

Spot Safety Project Evaluation

Project Log # 200702017

Spot Safety Project # 04-97-268

**Spot Safety Project Evaluation of the Roadway Wedging for Drainage
On US 258 approximately 0.4 mile southwest of SR 1523
Edgecombe County, near Tarboro**

Documents Prepared By:

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

Principal Investigator



Jason B. Schronce

4-8-2009
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 04-97-268 – Segment of roadway including the horizontal curve approximately 0.4 mile southwest of SR 1523 on US 258 in Edgecombe County.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasures chosen for the subject location were the resurfacing and wedging of roadway for improved drainage. US 258 is a two lane, two-way facility with a posted speed limit of 55 mph. Passing zones exist right up to the curve which is located approximately 0.4 mile southwest of the SR 1523 (Shiloh Farm Road) intersection.

The original statement of problem was the lack of super elevation through the above-mentioned curve. This is mainly evident when the roadway is wet, given that water does not adequately drain off the roadway therefore causing vehicles to hydroplane. Out of the twenty reported crashes in the initial crash analysis, seventeen (17) occurred during wet roadway conditions.

The project background information also states that other countermeasures have been attempted at this location without great success. These include paint and raised reflective pavement marking revisions and extensive signing procedures. The Safety Evaluation Group was unable to establish dates for these improvements and therefore did not include them specifically in this analysis.

The initial crash analysis was completed from February 1, 1991 to January 31, 1997 with twenty (20) reported crashes. Sixteen (16) of which were ran-off roadway Crashes. These twenty crashes resulted in two (2) fatalities, nine (9) class “A,” eight class “B,” and six (6) class “C” injuries. The final completion date for the improvement at the subject intersection was on May 13, 2002 with a total cost of \$55,000.00.

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 was from March 1 to July 31, 2002. The before period consisted of reported crashes from September 1, 1995 through February 28, 2002 (6 years and 6 months); and the after period consisted of reported crashes from August 1, 2002 through January 31, 2009 (6 years and 6 months). The ending date for this analysis was determined by the available crash data at the time of analysis.

The treatment data consisted of all crashes on US 258 in Edgecombe County between milepost 17.90 and 18.65. The horizontal curve in question is located at approximately the 18.25 milepost. *Please see attached location map and photos for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Ran-off Roadway Crashes and Head-on Collisions were the target crashes for the applied countermeasure.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	19	14	- 26.3 %
Total Severity Index	16.08	2.59	- 83.9 %
Target Crashes	12	5	- 58.3 %
Target Crash Severity Index	23.65	3.96	- 83.3 %
Volume	2,400	3,800	58.33 %
<u>Injury Crash Summary - Total</u>			
Fatal injury Crashes	1	0	- 100.0 %
Class A injury Crashes	2	0	- 100.0 %
Class B injury Crashes	2	3	50.0 %
Class C Injury Crashes	6	0	- 100.0 %
Total Injury Crashes	11	3	- 72.7 %

The naive before and after analysis at the treatment location resulted in a 26 percent decrease in Total Crashes, a 58 percent decrease in Target Crashes, and an 84 percent decrease in the Total Severity Index. The before period ADT year was 1999 and the after period ADT year was 2004.

