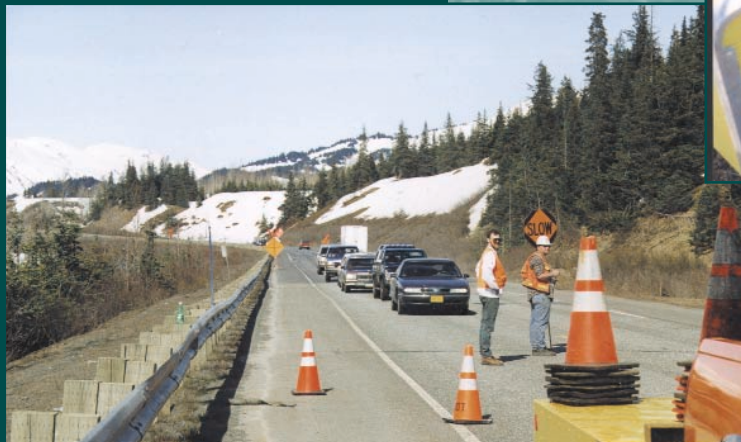
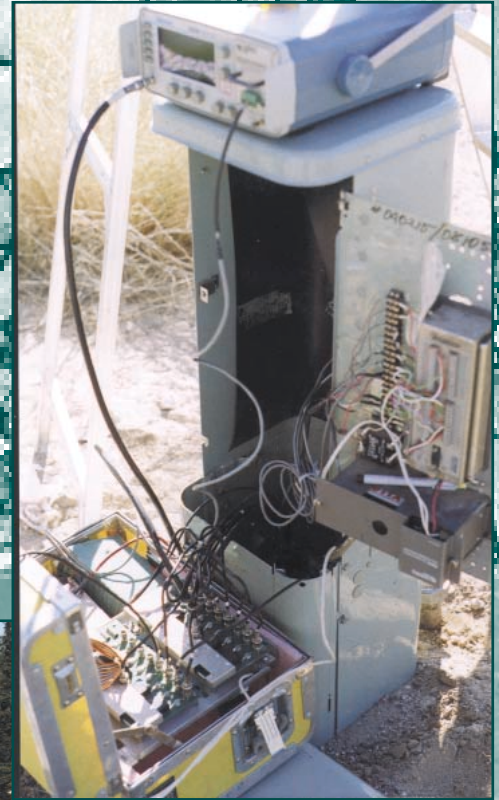


LTPP: 2002 YEAR IN REVIEW



U.S. Department
of Transportation
**Federal Highway
Administration**

INTRODUCTION

In 2002, as in previous years, the Long Term Pavement Performance (LTPP) program continued working to provide a better understanding of the "hows" and "whys" of pavement performance. This report outlines LTPP's 2002 program area accomplishments and provides an overview of key initiatives that LTPP will pursue in 2003.

Understanding pavement performance is vital to building and maintaining highway systems. Pavements carry all kinds of vehicular traffic for commerce and recreation, and they are critical to our Nation's economic well-being. Understanding how and why pavements perform as they do can improve the produc-

tivity and mobility of the national highway transportation system.

For several years now, the Federal Highway Administration's (FHWA) LTPP program focused on how and why pavements perform the way that they perform. LTPP collects data from more than 2,500 pavement sections in the United States, analyzes these data, and then translates these insights into products and information for pavement design, rehabilitation, maintenance, and management.

In 2002, LTPP continued to improve the quality and quantity of data in the LTPP database by completing an extensive review of the materials database and an action plan that addresses any gaps in the data. LTPP also reexamined the Specific Pavement Studies (SPS) test sections. In particular, LTPP evaluated the edge drain performances at the SPS-1, SPS-2, and some of the SPS-6 sites in 2002. Work also continued on the LTPP SPS Traffic Data Collection Pooled Fund Project; 18 States committed \$2 million to the project to date.

LTPP completed several data analysis projects in 2002. One project, "Review of LTPP Layer Thickness Data," resulted in a new guide entitled, *Research Guide to the Long Term Pavement Performance Thickness Data*, which

will be published in Spring 2003 by FHWA. This guide will help LTPP database users understand the differences between (and, thus, appropriate uses of) the layer thickness data found in different database tables. In addition, as a result of LTPP data analysis completed in 1999, *Temperature Predictions and Adjustment Factors for Asphalt Pavements*, (FHWA-RD-98-085), the American Association of State Highway and Transportation Officials (AASHTO) adopted standard T317-02, "Prediction of Asphalt-Bound Pavement Layer Temperatures," and balloted a second standard, "Recommended Practice for Application of Temperature Adjustment Factors to Backcalculated Asphalt Modulus, Deflections, and Deflection Basin Characteristics."

