

Traffic Barrier Systems Service Level 1 (SL-1) Bridge Rail

Final Report

WA-RD 106.2
August 1988



Washington State Department of Transportation
Planning, Research and Public Transportation Division

in cooperation with the
United States Department of Transportation
Federal Highway Administration

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
TECHNICAL REPORT STANDARD TITLE PAGE

1. REPORT NO. WA-RD 106.2	2. GOVERNMENT ACCESSION NO.	3. RECIPIENT'S CATALOG NO.	
4. TITLE AND SUBTITLE TRAFFIC BARRIER SYSTEMS SERVICE LEVEL (SL-1) BRIDGE RAIL		5. REPORT DATE August 1983	
		6. PERFORMING ORGANIZATION CODE	
7. AUTHOR(S) Don Gripne		8. PERFORMING ORGANIZATION REPORT NO. FHWA Demonstration Project No. 64	
9. PERFORMING ORGANIZATION NAME AND ADDRESS Washington State Department of Transportation Olympia, WA 98504		10. WORK UNIT NO.	
		11. CONTRACT OR GRANT NO. GC 7740	
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Department of Transportation Federal Highway Administration		13. TYPE OF REPORT AND PERIOD COVERED Jan. 1987 to Aug. 1983	
		14. SPONSORING AGENCY CODE	
15. SUPPLEMENTARY NOTES This study was conducted in cooperation with the U. S. Department of Transportation Federal Highway Administration.			
16. ABSTRACT The Washington State Department of Transportation (WSDOT) designed and installed Service Level (SL-1) bridge rails on three treated timber bridges in the state. To date, there have been no accidents or maintenance problems reported at any of the modified bridges.			
17. KEY WORDS Bridge rail modification Rail for Timber bridge		18. DISTRIBUTION STATEMENT	
19. SECURITY CLASSIF. (of this report) Unclassified	20. SECURITY CLASSIF. (of this page) Unclassified	21. NO. OF PAGES	22. PRICE

TRAFFIC BARRIER SYSTEMS
SERVICE LEVEL 1 (SL-1)
BRIDGE RAIL

by
Don Gripne
Project Development

Final Report
FHWA Demonstration Project No. 64
HR0910

Prepared for
Washington State Department of Transportation
and in cooperation with
U.S. Department of Transportation
Federal Highway Administration

August 1988

TABLE OF CONTENTS

	PAGE
PURPOSE	1
STUDY SITE	2
VICINITY MAPS	4
DESIGN	6
RAIL PERFORMANCE	7
CONTACT PERSON	7

PURPOSE

The Service Level-1 (SL-1) Bridge Rail was designed to function adequately and to be cost-effective when compared to conventional longitudinal barriers. The purpose of this demonstration project is to determine if these design goals can be achieved and to identify any modifications that could improve field performance.

The SL-1 system was developed and tested for the FHWA by Southwest Research Institute. The Demonstration Projects division of the FHWA wanted to verify the laboratory tests under actual field conditions and to obtain installation, performance, and maintenance data for this barrier system.

The purpose of this demonstration project is to show the feasibility and practicability of installing an SL-1 system on timber bridges and to perform an in-service evaluation to obtain maintenance costs and identify any design deficiencies.

The SL-1 systems were installed on low volume state highways at sites suggested by the WSDOT and approved by the FHWA, Washington Division.

STUDY SITE

This demonstration project, consisting of the installation of a Service Level 1 (SL-1) railing system on timber bridges, has been completed on the three bridges that were selected for the study. The Middle Nemah River Bridge and the Jorgenson Slough Bridge are located on SR 101 and the Coulter Creek Bridge is located on SR 106, all in Western Washington. (See Vicinity Maps.)

