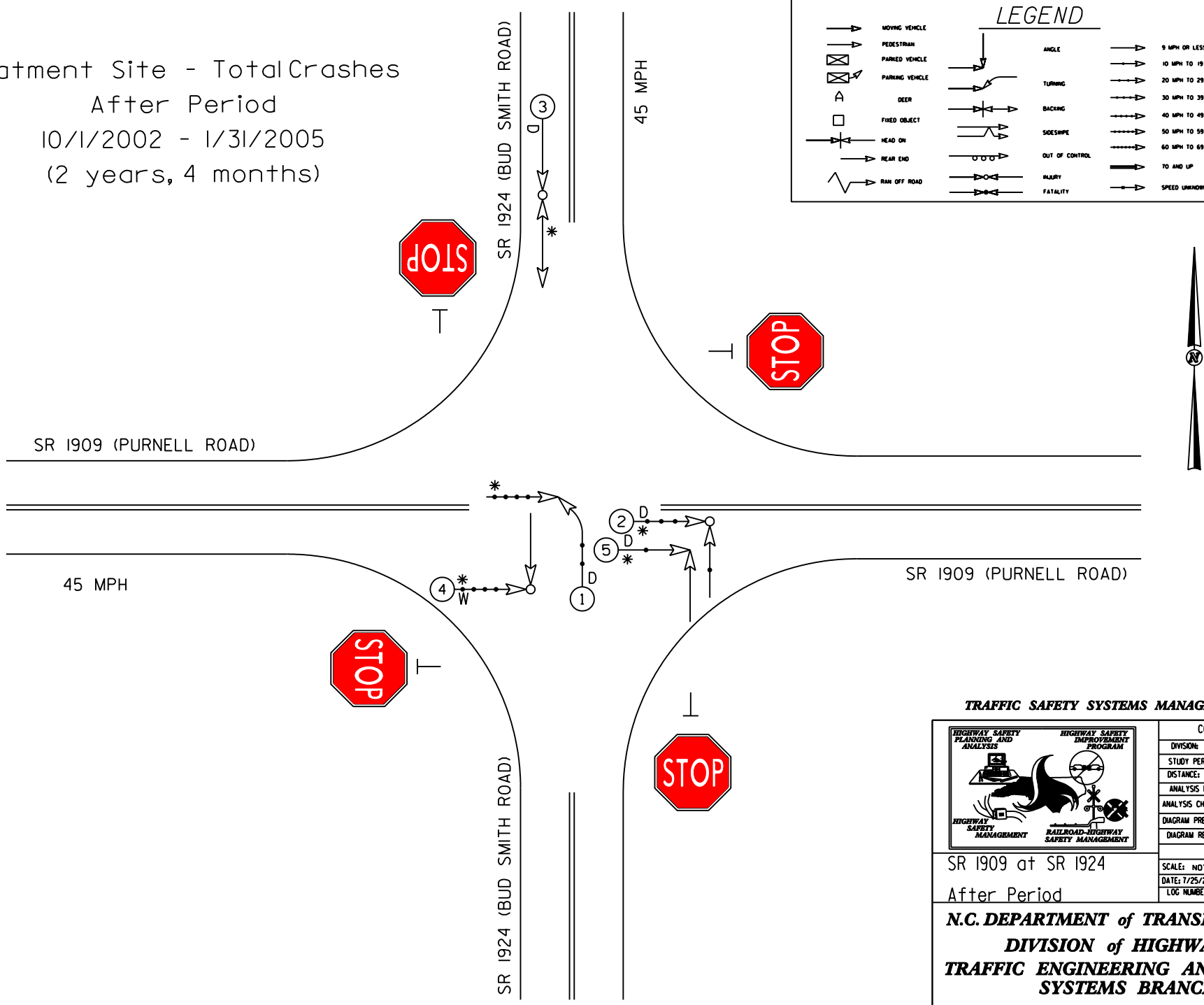
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION:	AREA:
	STUDY PERIOD: 02/01/00 - 05/31/02	
	DISTANCE: Y-LINE = 150 ft	
	ANALYSIS PREPARED BY: CLG	
ANALYSIS CHECKED BY:		
DIAGRAM PREPARED BY: CLG		
DIAGRAM REVIEWED BY:		
SR 1909 at SR 1924		
Before Period		
SCALE: NOT TO SCALE		
DATE: 7/25/2005		
LOG NUMBER: 20050792		
N.C. DEPARTMENT of TRANSPORTATION DIVISION of HIGHWAYS TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH		

Treatment Site - TotalCrashes
 After Period
 10/1/2002 - 1/31/2005
 (2 years, 4 months)

LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PAKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
	DEER		OUT OF CONTROL		40 MPH TO 49		WET
	FIXED OBJECT		INJURY		50 MPH TO 59		ICY OR SNOWY
	HEAD ON		FATALITY		60 MPH TO 69		TO AND LP
	REAR END		SPEED UNKNOWN		TO AND LP		ONLY
	RAN OFF ROAD						



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION:	AREA:
	STUDY PERIOD: 10/01/02 - 01/31/05	
	DISTANCE: Y-LINE = 150 ft	
	ANALYSIS PREPARED BY: CLG	
	ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: CLG		
DIAGRAM REVIEWED BY:		
SR 1909 at SR 1924		
After Period		
N.C. DEPARTMENT of TRANSPORTATION DIVISION of HIGHWAYS TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH		

SCALE: NOT TO SCALE
 DATE: 7/25/2005
 LOG NUMBER: 20050792