Also in 2002, LTPP developed two new products—the Seasonal Monitoring Program (SMP) CD-ROM and the Resilient Modulus (M_R) CD-ROM. The SMP CD-ROM provides a comprehensive collection of information related to SMP data, installation, and research reports, and includes SMP data from the LTPP database and related computed parameters. The M_R CD-ROM provides a comprehensive package of information and data related to M_R . It includes an interactive M_R guide and FHWA's *LTPP Materials Characterization Program: Resilient Modulus of Unbound Materials (LTPP Protocol P46) Laboratory Startup and Quality Control Procedures* (FHWA-RD-96-176).

As in previous years, LTPP's partners remained strong in their support of the program in 2002. The States and Provinces, AASHTO, the Canadian Strategic Highway Research Program (C-SHRP), the Transportation Research Board (TRB), and FHWA all continued to play key roles in helping the program achieve its goals.

ACCOMPLISHMENTS 2002

Data

In 2002, LTPP continued to improve the quality and quantity of data in the LTPP database.

Results of this work included an extensive review of the SPS materials data, which identified gaps in the LTPP database. Some of these gaps will be addressed as States complete their SPS project material testing. To complete the remaining gaps, LTPP developed an action plan that includes a new material testing contract. Awarded in 2002, the new contract will complete the resilient modulus test on bound and unbound materials.

LTPP also completed data collection on the condition of the edge drains at the SPS-1, SPS-2, and some SPS-6 sites. The project's objective was to determine drain conditions and functioning levels to ensure that LTPP's drainage analysis is complete and relevant. Edge drain videos and reports were sent to the respective LTPP State Coordinators. The information is available through LTPP Customer Service at ltppinfo@fhwa.dot.gov. In addition, the data collected from this project will be added to the LTPP database.

Late in 2002, LTPP awarded a contract for using ground-penetrating radar (GPR) to determine the layer thicknesses of all SPS-1 test sections. This contract award also included one each of the following sites: SPS-2, SPS-5, and SPS-6. GPR provides accurate layer thickness measurements for flexible pavements, but its layer thickness measurements for rigid pavements may not be as accurate. LTPP therefore conducted a pilot study, using the impact echo hammer to determine the layer thickness

measurements. The pilot was conducted on the same SPS-2 site that researchers evaluated using the GPR. As of this report date, the comparison of these two methods is still in process.

LTPP also continued its work on the SPS Traffic Data Collection Pooled Fund Study¹. In 2002, LTPP completed a series of pilot studies to verify the feasibility of performance and field procedures. The pilots looked at both piezo and bending plate sensor systems installed in asphalt and portland cement concrete pavements. The traffic pooled fund study is a two-phase project, with the first phase assessing, calibrating, and evaluating current LTPP Weigh-in-Motion systems. FHWA is in the process of soliciting requests for proposals for the first phase of this study. The second phase will procure, install, and maintain the new Weigh-in-Motion systems.

To improve the quality and quantity of traffic data, LTPP released version 1.1 of the LTPP Traffic Analysis Software in 2002. The most notable changes to the new release include adding graphing capabilities, populating the site equipment information, and expanding the processing capability for populating the database.

LTPP awarded a new 5-year technical support contract in 2002, along with a contract for the purchasing and maintaining four new road-profiling systems.

Analysis

In 2002, FHWA completed four data analysis projects and awarded three new LTPP data analysis contracts.

Work continued on LTPP's first data analysis pooled fund study, "Effect of Multiple Freeze-Thaw versus Deep Frost Penetration on

¹ LTPP SPS Traffic Data Collection Pooled Fund Project TPF-5(004) was initiated in 2000 to improve the quality and quantity of monitored traffic data (volumes, classifications, and weights) from the program's SPS-1, SPS-2, SPS-5, SPS-6, and SPS-8 projects.

FHWA LTPP Data Analysis Projects

Completed in 2002²

- ◆ Review of LTPP Layer Thickness Data
- ◆ Review of SPS-8 Experiment
- ◆ Review of LTPP Joint and Crack Load Transfer Data
- ◆ Seasonal Variations in Unbound Pavement Materials

Pavement Performance.” Early in 2002, the project’s technical advisory panel convened and finalized the project statement. The group will pursue the project through one of LTPP’s new data analysis contracts.

