Spot Safety Project Evaluation

Project Log # 200505125

Spot Safety Project # 06-98-205

**Spot Safety Project Evaluation of the Guardrail Installation,
On SR 1527-Pine Log Road at the Raft Swamp Bridges
Near Lumberton, Robeson County**

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

_____ 09/14/2005
Carrie L. Simpson Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 06-98-205 –
On SR 1572-Pine Log Road at the Raft Swamp Bridges, near 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 guardrail at and between the three bridges over Raft Swamp. Dale W. Privett P.E., Area Traffic Engineer, originally requested improvements after a fatal accident investigation at the location. SR 1572-Pine Log Road is a heavily travelled rural two-lane facility with a speed limit of 55 mph. This road provides a "cut through" between NC 211 and NC 72.

The initial crash analysis for this location was completed from January 1, 1989 through January 31, 1998 with a total of sixty-four (64) reported crashes. According to the initial analysis, there were forty-six (46) Ran Off Road crashes, five (5) Rear End crashes, three (3) Sideswipe crashes, three (3) Angle crashes, two (2) Left Turn Same Roadway crashes, and five (5) "Random in Nature" crashes. These crashes resulted in two (2) fatalities, four (4) class A injuries, twenty-six (26) class B injuries, and forty (40) class C injuries. It was felt that the severe crashes were attributed to the roadway alignment and unprotected bridge railing. The countermeasure was installed to reduce the severity of the Ran Off Road crashes. The final completion date for the improvement at the subject intersection was on April 1, 2000.

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 February 1, 2000 through May 31, 2000. The before period consisted of reported crashes from July 1, 1995 through January 31, 2000 (4 Years, 7 Months) and the after period consisted of reported crashes from June 1, 2000 through December 31, 2004 (4 Years, 7 Months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The treatment data consisted of all crashes on the 0.95 mile strip of SR 1527-Pine Log Road from 0.1 miles northeast of Bridge #211(MP 1.8) to 0.1 miles southwest of Bridge #207 (MP 2.75). This strip also includes Bridge #210. A 0 feet Y-line was used in the analysis. Please see attached *Location Map* for further detail.

The following data Table 1 depicts the Naive Before and After Analysis for the Total Crashes and Target Crashes at the treatment location. Table 2 provides an in depth examination of the Naïve Before and After Analysis for the Target Crashes. Please note that Target Crashes include the following crash types: Ran Off Road - Right, Ran Off Road - Left, Ran Off Road - Straight, Overturn/Rollover, Fixed Object, Head On, Sideswipe - Same Direction, and Sideswipe - Opposite Direction. Target Crashes are all potential Run-Off Road crashes and include those crash types where at least one vehicle was involved in a lane departure.

Table 1. Treatment Information	Before Period	After Period	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	21	29	38.1
Total Severity Index	11.74	11.90	1.4
Total Target Crashes	18	20	11.1
Target Severity Index	13.12	14.59	11.2
Volume	7700	8200	6.5

Table 2. Target Crash Information	Before Period	After Period	Percent Reduction (-)/ Percent Increase (+)
Target Crashes			
Fatal Injuries	1	3	200.0
Non-Fatal Injuries	11	18	63.6
Total Injuries	12	21	75.0
Target Crashes			
Night Crashes	9	8	-11.1
Wet Crashes	4	9	125.0
Alcohol/ Drug Crashes	3	2	-33.3
Guardrail/ Bridge Rail Struck	5	9	80.0

The naive before and after analysis at the treatment location resulted in a 38.1 percent increase in Total Crashes, a 1.4 percent increase in the Total Severity Index, and a 6.5 percent increase in Average Daily Traffic (ADT). There was also an 11.1 percent increase in Target Crashes and an 11.2 percent increase in the Severity Index for Target Crashes. The before period ADT year was 1997 and the after period ADT year was 2002.

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 38.1 percent increase in Total Crashes and an 11.1 percent increase in Target Crashes. The summary results above demonstrate that the treatment location appears to have had an increase in both Total and Target Crashes from the before to the after period.

