LTPP Newsletter

U.S. Department of Transportation
Federal Highway Administration

Volume 6, Issue 4 Fall 2010

1,000,000 Miles and LTPP Profilers Are Still Collecting Quality Data

Four longitudinal high speed road profilers have been in-service since 2002 and collectively have exceeded 1,000,000 travel miles. Due to the concern over the age and mileage on this fleet of Long-Term Pavement Performance (LTPP) profilers and as part of normal LTPP operations, a side-by-side comparison test, called a "Profiler Rodeo," was conducted in May 2010 at the MnROAD Facility operated by the Minnesota Department of Transportation. This article discusses the LTPP quality control practices, results of the rodeo, and profiler resources available from LTPP.

The current LTPP high speed profilers, operators, and staff at the May 2010 Profiler Rodeo.

Profiler Rodeos are just one part of the quality management program developed by LTPP for longitudinal profile data. Quality data checks on LTPP profiler data collection used over the years include:

- Daily measurements of laser sensor calibration and accelerometer calibration checks, in addition to a bounce test check.
- Use of acceptance procedures developed by LTPP to check the variability between repeat measurements on the same day, and to detect anomalous "spikes" and other data measurement problems.
- Monthly calibrations of the distance measurement instrument (DMI), laser height sensors, accelerometers, and air temperature thermometer.
- Regional profile checks against the reference measurements conducted during profile rodeos.
- A single pavement section which is typically not a LTPP test section that serves as the "control-reference" profile test section near the LTPP regional offices. Frequent measurements are performed on this section over time as a system stability check.

The May 2010 Profiler Rodeo comparison test was the fourth one between the current fleet of LTPP profilers. The first test was performed in 2002 as part of the procurement acceptance protocol. Two other comparison rodeos were performed in July 2003 and May 2007. The objectives of this latest rodeo were to:

- Evaluate the static accuracy of the height sensors in the profilers.
- Evaluate the results from the bounce test.
- Evaluate the accuracy of the DMI.
- Compare International Roughness Index (IRI) values obtained by the profilers with those obtained from the Dipstick and SurPRO (a manually operated rolling inclinometer profiler) reference devices.
- Compare the profiles obtained by the profilers.
- Compare the IRI values between the profilers.
- Evaluate the repeatability and accuracy cross correlation values for each profiler.

The tests were conducted on six test sections at MnROAD. Three Portland cement concrete, two dense graded asphalt concrete, and one chip seal-surfaced test sections with varying levels of roughness were used for the comparison. While some minor technical issues were discovered from these tests, overall the LTPP profilers were judged as providing acceptable research quality measurement results that are interchangeable between devices.

The following resources to further investigate this topic include:

- The LTPP Manual for Profile Measurements and Processing (FHWA-HRT-08-056) contains forms, procedures, and details of checks, calibrations, and tests that were performed on the LTPP devices and is available online. This document is also contained in the LTPP Reference Library distributed as part of the Standard Data Release.

- The formal report on the findings from the May 2010 Profiler Rodeo investigation.

- Raw data and reports from the LTPP profiler side-by-side comparison tests dating back to the original studies conducted in 1990.

The LTPP approach to performing inertial profiler comparisons can be used by DOTs to compare the State's inertial profiler equipment and determine whether or not the devices are all performing in a similar manner. The procedures used by LTPP to maintain, evaluate, and use inertial profilers have contributed to the longlife of the LTPP profilers and their continuing ability to collect roughness data for the program.

To obtain information on the LTPP approach to quality management of longitudinal profile data collection and LTPP operational guidelines, contact the LTPP Customer Support Service Center at ltppinfo@dot.gov.

For more information about the Profiler Rodeo, contact Larry Wiser at larry.wiser@dot.gov or (202) 493-3079.

LTPP Completes Transition of IMS Operations to the Federal Highway Administration (FHWA)

In 2009, we reported that the LTPP Information Center at the Turner-Fairbank Highway Research Center (TFHRC) had successfully set up a new state-of-the-art server to store LTPP information. This was the first step in integrating the LTPP Information Management System (IMS) as part of the daily LTPP program activities. This year, we are pleased to report that the transition of all LTPP IMS Operations to FHWA is complete.

