

# **Hazard Elimination Project Evaluation**

Project Log #'s 200502083 & 200502087

Hazard Elimination Projects W-2936 & W-2942

**Evaluation of Shoulder Guardrail Installation on US 64 from Jackson County Line to  
SR 1320 (East Intersection), Transylvania County**

Documents Prepared By:

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6-30-06  
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# ***Hazard Elimination Project Evaluation Documentation***

## **Subject Location**

Evaluation of Hazard Elimination Projects W-2936 and W-2942 – Installation of shoulder guardrail on US 64 from Jackson County Line to SR 1320 (East Intersection) in Transylvania County

## **Project Information and Background from the Project File Folder**

The safety countermeasure chosen for the subject location was the installation of approximately 40,000 linear feet of shoulder guardrail at select locations. US 64 is a two-lane highway with shoulder widths of 3 feet and speed limit of 55 miles per hour. According to the project file, the alignment of the road is poor due to the mountainous terrain and a general deficiency in guardrail exists.

The initial crash analysis for this location was completed from January 1, 1989 through December 31, 1991 with a total of 57 reported crashes. The most prevalent crash pattern at the location was ran off road crashes, which make up 53 percent of the total crashes. The guardrail was installed to reduce the severity of the pattern of ran off road crashes. W-2936 was let in November of 1996 and closed out in December of 1996 at an estimated cost of \$341,000. W-2942 was let in December of 1996 and closed out in March of 1997 at an estimated cost of \$269,000.

## **Naïve Before and After Analysis**

After reviewing the hazard elimination project file folder along with all the crashes at the subject locations, the crash data omitted from this analysis to consider for an adequate construction period was from November 1, 1996 through May 31, 1997. The before period consisted of reported crashes from January 1, 1990 through October 31, 1996 (6 Years, 10 Months) and the after period consisted of reported crashes from June 1, 1997 through March 31, 2004 (6 Years, 10 Months). The ending date for this analysis was determined by the available before period crash data.

The treatment data consisted of all crashes on the 11.95 mile strip of US 64 from the Transylvania County Line to SR 1320 (East Intersection) with a 0 foot y-line. Please see the attached *Location Map* for further detail.

The following table depicts the Naïve Before and After Analysis for the Total Crashes and Target Crashes at the treatment location. Please note that Ran Off Road crash types were the target crashes for the applied countermeasure. Ran Off Road crash types considered are as follows: Ran Off Road – Left, Ran Off Road – Right, Ran Off Road – Straight, Fixed Object, Head-on, Sideswipe – Same Direction, Sideswipe – Opposite Direction, and Overturn / Rollover.

<b><u>Treatment Information</u></b>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-)/ Percent Increase (+)</b>
Total Crashes	177	258	45.8%
Total Severity Index	13.7	8.81	-35.7%
Total Target Crashes	115	143	24.3%
Target Severity Index	14.71	9.31	-36.7%
Volume	3,700	5,000	35.1%

<b><u>Target Crash Information</u></b>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-)/ Percent Increase (+)</b>
<i>Target Crashes - Injuries</i>			
Fatal Injury Crashes	3	1	-66.7%
Non-Fatal Injury Crashes	53	58	9.4%
Total Injury Crashes	56	59	5.4%
<i>Target Crashes - Contributing Factors</i>			
Night Crashes	41	41	0.0%
Wet Crashes	48	46	-4.2%
<i>Target Crashes - Crash Types</i>			
Ran Off Road	91	37	-59.3%
Fixed Object	2	61	2950.0%
Sideswipe, Total	14	24	71.4%
Sideswipe, Same Direction	14	8	-42.9%
Sideswipe, Opposite Direction	0	16	N/A
Head On	5	9	80.0%
Overturn / Rollover	3	12	300.0%

The naïve before and after analysis at the treatment location resulted in a 46 percent increase in Total Crashes, a 24 percent increase in Target Crashes, a 5 percent increase in Target Injury Crashes, and a 35 percent increase in Average Daily Traffic (ADT). Further investigation shows there was a 36 percent decrease in Severity Index for Total Crashes and a 37 percent decrease in the Severity Index for Target Crashes. The before period ADT year was 1993 and the after period ADT year was 2000.