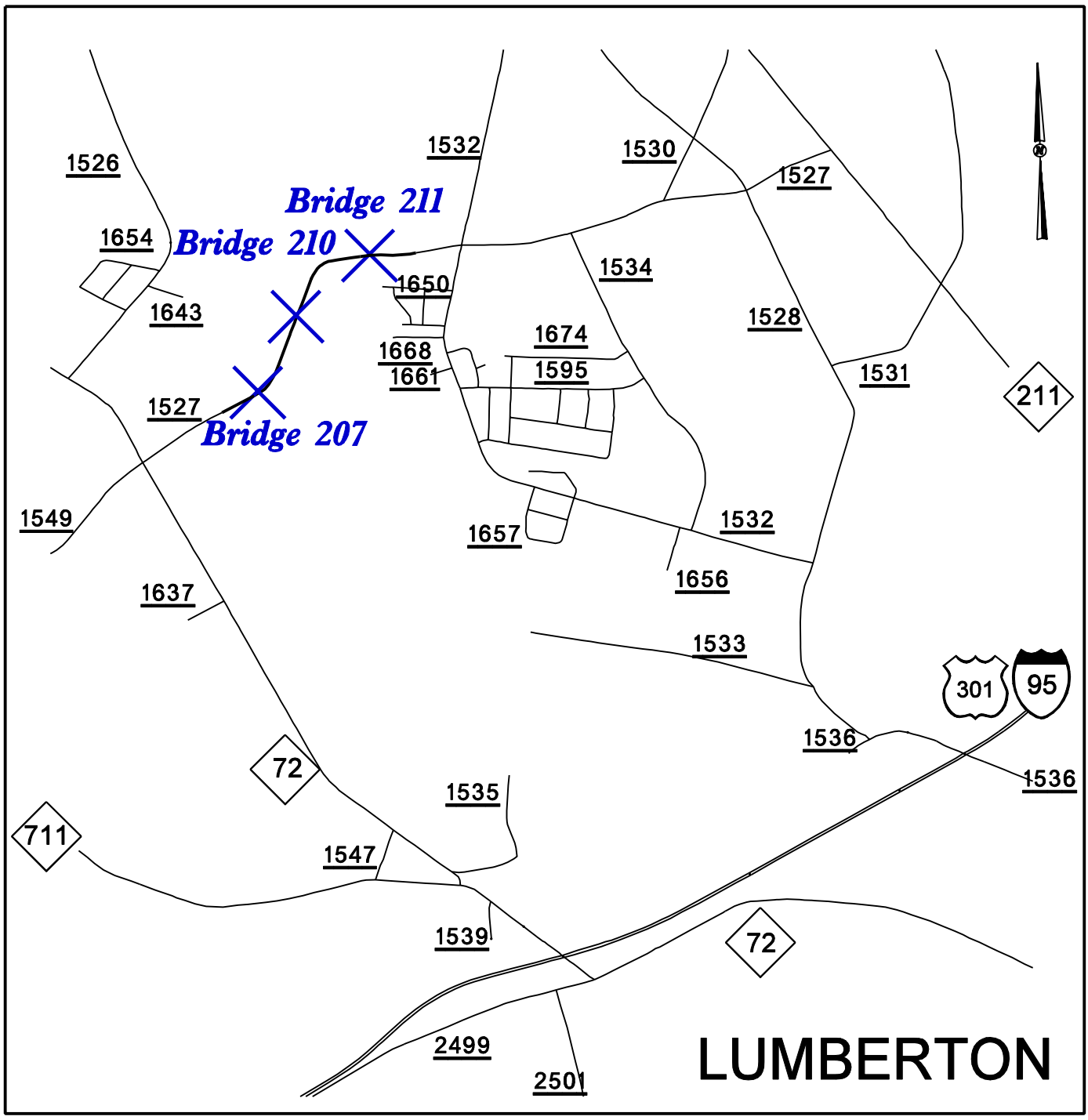
As previously stated, the guardrail was installed to reduce the severity of the Ran Off Road crashes and to prevent motorists from entering the swamp. One fatal injury crash and one class C injury crash occurred in the before period as a result of the motorist running off the road and entering the water. In the after period, the guardrail prevented any vehicles from entering the water and was effective in protecting motorists from the concrete bridge railing. In the before period, the bridge rail was struck in five crashes. In the after period, either the guardrail or the bridge rail was struck in nine crashes. Therefore, there was an 80.0 percent increase in the number of guardrail/ bridge rail hits in this section.