Results and Discussion

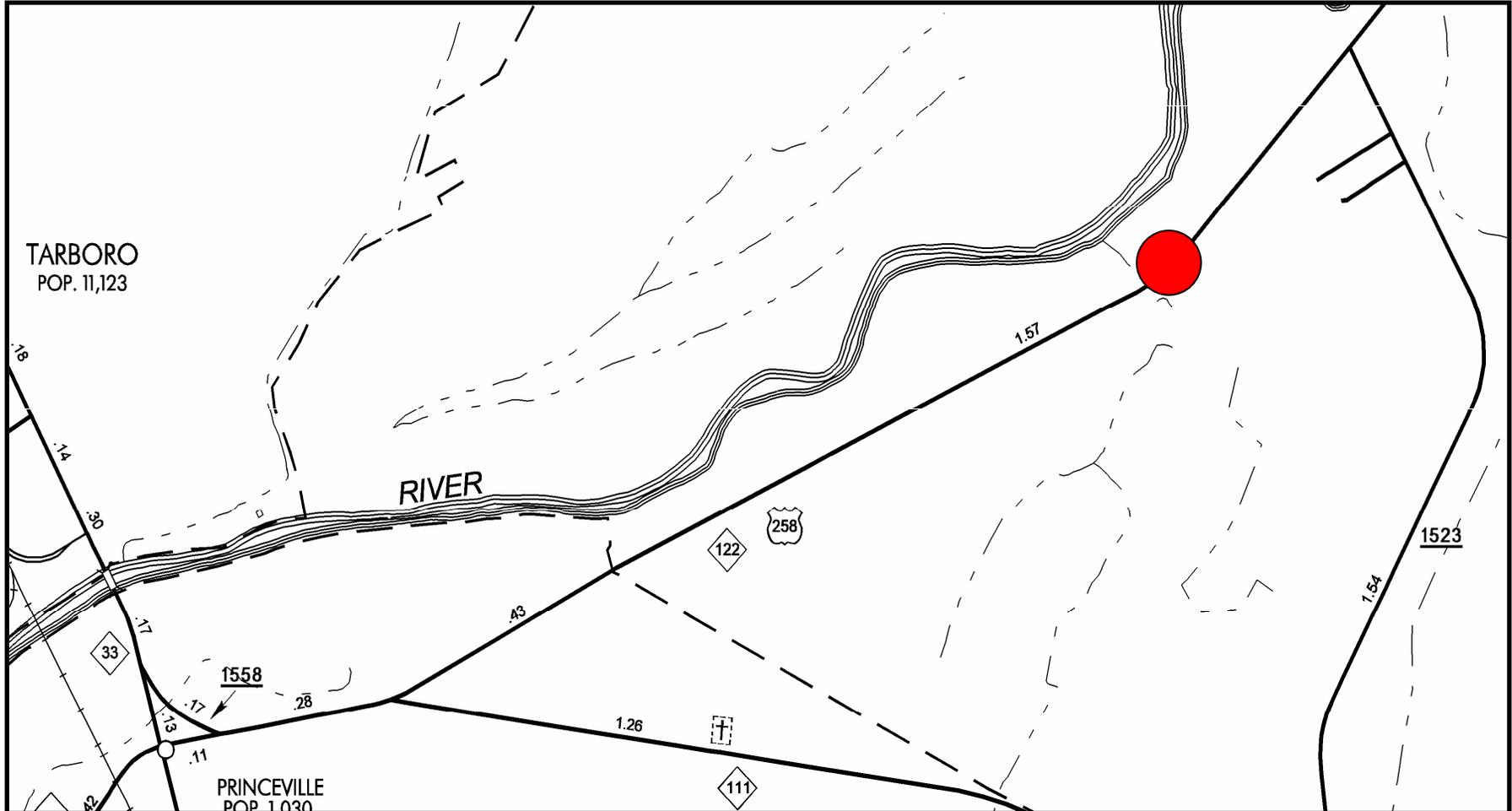
The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 26 percent decrease in Total Crashes and a 58 percent decrease in Target Crashes. The summary results above demonstrate that both Total and Target Crashes appear to have decreased at the treatment location from the before to the after period.

Referencing the *Collision Diagrams*, ran-off road crashes associated with the curve on this segment of roadway have been positively effected by the improvements. The ran-off road crashes that occurred during the before period appear to be influenced by speeds to high for roadway conditions; especially when the roadway was wet or icy. There also appears to be major improvement in the crash severity from the initial analysis through the project completion. The improvements in the crash severity give this project a significant benefit-cost ratio.

The calculated benefit to cost ratio for this project is **29.62 considering total crashes**. The benefit to cost ratio **considering only target crashes is 29.51**. 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 approaching the curve from both directions. Notice the signage and pavement markings leading into and through the curve. As the Safety Evaluation Group completes additional spot safety reviews for this type of combined countermeasures, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of intersection.