## **Results and Discussion**

The naïve before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 46 percent increase in Total Crashes and a 24 percent increase in Target Crashes. Further investigation shows that the Severity Index of Total Crashes and Target Crashes appear to have decreased 36 and 37 percent respectively using naïve methodologies. The summary results above demonstrate that the treatment location appears to have had an increase in both Total and Target Crashes and a decrease in the Severity Index from the before to the after period.

It should be noted that there was no specific information in the project file as to exactly where each run of guardrail was placed in this project. Therefore specific crash information for each run of

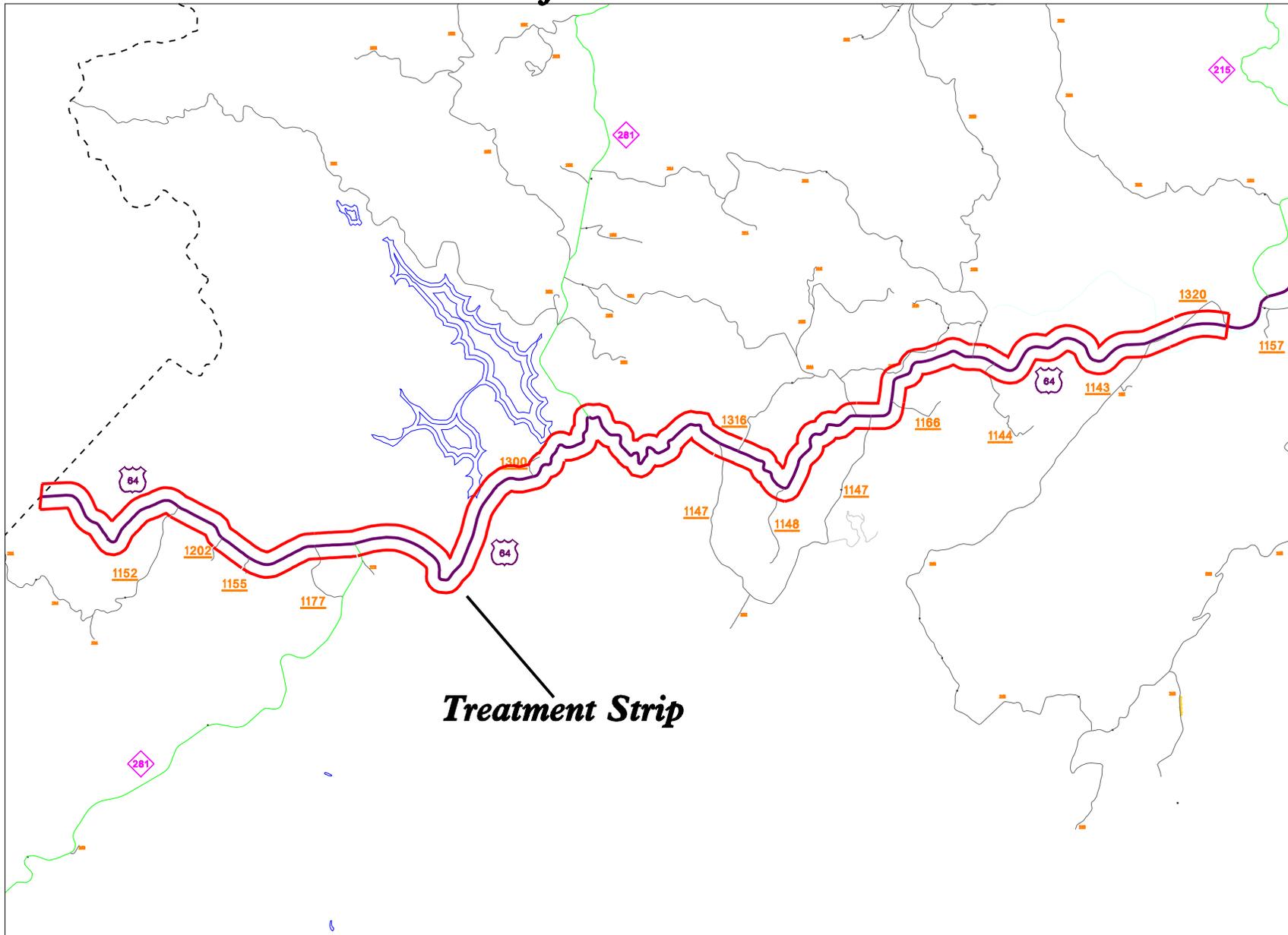
guardrail could not be analyzed. The site visit confirmed where guardrail exists along the segment today, but there was no way to determine where guardrail existed before the project.