The LTPP IMS consists of the Pavement Performance Database (PPDB) and the Ancillary Information Management System (AIMS). The PPDB contains pavement-related data, computed parameters, and summary weather and traffic data. It currently has 330 million data records. The AIMS is the collection of LTPP information that is not contained in the PPDB. This information includes all documents, videos, photos, raw data files, software, manuals, and protocols created as part of the LTPP program. The AIMS repository contains 2.2 million files and is updated annually. The entire data warehouse—PPDB and AIMS—consumes 4.5 terabytes of storage on the LTPP repository.

To preserve this national information database, which is designed to support pavement, traffic, and other transportation disciplines into the future, the FHWA completed the following activities:

- Established a secure room on Government property for the LTPP Information and Customer Support Center.

- Installed a secure and state-of-the-art database server.

- Installed the production PPDB on the server.

- Loaded all AIMS files on the server.

- Hired a dedicated database administrator to handle all database and file operations.

- Established a physical research library containing paper copies of all significant LTPP legacy, analysis, and program documents.

- Awarded a contract to provide safe, offsite storage of the LTPP data backups.

The LTPP Information and Customer Support Service Center in a secured room at the FHWA TFHRC.

With the completion of these activities, the LTPP Team is in the process of developing a strategic plan for LTPP IMS activities for the next 5 years. This process, which began more than a year ago and includes inputs from stakeholders such as the Transportation Research Board (TRB) LTPP Committee and TRB Expert Task Group on LTPP Special Activities, is helping to shape the next steps in the LTPP IMS plan with a focus on making the IMS easier to use.

Part of making the IMS easier to use is making the LTPP data and AIMS files more available to users. Two significant projects that support this objective are underway. The first is a re-design of DataPave Online with a geographic data review and selection interface and enhanced data extraction utilities. Look for a public version in 2011. The LTPP Program is also re-designing the IMS platform from a client-server infrastructure to a Web-centric operations environment.

For more information, contact Jane Jiang at jane.jiang@dot.gov or (202) 493-3149.

LTPP Performance Forecast

Developed as part of the "Effect of Multiple Freeze-Thaw Versus Deep Frost Penetration on Pavement Performance" Pooled-Fund Study, TPF-5(013), the LTPP Performance Forecast product produces freeze/thaw performance predictions for both rigid and flexible pavements. These predictions are based on regression models using data available from approximately 800 in-service test sections in the LTPP database. These sections consist of a variety of climates with various subgrade types and a range of loading conditions. Using the LTPP Performance Forecast, users can compute roughness, structural cracking, environmental cracking, rutting, and faulting predictions as a function of pavement age. The forecasts are based on user-defined inputs for traffic, structure, environment, and subgrade conditions.

Complete details on model development and the pooled fund study can be found in the final report, *Effects of Multiple Freeze Cycles and Deep Frost Penetration on Pavement Performance and Cost* (FHWA-HRT-06-121). Since the main objective of the study was to quantify the impacts of frost on pavement performance, the models developed and implemented in this application cover both frost and non-frost regions and are applicable to a range of climates.

While the LTPP Performance Forecast is not a pavement design program, it can be used to help agencies check and calibrate a mechanistic empirical-based pavement design program (i.e., the *Mechanistic Empirical Pavement Design Guide* (MEPDG)) against local conditions. The MEPDG was developed using national models that represent average performance trends throughout the United States; however, there are significant differences in pavement performance across the United States based on various local environmental conditions. Agencies should consider calibrating the MEPDG for their local conditions by adjusting MEPDG calibration factors. Procedures on how to use the LTPP Performance Forecast to calibrate MEPDG models to local conditions are described in the final report. This is particularly useful for agencies that do not have measured pavement performance data available for calibration purposes.

The LTPP Performance Forecast can be used by State, county, and local agencies to forecast or estimate performance trends for pavement sections of interest in specific user-defined environmental settings. Similarly, the LTPP Performance Forecast could also be used to check and develop pavement performance trends used in an agency's pavement management system. The online application can be found at www.ltpp-products.com.