In the spring of 2002, the TRB Data Analysis Expert Task Group (ETG)

reviewed and updated FHWA and TRB’s *Strategic Plan for Long Term Pavement Performance Data Analysis* and TRB’s ETG’s *Long Term Pavement Performance Data Analysis Program* documents. The current versions of both documents are posted at www.tfhrc.gov/pavement/ltp/analysis.htm.

Products

LTPP’s product work in 2002 resulted in several new offerings, including the release of two CD-ROM products. The SMP CD-ROM set features three CDs that contain all the documentation and data from LTPP’s Seasonal Monitoring Program. The set provides the information needed to develop a basic understanding of the impact of diurnal, seasonal, and annual variations on pavement responses and properties from the separate and combined effects of temperature, frost penetration, and moisture.

The M_R CD-ROM contains digitized versions of three videotapes (originally created by the Minnesota Department of Transportation) that explain LTPP’s unbound resilient modulus laboratory test and procedures, and include a copy of the 1993 AASHTO *Guide for Design of Pavement Structures*, which outlines the process for measuring M_R .

The TRB-LTPP Product Subcommittee continued to plan LTPP product development and delivery. Status of the subcommittee projects

proposed in 2001 for possible National Cooperative Highway Research Program (NCHRP) funding is as follows:

- ◆ Guidelines for Determining As-Built Material Properties Characteristics for Highway Agency Applications: *Not recommended for funding.*
- ◆ Guidelines for Integrating Measurement Variability in Network PMS Condition Data Collection and Analysis: *Recommended pursuing the project. However, FHWA will initiate the project in 2003.*

Status of the subcommittee projects proposed in 2001 for pooled funding is as follows:

- ◆ Improving the Quality of Pavement Profiler Measurement (formerly known as Pavement Profiler Procurement, Calibration, and Maintenance and Operations Guidelines). *Pooled fund effort initiated.*
- ◆ Falling-Weight Deflectometer (FWD) Calibration Center and Operational Improvements. *Pooled fund effort initiated.*
- ◆ Evaluation and Implementation of Resilient Modulus for Unbound Materials Test Procedures. *Delayed pending evaluation of the M_R CD-ROM.*

FHWA’s Office of Pavement Technology also continued its work with several LTPP products in 2002. These included the profile viewer software, Web-based “Guidelines for Temperature Adjustment of Falling Weight Deflectometer Results,” “Pavement Practice Manual,” and two National Highway Institute courses: 131062 Portland Cement Concrete Evaluation and Rehabilitation, and 131063 Hot-Mix Asphalt Evaluation and Rehabilitation.

Finally, FHWA’s Midwestern Resource Center and the California Department of Transportation (Caltrans) continued work on “Anytime Weather,” a climatic database.

² LTPP awarded three new data analysis contracts in 2002. All work on ongoing projects was completed in 2002. No new projects were initiated in 2002.

GETTING THE WORD OUT

Meetings

Each year, FHWA LTPP staff and contractors make presentations at various industry trade association and governmental meetings throughout the United States. In 2002, these activities included the LTPP Box Session, State Coordinators Meeting, LTPP International Coordinators Meeting, and several other LTPP presentations at the 2002 TRB annual meeting.

In February 2002, LTPP participated in the Texas LTPP Coordinators "Real Results on Real Roads" meeting in Austin, TX. In May 2002, LTPP made several presentations and staffed an exhibit on the traffic pooled fund study at the 2002 North American Travel Monitoring Exhibition and Conference in Orlando, FL. Also in May, LTPP presented products at the Eastern Resource Centers Pavement and Materials Engineers meeting in Saratoga Springs, NY. Then in June, LTPP presented "LTPP: Looking to the Future" at the Southeastern Pavement Conference in Nashville, TN. Later in June, LTPP presented "LTPP Products for Local Agencies" at the Southern Regional Local Technical Assistance Program Technology Transfer Centers Meeting in San Juan, PR, and again in September at the Southeastern Local Roads Conference in Myrtle Beach, SC.

Throughout the year, LTPP met with State highway agencies in Georgia, New York, Maine, New Mexico, Virginia, and Texas. The SPS Traffic Data Collection Pooled Fund Study was among other issues presented.