Location Map
Edgecombe County
Evaluation of Spot Safety Project # 04-97-268



Treatment Location: Strip on US-258 / NC-122 South of SR 1523 (Shiloh Farm Road)
US-258 MP: 17.90 – 18.65, Near Tarboro

TREATMENT SITE PHOTOS TAKEN 5/30/2007



Traveling Northbound on US 258 – signage leading into curve



Traveling Northbound on US 258



Traveling Northbound on US 258



Traveling Southbound on US 258 – curve advisory speed of 45 mph



Traveling Southbound on US 258



Traveling Southbound on US 258

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: US-258 near SR 1523
 COUNTY: Edgecombe
 FILE NO.: SS 04-97-268

BY: JBS
 DATE: 4/6/2009
 NOTES: Target Crashes- Ran-off Road

DETAILED COST: TYPE IMPROVEMENT - Resurface and Wedge for Drainage

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$55,000	10	0.149	\$8,197
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$55,000	10	0.149	\$8,197

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$0
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$0
 TOTAL ANNUAL COST= \$8,197
 TOTAL COST OF PROJECT= \$55,000

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	6.50	3	0.46	6	0.92	3	0.46	\$249,185
AFTER	6.50	0	0.00	2	0.31	3	0.46	\$7,338

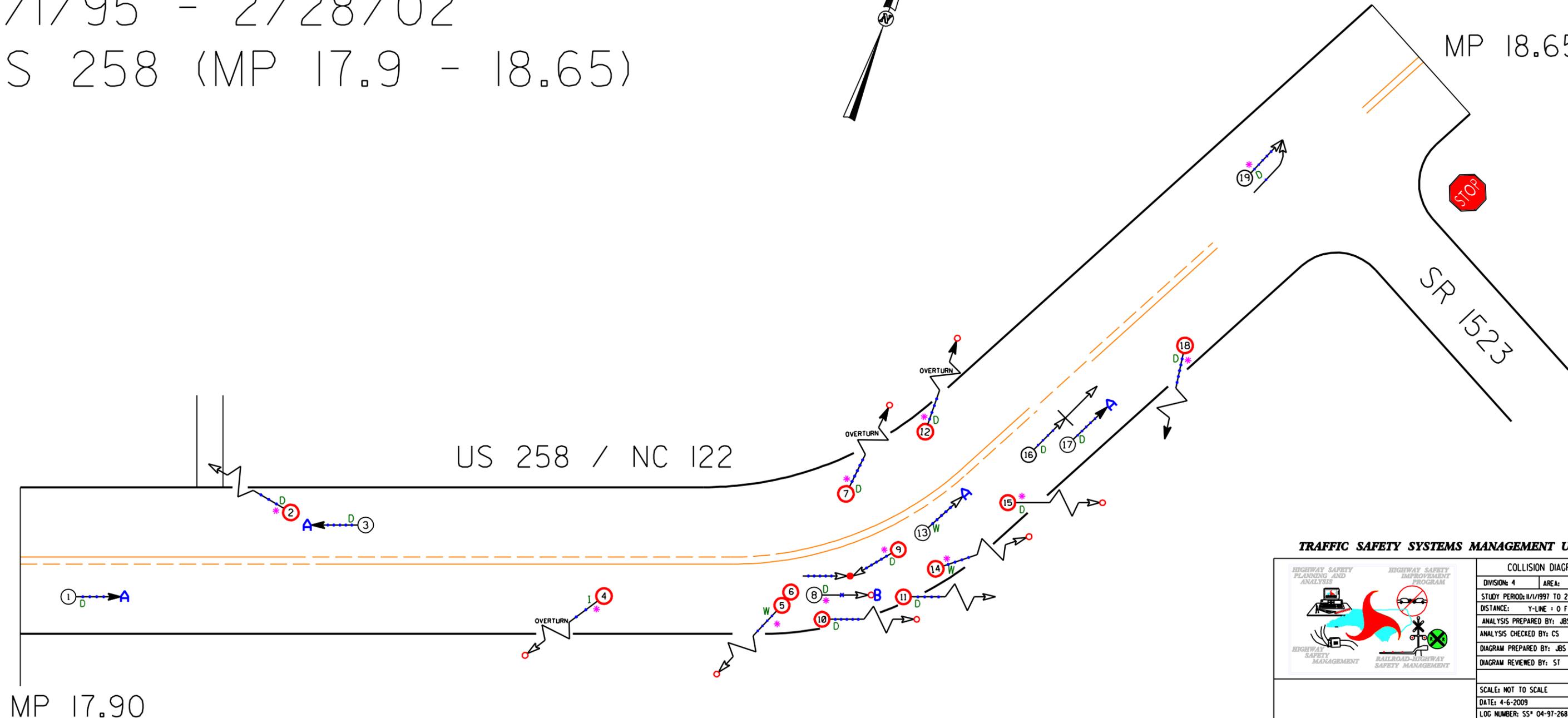
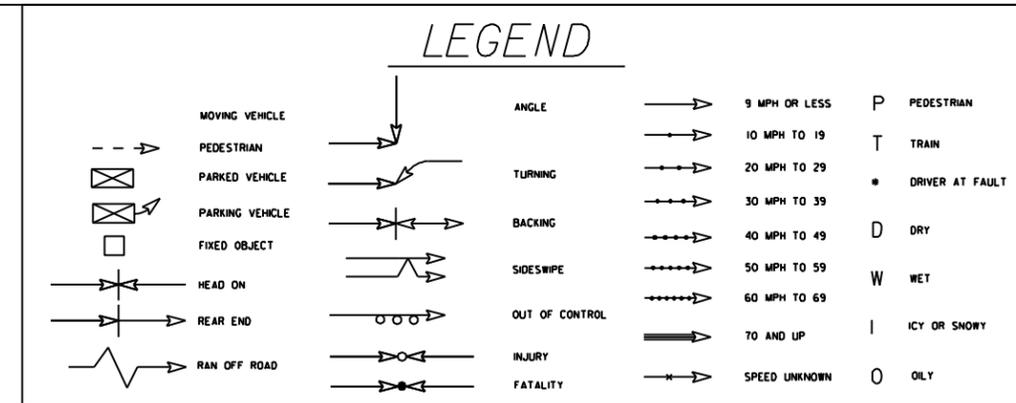
Annual Benefits from Crash Cost Savings \$241,846

