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Subject Area: VI Public Transit and VII Rail

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Wheel/Rail Noise Mitigation

This TCRP digest provides a description of the products developed from TCRP [Project C-3](#), "Wheel/Rail Noise Mitigation," conducted by Wilson, Ihrig & Associates, Inc.

INTRODUCTION

This digest describes tools developed to assist engineers responsible for wheel/rail noise control in the design, construction, and operation of rail transit systems.

In today's climate of environmental consciousness, transit systems are being asked to reduce noise that had previously been considered an intrinsic part of their operations. Noise generated at the wheel/rail interface, either on sharp-radius curves or on tangent track, is considered objectionable. Transit agencies have implemented numerous mitigation techniques--of varying effectiveness--to reduce or control this noise. The successes and failures of these mitigation practices provide information that can be useful to transit agencies.

Research was conducted under TCRP Project C-3, *Wheel/Rail Noise Mitigation*, by Wilson, Ihrig & Associates. This research, completed in 1996, assessed existing wheel/rail noise-mitigation techniques, classified and evaluated them, and developed tools to select the most appropriate solutions for wheel/rail noise problems.

To perform the research, the researchers conducted a comprehensive literature review of wheel/rail noise control practices; surveyed all North American and selected foreign heavy and light rail transit agencies to ascertain their current wheel/rail noise-mitigation techniques and their related experiences--both good and bad; compiled wheel/rail noise-mitigation field

test reports from transit agencies and product manufacturers and suppliers; and field tested several noise-mitigation measures at several transit agencies. From these activities, a "Wheel/Rail Noise Control Manual" and an accompanying software tool were developed.

WHEEL/RAIL NOISE CONTROL MANUAL AND SOFTWARE

TCRP Report 23, "Wheel/Rail Noise Control Manual," provides practical step-by-step procedures for controlling wheel/rail noise by using technologies with demonstrated effectiveness. Procedures are included for identifying wheel/rail noise sources, developing mitigation designs, and estimating probable costs and effectiveness. The manual covers noise generated on tangent track, curved track, and special trackwork. Mitigation measures include onboard, track, and wayside treatments.

Accompanying the manual is a user-friendly software package that helps the user identify appropriate noise-mitigation techniques for various types of wheel/rail noise. Several sound "clips" are included to assist the user in determining the type of noise that most closely resembles that which is to be controlled. The software package also provides several calculation worksheets that allow the user to estimate life-cycle costs and expected noise attenuation for various mitigation measures. System requirements for the use of the software are provided below.

Required

1. 386 or better processor (486-33 or better recommended)
2. Microsoft Windows 3.1 or higher
3. VGA video or better (minimum 640 x 480 pixel resolution)
4. 4 megabytes of RAM (8 recommended)
5. 5.5 megabytes of free hard-drive space

Optional

6. Windows-compatible sound card and speakers (needed only to playback sound clips)

Instructions on the installation and use of the software are included in the *TCRP Report 23*.

FINAL REPORT

In addition to the manual and software, an unpublished companion report entitled "Wheel/Rail Noise Control for Rail Transit Operations-Final Report" was also prepared. This report summarizes the various

tasks undertaken during the project and includes results of several wheel/rail mitigation techniques field tested during the project. Field tests conducted during the project were used to assess the effectiveness of dry-stick lubricants (high positive friction [HPF] dry-stick friction modifiers and low coefficient of friction [LCF] flange lubricants) in controlling rail corrugation and wayside noise at tangent track and wheel squeal at curves in Los Angeles and Sacramento, California; and the effectiveness of rail vibration dampers in controlling wheel squeal at curves in Boston, Massachusetts. The results of these field tests have been incorporated in *TCRP Report 23*.

HOW TO OBTAIN COPIES

A copy of *TCRP Report 23*, "Wheel/Rail Noise Control Manual," and its accompanying software tool can be obtained free of charge by contacting the American Public Transit Association (APTA) at the following address:

American Public Transit Association
c/o TCRP Dissemination
1201 New York Avenue, N.W.
Washington, DC 20005
FAX: 202/898-4019
e-mail: tcrp@apta.com

Please include your name and mailing address on the request.

Please note that those TRB members normally receiving public transit or rail-related TRB publications will not automatically receive a copy of *TCRP Report 23* because of the specialized audience for the report. Therefore, TRB members interested in receiving a copy of *TCRP Report 23* should contact APTA as described above.

The unpublished companion final report is available on request through the TCRP, 2101 Constitution Avenue, N.W., Washington, DC 20418.

ACKNOWLEDGMENTS

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These **Digests** are issued in the interest of providing an early awareness of the research results emanating from projects in the TCRP. By making these results known as they are developed, it is hoped that the potential users of the research findings will be encouraged toward their early implementation. Persons wanting to pursue the project subject matter in greater depth may do so through contact with the Cooperative Research Programs Staff, Transportation Research Board, 2101 Constitution Ave, N.W., Washington, DC 20418.

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