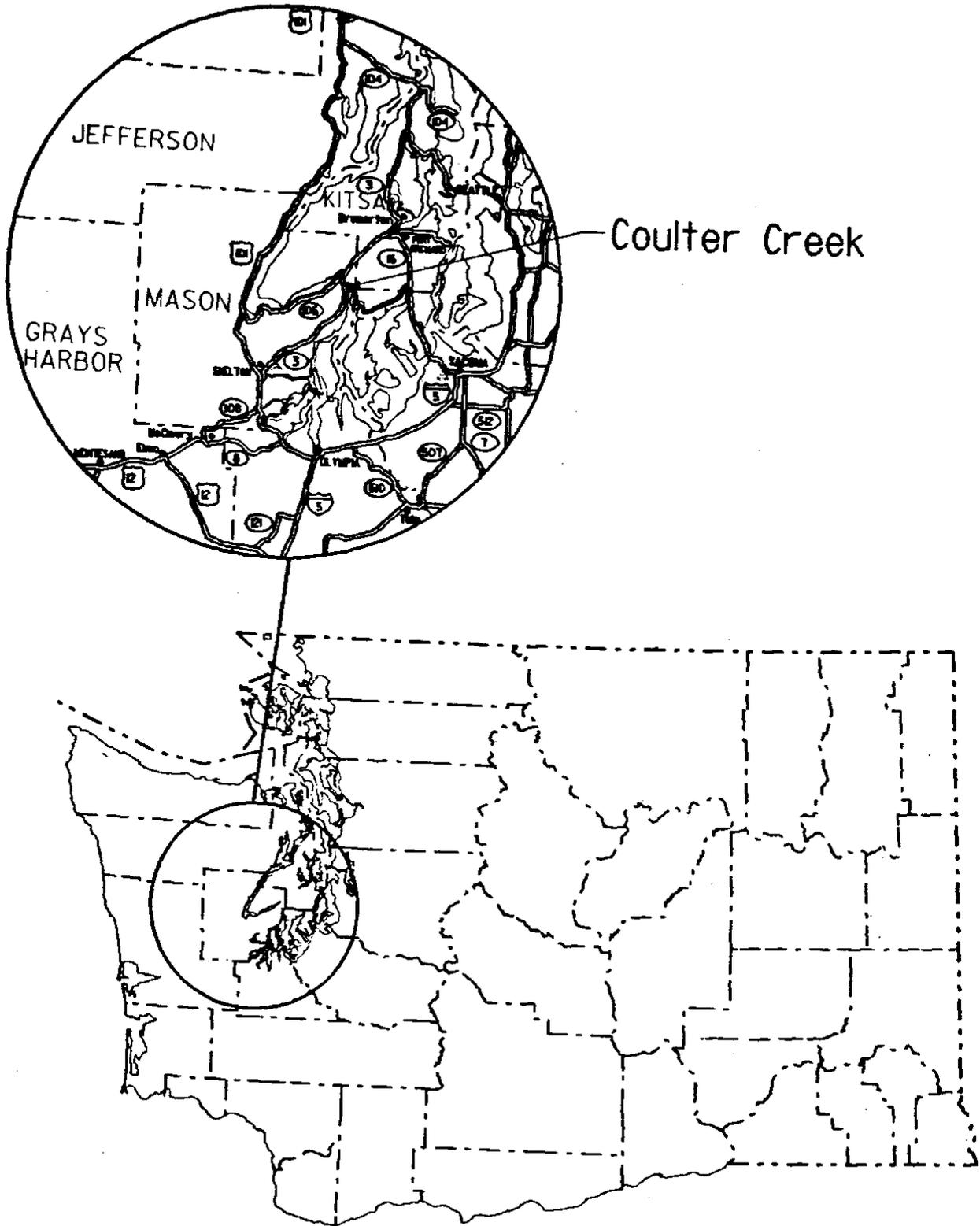
Below are data of these bridges:

Bridge name	Middle Nemah River
Bridge No.	101/31 M.P. 33.8
Life Expectancy	1995
ADT	2250
Accident Experience	None
Width	Twenty-eight feet
Appr. Rdwy width	Twenty-four w/ two-foot asphalt shoulders
Bridge Length/Type	Eighty-six feet/creosote treated Timber trestle
Average Operating Speed	55 MPH
Vehicle Mix	13% Trucks
Completion Date of SL-1 Installation	Dec. 31, 1985
Bridge name	Jorgenson Slough
Bridge No.	101/33 M.P. 34.3
Life Expectancy	1994
ADT	2250
Accident Experience	None
Width	Twenty-eight feet
Appr. Rdwy. width	Twenty-four feet w/two-foot shoulders
Bridge Length/Type	Seventy feet/timber treated Longitudinal laminated deck
Average Operating Speed	55 MPH
Vehicle Mix	13% Trucks
Completion Date of SL-1 Installation	Dec. 31, 1985

Bridge name	Coulter Creek
Bridge No.	302/3 M.P. 1.99
Life Expectancy	1997
ADT	1950
Accident	None
Experience	
Width	Twenty-eight feet
Appr. Rdwy. width	Twenty-four feet w/two-foot shoulders
Bridge	One hundred sixteen feet/creosote
Length/Type	Treated timber trestle
Average Operating	
Speed	45 MPH
Vehicle Mix	6% Trucks
Completion Date of SL-1 Installation	Oct. 1, 1986

VICINITY MAP

Coulter Creek Bridge



DESIGN

The design of the bridge rails followed the criteria in NCHRP Report 239, "Multiple-Service-Level Highway Bridge Railing Selection Procedures." The 239 report addressed the use of the SL-1 system on concrete bridges, so in order to use the system on wooden bridges, brackets were designed that could be bolted to the wooden deck. The rest of the system could then be connected to the bracket.

The mounting brackets for the rail posts were designed for use with the different timber bridge decks. All of our wooden deck bridges have an asphalt overlay on them. It was determined these brackets could be modified to accommodate an asphalt overlay depth of up to 9 inches. Asphalt depth greater than 9 inches will create a design that will cause construction problems in trying to install the system under traffic. Each bridge needs to be reviewed to see what modification needs to be made to the bracket to accommodate that bridge.

In all cases, the brackets need to be designed so that the posts are the same length and the top of the rail is 32 inches from roadway surface. The installed system will then be compatible with the system that was crash tested.

Most of our timber bridges have timber rub rails or curbs. This rail has to be removed to install the SL-1 system, thus requiring asphalt to fill in the void. To provide a nice finished surface at the edge of the bridge, a treated timber was bolted to the deck to provide a barrier to place the asphalt against.

RAIL PERFORMANCE

In the year that the SL-1 bridge rail has been in service there has been no rail maintenance performed on any of these bridges.

We have found this railing system to be ideal for use on routes with low daily traffic. We will continue to use the SL-1 bridge rails to upgrade timber and in some cases older concrete bridges throughout the state.

CONTACT PERSON

The principal investigator of the project is:

Don J. Gripne
Design Standards
and Policy Development Engineer
Washington State Department of Transportation
Olympia, WA 98504
(206) 753-0826