

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION  
**TECHNICAL REPORT STANDARD TITLE PAGE**

1. REPORT NO. WA-RD 151.1	2. GOVERNMENT ACCESSION NO.	3. RECIPIENT'S CATALOG NO.
4. TITLE AND SUBTITLE Gabion Wall Soil Interaction Study I-90, Snoqualmie Pass Vicinity	5. REPORT DATE March 1988	6. PERFORMING ORGANIZATION CODE WA 7503
7. AUTHOR(S) Keith W. Anderson	8. PERFORMING ORGANIZATION REPORT NO.	10. WORK UNIT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Washington State Department of Transportation Olympia, WA 98504	11. CONTRACT OR GRANT NO.	13. TYPE OF REPORT AND PERIOD COVERED Final Report
12. SPONSORING AGENCY NAME AND ADDRESS Washington State Department of Transportation Olympia, WA 98504	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 This report documents the limited results of a study which monitored the movement of a comparatively large (45 feet in height) gabion wall. The data collected indicated that about 4.5 inches of movement occurred at the top of the wall in the form of an outward tilt away from the backfill. Design procedures used to construct the wall were verified by the successful performance of the wall for a period now exceeding 12 years.		
17. KEY WORDS Gabion Soil Inclinometer Pressure cell	18. DISTRIBUTION STATEMENT	
19. SECURITY CLASSIF. (of this report) Unclassified	20. SECURITY CLASSIF. (of this page) Unclassified	21. NO. OF PAGES 7
		22. PRICE

**GABION WALL SOIL INTERACTION STUDY**

I-90, Snoqualmie Pass Vicinity

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**FINAL REPORT**  
**EXPERIMENTAL FEATURE WA 75-03**

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

March, 1988

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TABLE OF CONTENTS

	Page
ABSTRACT.....	iii
INTRODUCTION.....	1
OBJECTIVE.....	1
MONITORING OF THE WALL.....	1
RESULTS.....	1
CONCLUSIONS.....	2
REFERENCES.....	3

## ABSTRACT

This report documents the limited results of a study which monitored the movement of a comparatively large (45 feet in height) gabion wall. The data collected indicated that about 4.5 inches of movement occurred at the top of the wall in the form of an outward tilt away from the backfill. Design procedures used to construct the wall were verified by the successful performance of the wall for a period now exceeding 12 years.

## INTRODUCTION

This is the final documentation on a study which involved the monitoring of the post-construction movements of a gabion wall constructed several miles west of Snoqualmie Pass on I-90. The wall was completed in October of 1976 as part of the construction of the westbound lanes on Contract 9911, "Ashel Curtis Interchange to Denny Creek". It was the largest of five such walls in the immediate area, with a length of 1,150 feet and a height varying from 9 to 45 feet.

## OBJECTIVE

The objective of the study was to obtain sufficient information to more accurately determine both the lateral earth pressures and foundation pressures, along with the compression and deflections, to be expected with this type of wall. At the time this study was initiated there was no firm design procedures for the design of walls constructed of gabions of this height. This project was expected to provide this design information and provide the design criteria for additional walls of even greater height to be built in the same vicinity under a future contract.

## MONITORING OF THE WALL

Movement of the wall was monitored both by measuring coordinate changes of targets mounted on the face of the wall, using terrestrial photogrammetry, and by measuring inclination changes of special casing set in the wall at two locations. There was reasonable agreement between the two techniques. Vertical and lateral pressures were measured within the wall and at the back of the wall using total pressure cells. The vertical pressures looked more reasonable than the horizontal pressures. This was probably due to arching problems around the cells. They were set in coarse sand contained by filter fabric in individual gabions. Extensometer were set in the wall to measure lateral expansion of the gabion with load. Several of the extensometers were damaged during construction and, therefore, we had little or no valid information from these instruments.

The photogrammetric measurements of the wall movement was accomplished as separate and complete research effort by the University of Washington. It verified the use of this method for the measurement of movements of large structures. Further in on effort can be found in the references listed at the end of this report.

## RESULTS

Final analysis of the data was never completed due to circumstances which rendered the data useless. A design change made in the subsequent months following completion of the experimental wall replaced the additional gabion walls with a viaduct structure. The only results of note are that the inclinometers showed as much as 4.5 inch of movement away from backfill at the top of the wall and that the vertical pressure cells verified the expected loads used to design the wall.

It should be noted that new technologies such as reinforced earth and tieback walls provide better alternatives to gabion walls for areas where the heights exceed the design standards for gabions.

## CONCLUSIONS

The only viable conclusion that can be reached from this truncated study is provided by the gabion walls themselves which are still in place as constructed. This indicates that the procedures used to design this wall were successful. The verification of the photogrammetric method as a viable means of measuring movements in large structure such as walls, buildings, and dams is also concluded from the companion research effort.

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