Sideswipe crashes from the before to the after periods have increased by 71 percent. This increase could be due to drivers shying away from the shoulder guardrail and drifting out of their lane. The existing shoulders on this section are approximately 3 feet according to the project file folder. This would require that the guardrail be placed fairly close to the travel lanes due to the existing design constraints. It should be noted that there was no crash type for “Sideswipe, Opposite Direction” on crash reports before year 2000. This would explain the dramatic increase shown for this particular crash type. The “Sideswipe, Total” category is more appropriate for before and after comparisons.

Typically, one would expect guardrail installation projects to result in an increased number of Ran Off Road Crashes and a decrease in the severity of Ran Off Road crashes. The increase in Ran Off Road Crashes is expected due to the placement of a fixed object (guardrail) near the travel way. The decrease in the severity of Ran Off Road Crashes is expected due to the guardrail being more forgiving than the object it is protecting. The results from this project seem to be in concurrence with the above-mentioned expectations. It may be beneficial to explore the possibility of placing countermeasures such as centerline or shoulder rumble strips to prevent drivers from leaving the roadway. This may help to reverse the increasing trend seen in the number of Ran Off Road Crashes.

As the Safety Evaluation Group completes additional reviews for this type of countermeasure, we will be able to provide more objective and definite information regarding actual crash reduction factors.