Workshops/Contests

FHWA and the American Society of Civil Engineering completed the third International

Contest on LTPP Data Analysis in 2002. A new category—the Curriculum—was added this year to recognize the use of DataPave in an educational setting, with six prizes awarded in four categories.

To test the beta version of the SMP CD-ROM, FHWA held an SMP beta testing workshop in Arlington, VA, on June 20 and 21. Participants provided valuable feedback and useful suggestions throughout the workshop.

Publications

LTPP continues to update the highway community on LTPP research findings, products, and field applications through its tech briefs, product briefs, and application notes. Tech briefs provide concise summaries of recent LTPP data analysis projects. Product briefs provide overviews of specific products, along with technical background, key features, and product benefits. Application notes describe how some States are using LTPP products or analysis findings and benefiting from these applications.

Research Reports

FHWA published several research reports documenting FHWA-sponsored LTPP data analysis in 2002. The published reports contain research findings that are of broad interest. Copies of the reports are distributed to State and Provincial highway agencies, FHWA headquarters and field offices, members of TRB committees advising LTPP, and other interested parties. Reports for a more limited audience are distributed on a limited basis. LTPP research reports with a limited interest and distribution are submitted to the National Technical Information Service to provide a readily accessible public record of work that was completed, but not formally published.

LTPP announces research results through its Web site; meetings; publications; and interactions with State highway agencies, industry trade associations, and professional societies. In 2002, LTPP continued to spread the word about the program and its results through as many venues as possible.



Web Site

LTPP's Web site provides information on the program's ongoing research activities and the products and reports that result from these activities. In 2002, LTPP added a customer satisfaction questionnaire to its Web site to glean information that will yield better service and support to customers. As in previous years, LTPP continued to publish the results of its analytical findings in the Web site's Library section. Viewers can access information quickly about the latest LTPP research reports, product briefs,

application notes, and resource documents in this section.

Similarly, updates and new information on LTPP's analysis and product efforts are posted on an ongoing basis. In 2002, LTPP continued to use the Web site as a key information source for its pooled fund studies—the Traffic Data Collection, the FWD Calibration Center and Operational Improvements, and Quality Improvements for Profile Measurement. This section provides the most up-to-date status, information, and background for the pooled fund studies.

FUNDING

The Appropriation Act for FY 2002 authorized approximately \$9.04 million of LTPP's funding in 2002. When the Transportation Equity Act for the 21st Century (TEA-21) was passed in May 1998, LTPP's total budget was effectively reduced by about one-third. Throughout FY 1998 to 2001, AASHTO's Board of Directors allocated approximately \$13.27 million in NCHRP funding for the LTPP program. The Appropriation Act for FY 2002 changed funding by providing an additional \$10 million in RABA for the LTPP and SuperPave programs.

Approximately \$7.63 million of the TEA-21 funds, along with \$3.1 million of the RABA funds, were used for LTPP data collection field operations in 2002. Without the additional RABA funding, LTPP would not have been able to collect all necessary data. LTPP's analysis program received approximately \$580,000 from TEA-21 funds in 2002, plus another \$350,000 from RABA funds. For product development, \$200,000 came from TEA-21 funds. For communication and coordination activities, \$634,000 was allocated from TEA-21 funds, \$200,000 from RABA.

The Appropriation Act for Fiscal Year (FY) 2002 changed funding by providing an additional \$10 million in Revenue Aligned Budget Authority (RABA) for the LTPP and SuperPave® programs.

THE PARTNERSHIP

LTPP is a partnership with State and Provincial highway agencies, TRB, AASHTO, C-SHRP, and FHWA, all of which are deeply involved in and essential to the program's success.

The States And Provinces

As owners of the LTPP test sections, the State and Provincial highway agencies invested significantly in the program. They designated the test sites, constructed the test sections, supplied test materials, and collected data from the test sites. They provided and continue to provide traffic data and support test section performance monitoring on an ongoing basis. Because they use and apply program results, State and Provincial highway agencies are LTPP's primary customers.

The States also play a key role in LTPP-initiated pooled fund studies. Several States support the LTPP's current SPS Traffic Data Collection Pooled Fund Study. A number of States also support LTPP's data analysis pooled fund project, "Effect of Multiple Freeze-Thaw versus Deep Frost Penetration on Pavement Performance."

