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Performance Evaluation of Experimental Highway Noise Barriers

U.S. Department
of Transportation

**Federal Highway
Administration**

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FOREWORD

Noise is an important environmental consideration for highway planners and designers. It can annoy and cause psychological or physiological harm, depending on frequency characteristics and loudness. The U.S. Department of Transportation and State transportation agencies are charged with the responsibility of optimizing compatibility of highway

operations with environmental concerns. Highway noise problems have been addressed by numerous investigations, including evaluations of the following:

(1) Noise sources and highway noise reference mean emission levels.
(2) Noise impacts at receptor locations.
(3) Effects of site geometry, meteorology, ground surface conditions, and barriers on noise propagation.
(4) Alternative methods of mitigating noise impacts.

The use of noise barriers along roadways is one of the principal means of mitigating vehicle noise. In an effort to maximize barrier performance and minimize costs, the Federal Highway Administration along with 17 sponsoring State transportation agencies initiated the National Pooled-Fund Study (NPFS), "Evaluation of Performance of Experimental Highway Noise Barriers." The multi-year study was conducted by the Research and Special Programs Administration, John A. Volpe National Transportation Systems Center. It was initially directed at the evaluation of parallel barriers under controlled traffic conditions at a test site located at Dulles International Airport near Washington, DC. The main results of this study have been reported in FHWA-RD-90-105, Parallel Barrier Effectiveness, Dulles Noise Barrier Project. The study was then expanded to examine the effectiveness of a parallel barrier located along Interstate 495 in Montgomery County, Maryland. The main results of this study have been reported in FHWA-RD-92-068, Parallel Barrier Effectiveness Under Free-Flowing Traffic Conditions.

This report summarizes the findings of the NPFS, in addition to presenting additional analyses of previously collected data. It will be of interest to engineers and other individuals involved in the mitigation of highway noise.

All data pertaining to the experimental conditions and measurements performed during the course of the NPFS have been archived at the John A. Volpe National Transportation Systems Center in Cambridge, MA.

Charles J. Nemmers
Director, Office of Engineering and
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13. ABSTRACT (Maximum 200 words)

During the period, October 1986 through April 1994, the U.S. Department of Transportation, Research and Special Programs Administration, John A. Volpe National Transportation Systems Center, in support of the Federal Highway Administration and seventeen sponsoring state transportation agencies conducted the National Pooled-Fund Study (NPFS), HP&R 0002-136, "Evaluation of Performance of Experimental Highway Noise Barriers." The first publication supporting the NPFS, FHWA-RD-90-105, "Parallel Barrier Effectiveness, Dulles Noise Barrier Project," presented the results for parallel barriers subject to controlled traffic conditions. The second publication, FHWA-RD-92-068, "Parallel Barrier Effectiveness Under Free-Flowing Traffic Conditions," presented the results for parallel barriers located along Interstate 495 in Montgomery County, Maryland. This report is the third and final publication supporting the NPFS. In addition to presenting the results of additional analyses of previously collected data, it summarizes the findings of the multi-year study.

14. SUBJECT TERMS Noise, Highway Noise, Parallel Noise Barrier, Insertion Loss, Multiple Reflections, Reflective Noise Barrier, Absorptive Noise Barrier, Tilted Noise Barrier, Pooled-Fund Study, Insertion Loss Degradation, Width-to-Height Ratio, Frequency	15. NUMBER OF PAGES 141
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During the period October 1986 through April 1994, the U.S. Department of Transportation, Research and Special Programs Administration, John A. Volpe National Transportation Systems Center (U.S. DOT/RSPA/VNTSC) in support of the Federal Highway Administration (FHWA), Office of Engineering and Highway Operations Research and Development (OEHORD), and 17 sponsoring State transportation agencies conducted the National Pooled-Fund Study (NPFS), "Evaluation of Performance of Experimental Highway Noise Barriers." All data collected during the course of this study were obtained, processed, and analyzed by the Volpe Center's Acoustics Facility (AF).

The information provided by each of the 17 sponsoring State transportation agencies materially contributed to the success of the study. The authors are grateful to the representatives of all the State agencies for their support and timely commentary.

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