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$233,650

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 29.51

TOTAL COST OF PROJECT - \$55,000 COMPREHENSIVE B/C RATIO - 29.51

SS# 04-97-268
 Edgecombe County
 Before Period
 9/1/95 - 2/28/02
 US 258 (MP 17.9 - 18.65)



Target Crashes

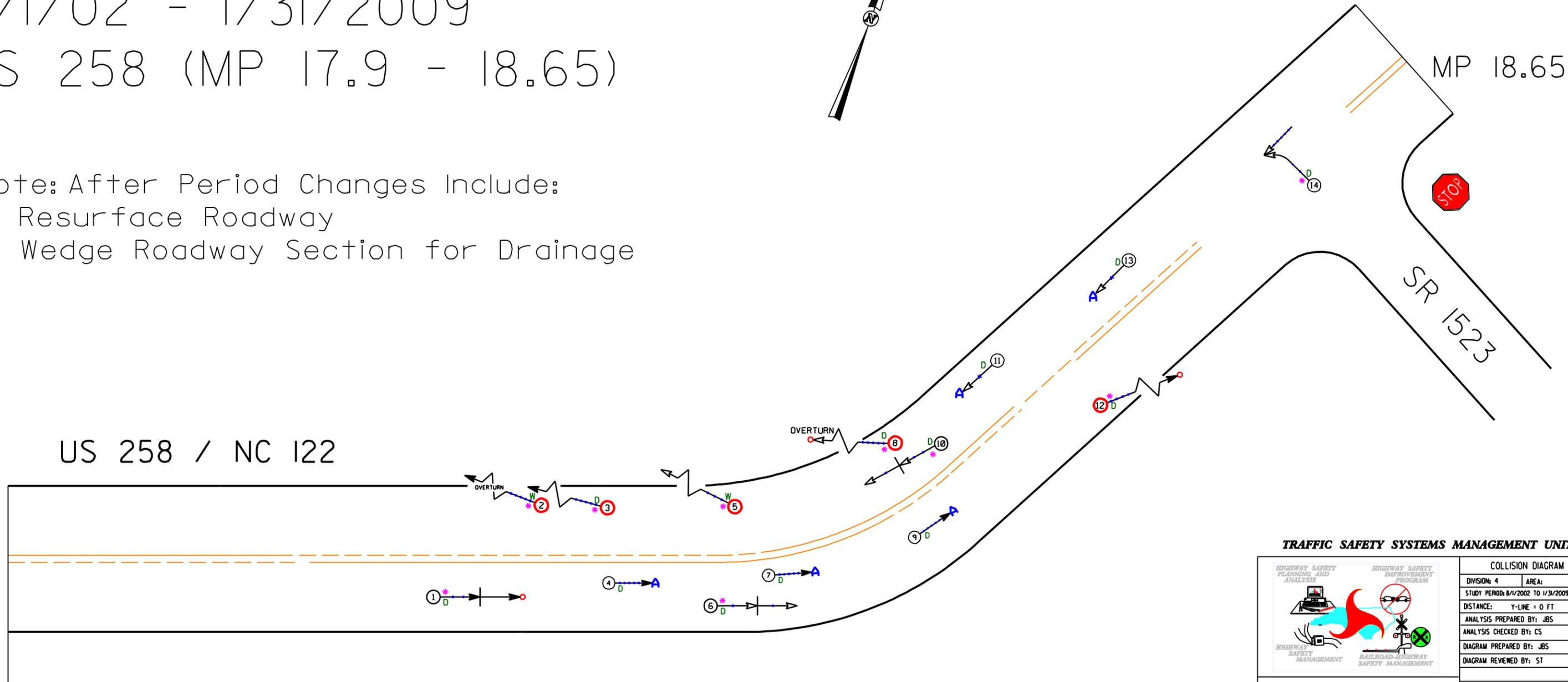
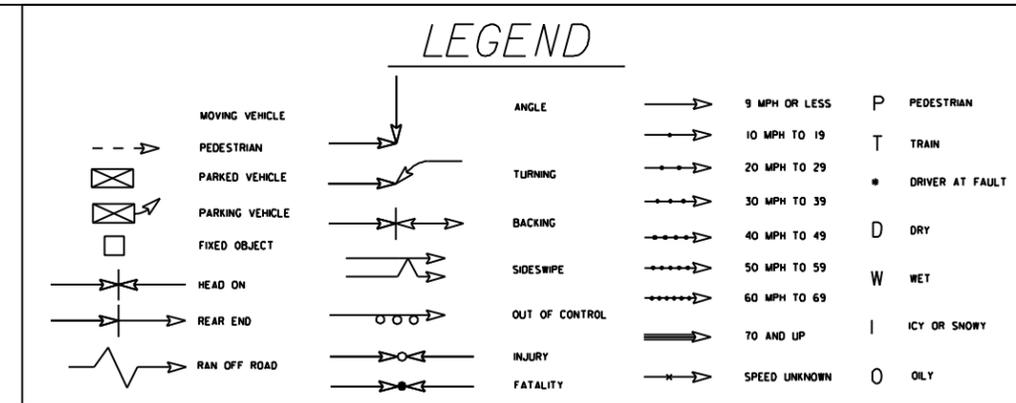
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 4	AREA:
	STUDY PERIOD: 11/1/1997 TO 2/28/2002	
	DISTANCE: Y-LINE : 0 FT	
	ANALYSIS PREPARED BY: JBS	
	ANALYSIS CHECKED BY: CS	
	DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST		
SCALE: NOT TO SCALE		
DATE: 4-6-2009		
LOG NUMBER: SS* 04-97-268 BEFORE		

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

SS# 04-97-268
 Edgecombe County
 After Period
 8/1/02 - 1/31/2009
 US 258 (MP 17.9 - 18.65)

Note: After Period Changes Include:
 1. Resurface Roadway
 2. Wedge Roadway Section for Drainage



MP 17.90

MP 18.65

Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

 	COLLISION DIAGRAM	
	DIVISION: 4	AREA:
	STUDY PERIOD: 8/1/2002 TO 1/31/2009	DISTANCE: Y-LINE: 0 FT
	ANALYSIS PREPARED BY: JBS	ANALYSIS CHECKED BY: CS
	DIAGRAM PREPARED BY: JBS	
	DIAGRAM REVIEWED BY: ST	
	SCALE: NOT TO SCALE	
	DATE: 4-6-2009	
	LOG NUMBER: SS* 04-97-268 AFTER	

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