

## Priority, Market-Ready Technologies and Innovations

### Pavement Smoothness Methodologies

#### **Problem: Rough pavements contribute to inefficient roadways**

Pavement smoothness is probably the single most important indicator of performance from the standpoint of the traveling public. National surveys of road users list smooth pavements as a top highway characteristic. Rough or uneven pavements adversely affect driver safety, fuel efficiency, ride quality, and vehicle wear and tear. Rough pavements also negatively impact pavement durability.

#### **Solution: Improve pavement smoothness technologies**

Because of the public's focus on smoothness, any improvements made in both the initial and long-term smoothness of a roadway should lead directly to greater customer satisfaction.

*Why is pavement smoothness important?*  
The functionality and performance of smooth pavements is better than that of rough pavements. Furthermore, high levels of initial smoothness have been shown to have a significant effect on the future smoothness of pavements and also have been linked to increases in pavement life.

#### **Putting It in Perspective**

- In a 2002 Federal Highway Administration (FHWA) survey, road condition was cited as the public's number one criterion for satisfaction.
- A National Cooperative Highway Research Program analysis showed that improved smoothness extends pavement performance life by as much as 50 percent.

#### **Benefits**

- Ensuring pavement smoothness during initial construction saves money and improves durability over the life of the pavement.
- Pavement smoothness enhances the safety and mobility of the Nation's highways.

#### **Successful Applications: New products help improve the condition of the Nation's highways**

*American Association of State Highway and Transportation Officials (AASHTO) Provisional Standards*

The provisional standards for pavement smoothness, adopted by AASHTO in June 2003, provide a standard set of specifications and protocols to assure owner agencies that test results from inertial profilers are both repeatable and reproducible.

The provisional standards include the following components:

- MP11-03 Profiler Equipment Specification.
- PP49-03 Profiler Certification Program.
- PP50-03 Smoothness Measurement Test Methods.
- PP51-03 Pavement Smoothness Specification.

Ongoing research will enhance these provisional standards to full standards within 7 years. Active research conducted under the FHWA research contract, "Smoothness Criteria for Concrete Pavements" will provide answers to questions concerning the appropriate specification

limits, the value of enhanced smoothness, and methodologies for identifying localized roughness.

*National Highway Institute (NHI) course on pavement smoothness measurement*

A training course offered by NHI, Pavement Smoothness: Use of Inertial Profiler Measurements for Construction Quality Control (NHI 131100), is an integral part of the PP49-03 Profiler Certification Program. This training course highlights the appropriate application of inertial profilers for construction quality control.

*Pavement Profile Viewer and Analyzer (ProVAL) software*

Advanced profile analysis capabilities, developed to support the provisional standards, currently are available as part of the ProVAL software. This software provides advanced profile analysis techniques such as power spectral density and cross correlation. ProVAL software is available at <http://www.roadprofile.com>.

### Deployment Statement

Smoother roads perform better, last longer, and increase user satisfaction.

### Deployment Goal

By 2008, 58.5 percent of the travel on the National Highway System will be on facilities with a reported International Roughness Index of 1.5 meters per kilometer (95 inches per mile) or less.

### Deployment Status

FHWA has identified 10 States where opportunities exist to implement pavement smoothness methodologies: California, Illinois, Louisiana, Massachusetts, Michigan, Missouri, New Jersey, New York, Pennsylvania, and Texas.

In 2006, a series of workshops are planned in California, Iowa, Louisiana, Michigan, New Jersey, and Ohio.

### Additional Resources

After an agency has implemented an improved pavement smoothness specification based on results from the use of inertial profilers, methods for achieving these specifications must be provided to contractors. Best practice guides for pavement smoothness for both asphalt and concrete pavements are available from the FHWA Office of Pavement Technology. These guides provide concise information about measuring, expressing, specifying, and achieving pavement smoothness.

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