Although the project did prevent motorists from entering the swamp, it did not prevent them from leaving the roadway. It did not correct the predominant crash problem, Run Off Road Crashes. In the before period, there were sixteen (16) Ran Off Road Crashes. In the after period, there were nineteen (19) Ran Off Road Crashes. The same crash pattern persists because no improvements were made to the roadway from the before to the after period.

The severity of crashes was not reduced from the before to the after period. In fact, the Severity Index for Target Crashes increased by 11.2 percent at the treatment location. The number of Target Crash injuries increased (by 75.0 percent) from twelve (12) injuries in before period to twenty-one (21) injuries in the after period. In the after period, there were two fatal injury crashes occurring when the vehicles ran off the road in a curved portion of the roadway without guardrail.

In order to mitigate the problem at the treatment site, countermeasures should be taken to prevent motorists from leaving the roadway. Possible countermeasures include installing centerline and shoulder rumble strips and improving delineation through the use of Chevrons in the curves. Better delineation will help to position vehicles correctly through the curves and provide more information in poor visibility conditions. In the after period, 40.0 percent of Target Crashes occurred at night and 45.0 percent occurred in wet pavement conditions, both circumstances are a possibility of poor visibility. Note that the pavement and shoulders appeared to be in good condition during the site visit for this evaluation. It is recommended that a site investigation be performed to identify the best possible alternative. Please see the attached Treatment Site Photos for additional visual information.

Location Map, near Lumberton, Robeson County
Evaluation of Spot Safety Project Number 06–98–205



Treatment Site:

SR 1725–Pine Log Road, from 0.1 miles northeast of Bridge #211

To 0.1 miles southwest of Bridge #207

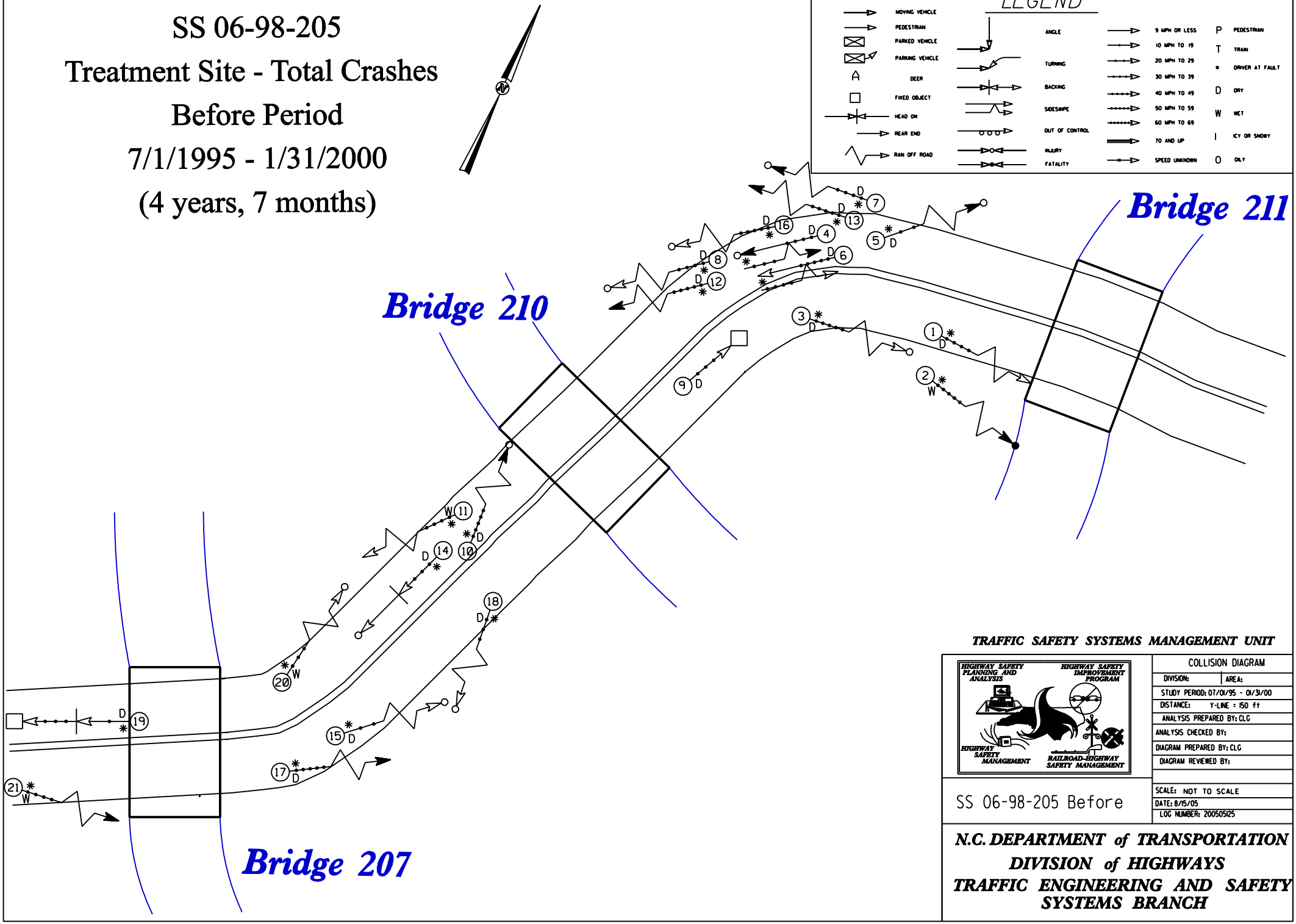
Treatment Site Photos (Taken on June 13, 2005)

Driving southwest on SR 1527-Pine Log Road

Treatment Site Photos (Taken on June 13, 2005)

Driving northeast on SR 1527-Pine Log Road

SS 06-98-205
Treatment Site - Total Crashes
Before Period
7/1/1995 - 1/31/2000
(4 years, 7 months)



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

HIGHWAY SAFETY PLANNING AND ANALYSIS
HIGHWAY SAFETY IMPROVEMENT PROGRAM
HIGHWAY SAFETY MANAGEMENT
RAILROAD-HIGHWAY SAFETY MANAGEMENT

COLLISION DIAGRAM

DIVISION:	AREA:
STUDY PERIOD: 07/01/95 - 01/31/00	
DISTANCE: Y-LINE = 150 ft	
ANALYSIS PREPARED BY: CLG	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: CLG	
DIAGRAM REVIEWED BY:	
SCALE: NOT TO SCALE	
DATE: 8/15/05	
LOG NUMBER: 20050525	

SS 06-98-205 Before

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DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

