



LTPP Pooled Fund Study Update

The Federal Highway Administration (FHWA) sponsors the Transportation Pooled Fund (TPF) Program as a way for FHWA, interested States, and other organizations to partner when significant or widespread interest is shown in solving transportation-related problems. Partners may pool funds and other resources to solve these problems through research, planning, and technology transfer activities.

TPF studies cover a wide array of topics, from asphalt to work zones. Studies address pavement quality and composition, traffic monitoring and management, bridge design and repair, air quality, development of training modules, and safety for drivers, pedestrians, and construction crews as well as fish, deer, and bats. In many cases, the pooled fund process provides an effective mechanism to promote new technology. Technology transfer covers activities that lead to the adoption of a new technique or product. The TPF Program encourages States to include technology transfer activities in all pooled fund studies, but some projects focus solely on technology transfer.

A number of Long-Term Pavement Performance (LTPP)-related pooled fund studies have been completed or are now underway. These include:

Effect of Multiple Freeze-Thaw Versus Deep Frost Penetration on Pavement Performance

This study was completed in November 2006, and the final report has been published. The report documents the study, which evaluated pavement deterioration in various environmental settings. In addition, the report documents local adaptations in use to mitigate frost-related damage and the cost differences associated with constructing and maintaining pavements in various climates. The researchers used performance models developed from the LTPP database to predict and compare performance in various environments. As described in the report, the prediction models are an important tool in the calibration process outlined in the National Cooperative Highway Research Program (NCHRP) Guide for Mechanistic-Empirical Design of New and Rehabilitated Pavement Structures and in pavement management applications for State highway agencies (SHAs) with limited quantities of regional performance data.

Final Report: [Long-Term Pavement Performance \(LTPP\) Data Analysis Support: National Pooled Fund Study TPF-5\(013\)](#), FHWA-HRT-06-121, 2006

TPF-5(013), [Effect of Multiple Freeze-Thaw Versus Deep Frost Penetration on Pavement Performance](#)
Study Partners: AK, ID, IL, MI, NC, NY, OH, PA
For more information, contact Larry Wiser at larry.wiser@fhwa.dot.gov or 202-493-3079.

Falling Weight Deflectometer (FWD) Calibration Center and Operational Improvements

Many SHAs expressed interest in updating the FWD calibration software and equipment and in establishing a long-term plan for support of the calibration facilities and their services.

In September 2004, Cornell University received the contract to perform this work, which involved updating the calibration hardware, software, and procedures, as well as training and installing the new calibration system in the four Strategic Highway Research Program/LTPP calibration centers in Colorado, Minnesota, Pennsylvania, and Texas. This first phase is complete, and a draft final report is available at the Web site listed below. Work to be conducted during the next phase includes equipping two additional calibration centers in California and Indiana, providing technical support, performing quality assurance audits, developing a FWD data collection guide and a calibration video, holding a backcalculation workshop, and providing training and certifications for FWD calibration center operators and FWD operators.

Funding was sufficient to cover the initial phase of this project; however, work identified for the option years will be subject to additional contributions to the pooled fund study. Any new FWD calibration facilities should benefit greatly from the new calibration system, training, and technical support available through this pooled fund study. To take advantage of these products, a minimum annual contribution of \$10,000 is recommended for 2006 through 2009.

TPF-5(039), [Falling Weight Deflectometer \(FWD\) Calibration Center and Operational Improvements](#)
Study Partners: CA, CO, FHWA, GA, IA, IN, KS, MN, MS, MT, ND, NJ, NY, PA, SC, SD, TX, WA
For more information, contact Eric Weaver at eric.weaver@dot.gov or 202-493-3153.

Long-Term Pavement Performance (LTPP) Specific Pavement Study (SPS) Traffic Data Collection

This study to collect research quality traffic data is underway. We currently are collecting data from 18 SPS test sites, and we expect to collect data from at least 28 sites throughout North America by the end of this calendar year. Any SPS site that requires a new weigh-in-motion (WIM) system will receive one this calendar year in order to collect at least 5 years of traffic data needed for the SPS sites.

The approved WIM technologies used for this study are bending plate, load cell, and quartz sensor. Two of the SPS sites are instrumented with a load cell WIM system with the remaining test sites evenly instrumented with a bending plate or quartz WIM system. This study not only has standardized the type of equipment that can be installed at these high-priority LTPP test sites but also has standardized the scheme used for classifying vehicles at the sites installed by the installation contractor. Highway agencies that installed their own WIM sites are strongly encouraged to use this same scheme for classifying vehicles at their SPS sites. This will allow for consistency in classifying vehicles. The data collected from the sites are downloaded and checked daily for accuracy, then processed each week with the LTPP traffic analysis software.

Highway agencies are still encouraged to join this project through either an in-kind contribution or by instrumenting an SPS site (this calendar year) with one of the above approved WIM technologies.

TPF-5(004), [LTPP SPS Traffic Data Collection](#)
Study Partners: AL, AZ, CA, CO, CT, DE, FL, GA, ID, IL, KS, LA, MB, MD, MI, MN, MS, NM, NY, OH, PA, TN, TX, UT, VA, WA
For more information, contact Deborah Walker at deborah.walker@fhwa.dot.gov or 202-493-3068.