The Provinces' participation is through C-SHRP. Launched in 1987, the program coordinates Canadian involvement in the U.S. Strategic Highway Research Program.

Transportation Research Board

TRB operates several committees that provide input and advice on LTPP's research and implementation activities. Committee members come from the State and Provincial highway agencies, industry, academia, and the international highway community, and the TRB-LTPP

Committee provides management-level input on LTPP's conduct. In addition, a product subcommittee and several topic-specific ETGs that supply technical review and input for key program areas. The dedicated volunteers who serve on these committees are tremendous assets to LTPP.

In 2002, a change was made to the TRB-LTPP Committee's structure, and established a new ETG for LTPP Database Development and Operations. The new group will provide technical guidance on database-related issues including accessibility, long-term maintenance and operation, and further database development.

The TRB-LTPP Committee also published *Fulfilling the Promise of Better Roads*³ in 2002. The 65-page document outlines and discusses issues associated with completing the LTPP mission.

American Association Of State Highway And Transportation Officials

AASHTO plays a critical role in LTPP. From recruiting test sections to adopting LTPP-developed methods, procedures, and guidelines as standards for pavement engineering, AASHTO provides the collective leadership for many of the program's successes to date.

In 2002, LTPP worked with the AASHTO Subcommittee on Materials to review and update the calibration procedures for FWDs. LTPP representatives also served on the Technology Implementation Group's Panel for the implementation of GPR technology for pavement evaluation. LTPP will continue to work with AASHTO through the Technology

³ *Fulfilling the Promise of Better Roads* is available from the TRB Business Office, National Research Council, 500 Fifth Street, NW, Washington, DC 20001 (telephone 202-334-3213; fax 202-334-2519). It also can be obtained through the Internet at www.TRB.org or www.nationalacademies.org/trb.

Implementation Group, the Subcommittee on Materials, the Joint Task Force on Pavements, and other committees as needed.

Federal Highway Administration

FHWA's Office of Infrastructure Research and Development manages LTPP's day-to-day research operations. Specific activities include collecting, processing, and disseminating data; orchestrating national analysis activities; and coordinating and communicating the LTPP program. FHWA's Resource Centers, Division

Offices, and the Office of Pavement Technology also play key roles in the LTPP program. The Office of Pavement Technology leads LTPP product development and product packaging activities for delivery. FHWA Resource Centers help conduct LTPP data collection and lead LTPP product delivery to the States, Divisions, and highway industry. In addition to assisting with product delivery, technical support, and overall coordination and communication, the Division Offices work directly with the States that support LTPP's data collection efforts.



THE FUTURE

*In 2003, LTPP will continue its mission to provide a better understanding of the “hows” and “whys” of pavement performance. It will do so by supplying the information and tools highway engineers and managers need to design, build, and maintain long-lasting and cost-effective pavements. Throughout 2003, LTPP will develop a budget request for the new legislation that will cover FY 2004-2009, using a variety of sources, including TRB’s publication **Fulfilling the Promise of Better Roads**, which assesses the program’s status and identifies crucial program needs during this timeframe.*

Data

In 2003, LTPP will continue to focus on improving the quality and quantity of data in the LTPP database, and work to address gaps in the materials data through the Materials Data Action Plan. LTPP also will award two contracts for phases 1 and 2 of the SPS Traffic Data Collection Pooled Fund Study.

Analysis

In 2003, LTPP will continue to pursue a programmatic approach to achieving the objectives defined in the 1999

Strategic Plan for LTPP data analysis. The FHWA LTPP staff will continue to work with the TRB-LTPP Committee, the TRB ETG on LTPP Data Analysis, AASHTO, NCHRP, and others to coordinate a national analysis program that will

achieve the plan’s defined outcomes. FHWA will devote analytical resources to continuing the ongoing systematic review and evaluation of LTPP data that is needed to support subsequent analyses.

Products

LTPP will continue ongoing product development projects, such as holding a DataPave workshop for State engineers and consultants in 2003, and promoting the use of DataPave through its work with the American Society of Civil Engineering on the International Contest on LTPP Data Analysis.

LTPP also plans to complete work on the climatic database, “Anytime Weather,” in 2003 and begin developing DataPave as an online tool.

Communication And Coordination

In 2003, FHWA will continue to explore new venues for keeping LTPP partners and customers up-to-date on its work and research results.



**Visit Us On The Web At
www.tfhrc.gov/LTPP.htm**



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