For more information, contact Larry Wiser at larry.wiser@dot.gov or (202) 493-3079.

Thank You for Saying "Yes" When We Called

Fifty pavement specialists from State Highway Agencies (SHAs), universities, and consulting firms across the country met at the Arnold and Mabel Beckman Center of the National Academies in Irvine, California, for 3 days in the late summer to develop recommendations for improvements to the FHWA's Strategic Plan for LTPP Data Analysis.

This LTPP Pavement Analysis Forum was jointly planned and implemented by the FHWA's LTPP Team and the TRB LTPP Committee to enable these specialists to set aside their regular duties for a few days and apply their energies and expertise to reviewing the Strategic Plan's targeted analytical outcomes and the descriptions of the projects that would yield these outcomes, and to revising and enhancing these outcomes and projects.

The forum was designed to identify, define, and prioritize the analytical studies that will produce results that can be further developed and combined into products that SHAs as well as others can use to help design, build, and maintain—on a mechanistic/empirical basis—existing and future highway pavements.

The forum consisted of opening and closing plenary sessions, but the forum format consisted primarily of breakout meetings of small work groups. Work groups were created to focus on each of the Strategic Plan's seven specific objectives, and to review, revise, and enhance the work in each to heighten its relevance to the needs of the SHAs. A total of 124 analysis outcomes, project definitions, or problem statements were developed.

The forum's output was compiled and provided to the TRB LTPP Committee and its traffic and special activities Expert Task Groups for their review and recommendation for implementation in 2011 and beyond.

This forum could not have happened without the dedication and support from those who attended and even those who wanted to participate but had other engagements. As Aramis López, the LTPP Team Leader stated in his opening and closing remarks at the forum, "thank you for saying yes when we called."

For more information, contact Larry Wiser at larry.wiser@dot.gov or (202) 493-3079.

In Brief

LTPP Meetings at the TRB 90th Annual Meeting

If you are in Washington, D.C. for the 2011 TRB Annual Meeting, please make plans to attend the LTPP State Coordinators' Meeting on Sunday, January 23 and the LTPP Box Session on Monday, January 24. More information about each meeting can be found at the TRB Web links below where you can also easily add the meetings to your TRB schedule.

Long-Term Pavement Performance State Coordinators' Meeting
Sunday, January 23, 2011
Session 147, 9:30 a.m. to 12:00 noon
This year's meeting will focus on States' use of LTPP data and products, and Victor Mendez, FHWA Administrator, will provide the opening remarks.
http://pressamp.trb.org/conferenceinteractiveprogram/EventDetails.aspx?ID=20242&Email=

Long-Term Pavement Performance Box Session
Monday, January 24, 2011
Session 265, 10:15 a.m. to 12:00 noon
This year's meeting will focus on collecting quality weigh-in-motion data.
http://pressamp.trb.org/conferenceinteractiveprogram/EventDetails.aspx?ID=20826&Email=

In addition, all attendees of the TRB Annual Meeting are welcome to attend, without registration or fee, the following session:

TRB Data Analysis Working Group (DAWG) Forum on Pavement Performance Data Analysis
Saturday, January 22, 2011, 9:00 a.m. to 6:00 p.m.
The DAWG sponsors this forum to discuss methods of pavement performance data analysis.
http://pressamp.trb.org/conferenceinteractiveprogram/EventDetails.aspx?ID=20236&Email=

Standard Data Release 25 Is Coming Soon

The next release of the LTPP database will be distributed at the TRB 90th Annual Meeting in January 2011. To get your copy, visit the LTPP booth during TRB week. Otherwise, you can request a copy of SDR 25 by contacting the LTPP Customer Support Service Center at ltppinfo@dot.gov or (202) 493-3035.

LTPP Keeps Rolling

The September/October 2010 issue of *Public Roads* magazine includes an article that describes the LTPP program's history and future direction. Click here to read more about how LTPP has impacted pavement engineering over the last 20 years and how it will influence the industry into the future.

To learn more about the LTPP program and products, visit: www.fhwa.dot.gov/pavement/ltpp/index.cfm or contact the LTPP Customer Support Service Center at ltppinfo@dot.gov or (202) 493-3035.

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