Florida Department of Transportation Research

On-Board Sound Intensity (OBSI) Study, Phase 2
BDT06

To many people, “environmental issues” might suggest air pollution, water pollution, or similar ideas. But an environmental issue of growing concern is noise pollution, which many cities in Florida are encountering as they grow, and neighborhoods that were once “out in the sticks” are now flanked by busy highways. More and more neighborhoods are being shielded from road noise by noise barriers that are up to 20 feet tall and run for hundreds of yards along busy highways.

Noise barriers can add considerable expense to a highway project, but a measure that can reduce road noise and the need for such high or extensive barriers is quieter pavements. Research has shown that traffic noise occurs mostly where tires meet the road, and roads can be engineered to generate less noise at the tire-pavement interface.

In this project, researchers at the John A. Volpe National Transportation Systems Center (Cambridge, MA) completed phase two of a project to measure noise created by Florida pavements at the tire-pavement interface and correlate it with roadside sound pressure levels. Phase one of the project (FDOT project BD550) focused on mechanisms of sound generation at the tire-pavement interface, development of a working trailer based system for On-Board Sound Intensity (OBSI) measurements, and evaluation of pavement properties in relation to generated sound levels. In phase two, researchers refined and finalized development of the OBSI trailer, continued developing a correlation between tire-pavement sound intensity levels and wayside sound pressure levels, tested additional pavements and developed an acoustic inventory of pavement surfaces used in Florida.

The sound from a particular source in an open environment can be difficult to measure reliably, but the OBSI trailer developed by the research team used microphones to measure tire-pavement noise without the influence of other ambient noise, especially traffic. To achieve the optimum

Sound walls, like this one along I-95 in Jacksonville, protect surrounding neighborhoods from the constant road noise of this busy highway.

design, a great deal of reconfiguration and testing was needed. Issues like air turbulence and vibration of the moving vehicle affected measurement quality and had to be compensated for. Measurement methods also had to be developed. In the end, the researchers were able to verify that the OBSI device delivered meaningful, reproducible results.

With the fully developed OBSI device, the researchers measured and ranked a wide variety of surface textures at over 45 locations in Florida, many on multiple days. Where possible, measurements were made both with the OBSI and a roadside device. An extensive database of measurements was compiled. Sound intensities were ranked, and various pavement mix parameters were correlated with sound measurements to determine their effect not only sound levels but also on frequency components of the sound. The project also developed standard operating procedures and other guidance documents for use of the OBSI device and training FDOT personnel on data collection.

This project laid a foundation for studying road noise and how it relates to pavement mixes, leading to quieter pavements and neighborhoods and less money spent on noise abatement.

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For more information, visit http://www.dot.state.fl.us/research-center