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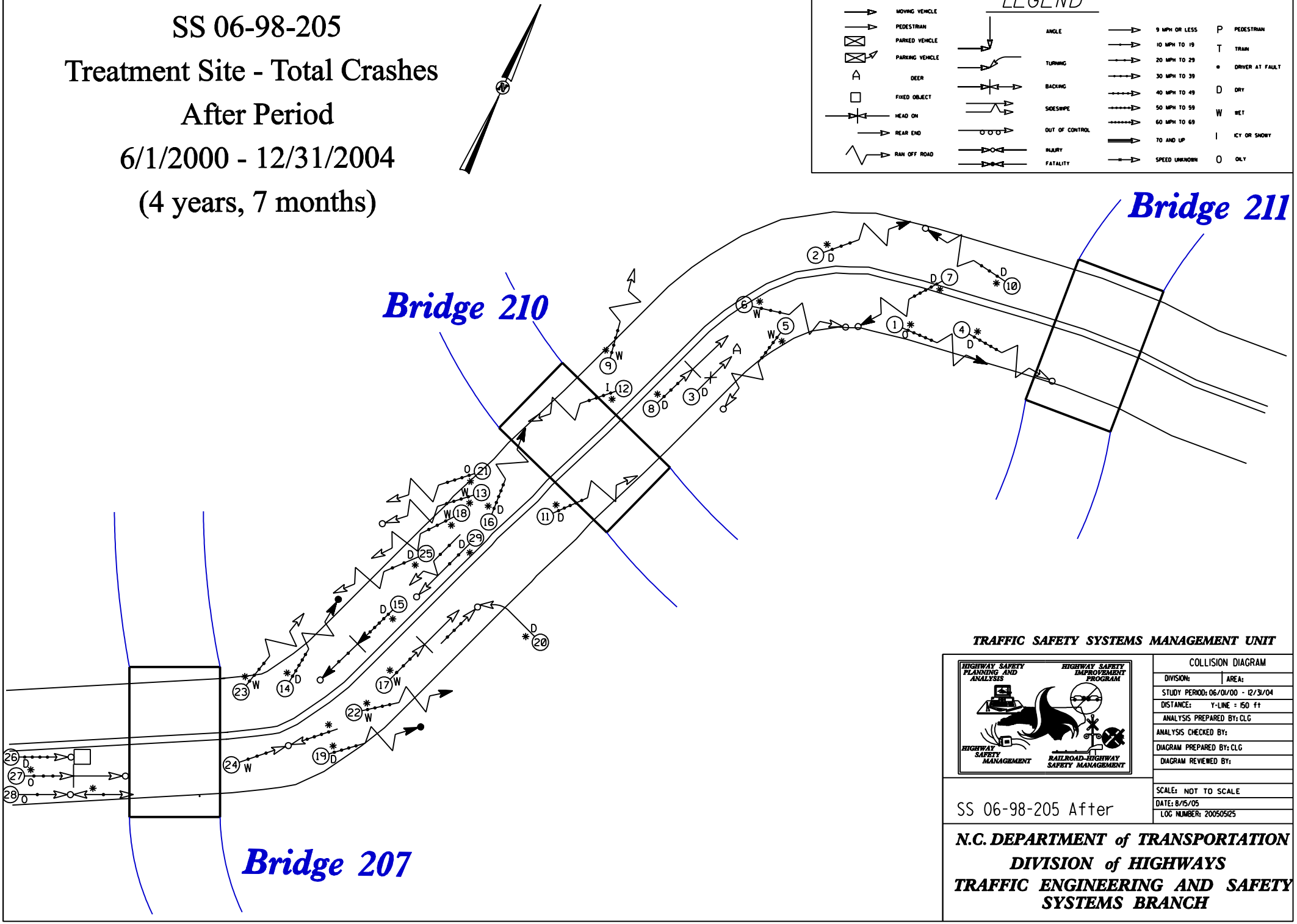
SS 06-98-205
Treatment Site - Total Crashes
After Period
6/1/2000 - 12/31/2004
(4 years, 7 months)



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COLLISION DIAGRAM

DIVISION:	AREA:
STUDY PERIOD: 06/01/00 - 12/31/04	
DISTANCE: Y-LINE = 150 ft	
ANALYSIS PREPARED BY: CLG	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: CLG	
DIAGRAM REVIEWED BY:	
SCALE: NOT TO SCALE	
DATE: 8/15/05	
LOG NUMBER: 20050525	

SS 06-98-205 After

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