# *Location Map, Transylvania County Evaluation of W-2936 and W-2942*



***Treatment Strip: US 64 From Jackson County Line to SR 1320 (East Intersection)***

*Treatment Site Photos (Taken on May 3, 2006)*



Driving West on US 64

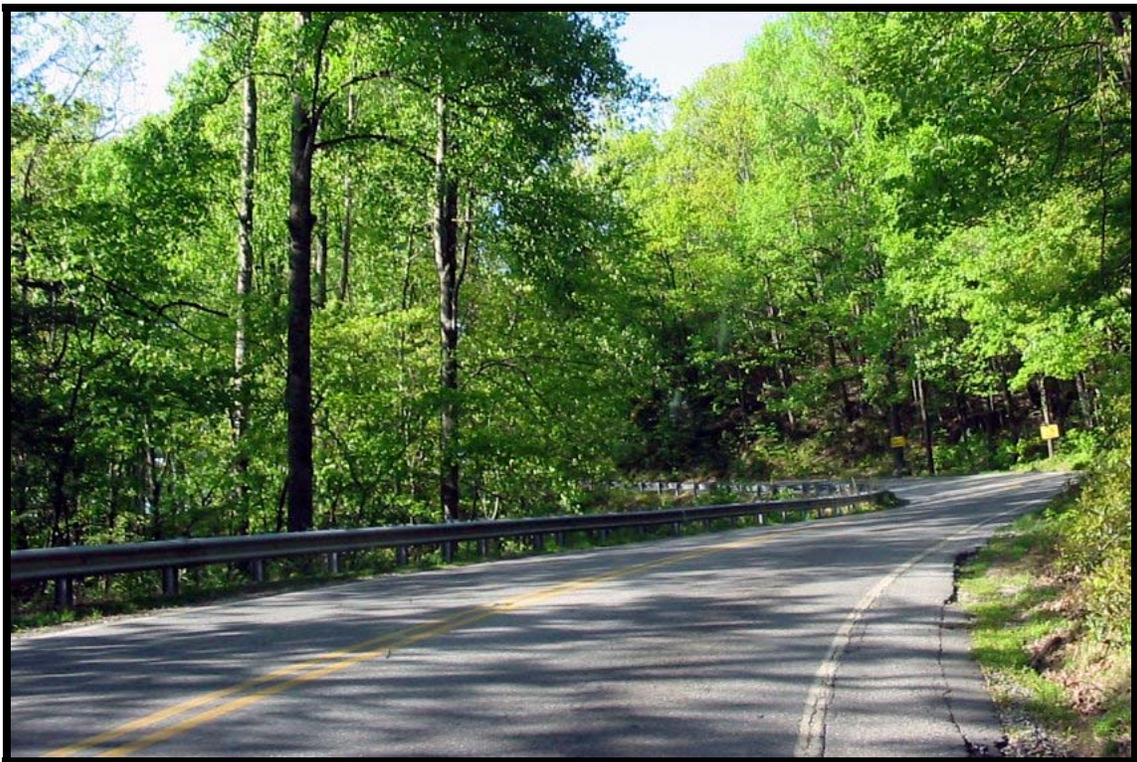


Driving West on US 64

*Treatment Site Photos (Taken on May 3, 2006)*

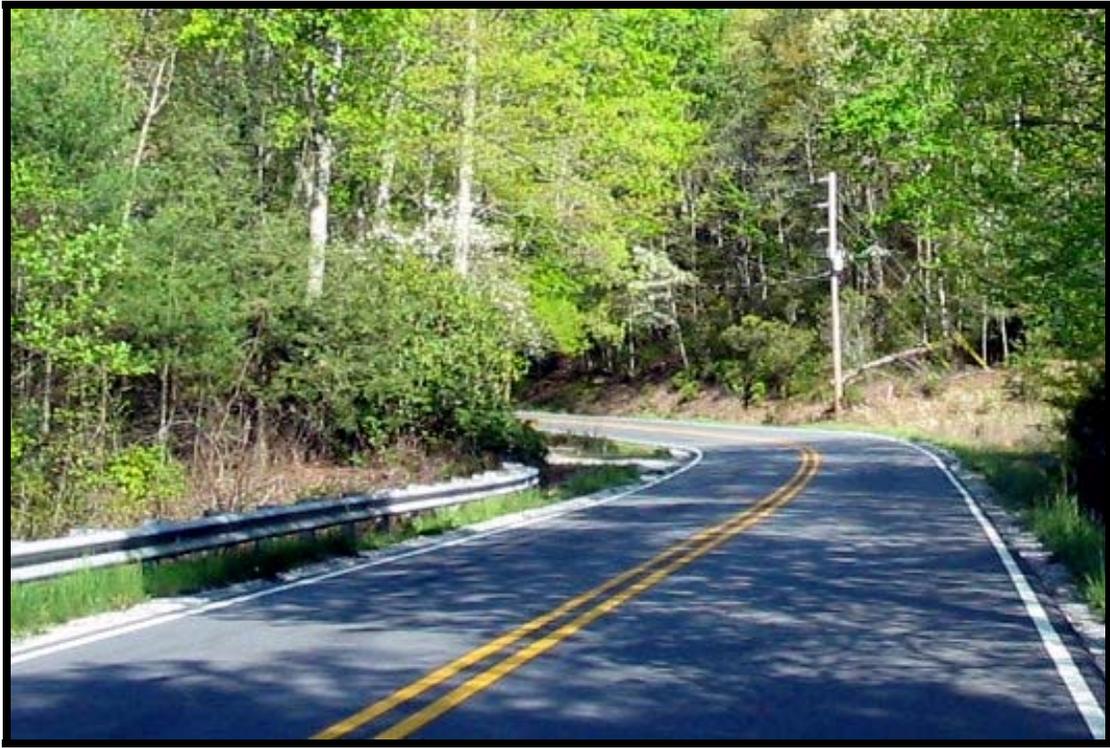


Driving West on US 64



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Driving West on US 64



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