Improving the Quality of Profiler Measurement

Many reports and studies have indicated that a need exists to bring integrity to data collection for ride quality by establishing calibration processes and verification procedures. The American Association of State Highway and Transportation Officials (AASHTO) has developed provisional standards to assist SHAs with the implementation of quality assurance programs relating to ride quality data collection. FHWA initiated this pooled fund study to assist with the implementation of the AASHTO provisional standards and to establish a level of integrity to the measurements. The proposed standards include:

- AASHTO PP 50-02 "Standard Equipment Specification for an Inertial Profiler"
- AASHTO PP 51-02 "Certification of Inertial Profiling Systems"
- AASHTO PP 52-02 "Operating Inertial Profilers and Evaluating Pavement Profiles"
- AASHTO PP 53-02 "A Pavement Ride Quality Specification When Measured Using Inertial Profiling Systems"

One of the main objectives of this multiyear, multitasked study was to deliver a profile analysis software program. The Profile Viewing and Analysis (ProVAL) software enables users to view and analyze pavement profiles collected by pavement profile measurement equipment. Different equipment manufacturers use different data formats and standards, making it difficult to compare profiles collected by diverse brands of equipment. ProVAL is the first and only software application that can read data from numerous pavement profilers and unify them using a common data format.

Since its debut in 2001, ProVAL has consistently and continuously been improved to meet users' needs. The recent news about ProVAL is that, after almost 4 years in the making, the ProVAL native data format is now an ASTM International standard, and will be published this summer as "E 2560-07: Standard Specification for Data Format for Pavement Profile". For more information on the standard, visit the ProVAL Web site at www.roadprofile.com and the ASTM International Web site at www.astm.org.

The recent release of ProVAL version 2.72 includes new features that improve upon this free software tool. These features, which will change the way that the industry processes pavement profiles, include:

- Improved ride stats at interval module
- Enhanced profilograph module
- Improved reports including direct export to Excel®
- Additional export facilities
- Added import file formats
- More automated import of event markers

If you have any questions, contact 888-ProVAL2, send an e-mail to info@roadprofile.com, or visit the ProVAL forum at www.roadprofile.com.

TPF-5 (063), [Improving the Quality of Pavement Profiler Measurement](#)
Study Partners: CA, CO, CT, FHWA, FL, GA, IL, KS, KY, MS, ND, NJ, NY, OH, OK, PA, SD, TX, WI
For more information, contact Robert Orthmeyer at robert.orthmeyer@fhwa.dot.gov or 708-283-3533.

Profiler Rodeo Held at Minnesota Road Research Project (MnROAD) Site



Figure 1. Participants at the 2007 Profiler Rodeo

In the LTPP Program, profile data at General Pavement Studies (GPS) and SPS sections are collected by four regional support contractors (RSCs), each of whom use an International Cybernetics Corporation (ICC) MDR 4083 inertial profiler. These profilers are equipped with three laser sensors that collect data along the left and right wheel paths and along the center of the lane at 25-millimeter (mm) intervals.

After completion of data collection, researchers use the ProQual software to compute profile data at 150-mm intervals along the left and right wheel paths. This computation is performed using a 300-mm moving average on the profile data collected at 25-mm intervals. After performing quality assurance checks, the researchers upload these data to the LTPP database. FHWA stores the profile data collected at 25-mm intervals at the regional offices.

From May 14-18, 2007, researchers performed a comparison test between the four ICC profilers used by the LTPP RSCs. The comparison test was performed at the MnRoad facility in Albertville, MN. This was the second comparison of the four LTPP ICC profilers since they went into operation in August 2002. The K. J. Law T-6600 profiler that is operated by the North Central RSC also was part on the comparison test. This profiler is equipped with three infrared sensors and collects data along the left and right wheel paths and along the center of the lane.

Five test sections were used for profile testing, and one test section was used to evaluate the accuracy of the distance measuring instrument (DMI).

The purpose of the profiler comparison test was to (1) evaluate the static accuracy of the height sensors in the profilers, (2) evaluate the results from the bounce test, (3) evaluate the accuracy of the DMI, (4) compare International Roughness Index (IRI) values obtained by the LTPP profilers with those from the Dipstick®, (5) compare the IRI values between the four profilers, and (6) compare the profiles obtained by the profilers.

A report summarizing the activities conducted during the comparison test and the results of the comparison between the LTPP profilers will be made available by FHWA through the LTPP Customer Support Service Center. For more information on this center, send an e-mail to ltppinfo@fhwa.dot.gov. For more information on these tests, contact Larry Wiser at larry.wiser@fhwa.dot.gov or 202-493-3079.

In Brief

The 19th Annual Road Profiler User's Group Meeting, October 14-17, 2007, Danville, VA

The purpose of this conference is to serve as a forum for the exchange of information between end users, data collectors, vendors, construction and design engineers, consultants, and researchers who have an interest in road profiles and pavement smoothness. The conference is intended for engineers and researchers in pavement and its related fields at all levels of government, contractors, consultants, universities, equipment manufacturers, and vendors. For more information, visit www.rpug.org.

Recently Published LTPP Reports

[LTPP 2006 Year in Review](#), FHWA-HRT-07-028.

Improving the productivity and mobility of the national highway transportation system are key goals of FHWA. During 2006, the LTPP program worked toward these goals through its efforts to provide answers to "how" and "why" pavements perform as they do.

[Long-Term Pavement Performance Program \(LTPP\) Materials Reference Library \(MRL\)](#), FHWA-HRT-06-116.

The purpose of this document is to provide information to individuals interested in obtaining materials from the MRL.

[Long-Term Pavement Performance Program Manual for Falling Weight Deflectometer Measurements](#), FHWA-HRT-06-132. This manual is intended for use in collection of FWD data for the LTPP Program. As such, it contains background information on FWD equipment and the general role of FWD testing within LTPP as well as a set of field operations guidelines for the data collection process.

For more information about the LTPP Program, visit www.fhwa.dot.gov/pavement/ltpp.

FHWA-HRT-07-047