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PRODUCT BRIEF

Long-Term Pavement Performance Bind Online

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This document provides an overview of the Long-Term Pavement Performance Bind Online functionality.⁽¹⁾ Details are provided in the LTPPBind Online User Guide (FHWA-HRT-17-010).⁽²⁾

Objective

This Product Brief introduces the reader to the Long-Term Pavement Performance Bind (LTPPBind) Online Web-based tool for selecting asphalt binder performance grades (PGs).⁽¹⁾ It explains what the tool is, who can benefit from its use, what its main features are, and how and where potential users can find more information.

Introduction

Initial specifications for the Strategic Highway Research Program's Superpave® asphalt binder PGs were based on the lowest and highest temperatures expected at a site.⁽³⁾ Later, the LTPP Program used data from the Seasonal Monitoring Program to quantify the relationship between air and pavement temperatures. This evaluation resulted in the development of

improved low and high pavement temperature models for selecting Superpave® asphalt binder grades.⁽³⁾

The current version of the LTPPBind 3.0/3.1 software uses degree days over 10 °C as the climatic value in a transfer function for high-temperature (HT) PG.⁽⁴⁾ The transfer function was developed by taking advantage of the integrated climatic model and the Mechanistic-Empirical Pavement Design rutting concepts.

LTPPBind Online is a new Web-based tool that helps State transportation departments select the most suitable binder PG for asphalt concrete pavement at a particular site based on the American Association of State Highway and Transportation Officials (AASHTO) M320-10 and AASHTO M332-14 standards.^(1,5,6) The algorithms for calculating

the high and low temperatures are the same as the LTPPBind 3.0/3.1 software.⁽⁴⁾

LTPPBind Online allows the use of National Aeronautics and Space Administration (NASA) Modern-Era Retrospective Analysis for Research and Applications (MERRA) climatic data, LTPP climatic data, or manual data.^(1,7) Based on the selected climatic data source, the maximum allowable rut depth, depth of pavement layer, base HT PG, equivalent single-axle load (ESAL) traffic volume, and traffic speed, LTPPBind Online is able to do the following:⁽¹⁾

- Select binder PGs based on actual temperature conditions at the site and the level of risk designated by the highway agency.
- Adjust the PG selection for traffic loading and speed.

- Compare binder PGs between the old AASHTO M320-10 standard and the AASHTO M332-14 standard for modified binders as demonstrated in figure 1.^(5,6)

Who Can Benefit From LTPPBind Online?

All State and Provincial transportation departments, the highway construction industry, asphalt binder producers, university faculties/students, and researchers will benefit from LTPPBind Online.⁽¹⁾ This new software tool provides pavement engineers with the

ability to select binder grades that are less restrictive and more cost effective for allowable rutting.

LTPPBind Online Tool Features

In addition to the high and low temperature PG, users can compare selected binder PGs between AASHTO M320-10 and AASHTO M 332-14 standards.^(5,6) Users can select climatic data from MERRA, LTPP climatic data (virtual weather station (VWS) or automated weather station (AWS)), or enter the climatic data manually.

MERRA data are selected by clicking on the map shown in figure 2 with the mouse cursor or by entering the coordinates in the search box. LTPP VWS climatic data are selected from a drop-down list of LTPP sections, and LTPP AWS climatic data are selected from existing AWS locations on the map in the United States only. Finally, users have the option of manually entering the climatic information for a specific location based on a credible climatic data source.

Figure 1. Comparison of AASHTO M320-10 standard and the AASHTO M332-14 standard.^(5,6)

Performance Grade		
AASHTO M320-10 Performance-Graded Asphalt Binder		
PG Temperature	High	Low
Performance Grade Temperature at 50% Reliability	64.0	-7.8
Performance Grade Temperature at 98% Reliability	65.6	-14.4
Adjustment for Traffic (AASHTO M323-13)	13.2	
Adjustment for Depth	0.0	0.0
Adjusted Performance Grade Temperature	78.8	-14.4
Selected PG Grade	82	-16
PG Grade	M320, PG 82-16	
AASHTO M 332-14 Performance-Grade Asphalt Binder using Multiple Stress Creep Recovery (MSCR) Test		
PG Temperature	High	Low
Performance Grade Temperature at 50% Reliability	64.0	-7.8
Performance Grade Temperature at 98% Reliability	65.6	-14.4
Designation for traffic loading	S	
Selected PG Grade	70	-16
PG Grade	M332, PG 70S-16	

Note: Temperatures are presented in degrees Celsius.

Figure 2. MERRA LTPP climatic data map.⁽⁸⁾

The screenshot shows the LTPP web application interface. On the left, a sidebar lists various tools including 'LTPP Dynamic Modulus Prediction', 'Pavement Performance Forecast', 'FWD Calibration', 'Distress Identification Manual', 'ERD File Builder', 'Pavement Loading User Guide', 'LTPPBind Online', and 'LTPP InfoPave Mobile'. The main content area is titled 'Climatic Data Source (Step 2 of 6)' and prompts the user to 'Please select the data source from option below:'. Four options are listed: 'MERRA' (selected), 'LTPP (Virtual Weather Station)', 'LTPP (Automated Weather Station)', and 'Manual'. A 'Select Location' button is at the bottom of this section. To the right, a 'Select Location' window is open, showing a map of the United States with a red location pin in Missouri. Below the map, the 'Selected Location' box displays the following information: Latitude: 39.02771884021161, Longitude: -93.62762909145355, and Location: Hamburger Hill Rd, Concordia, MO 64020, USA. At the bottom of the map window are 'Select' and 'Cancel' buttons. Below the map window, there are input fields for 'Standard Dev. of the high 7 days:', 'Longitude, Degree:', and 'Target Rut Depth'. Navigation buttons 'Save', 'Previous', and 'Next' are at the bottom right of the map window.

Once climatic data are entered, the user needs to input the allowable maximum rut depth, depth of pavement layer, base HT PG, traffic volume in million ESALs, and traffic speed. After clicking on the “Calculate” tab, the user can access the Binder PG Selection report, which has the following attributes:

- Provides all the parameters used to select a PG for the desired location.
- Shows the adjusted PG for traffic loading and speed.
- Provides the high and low PG at 50- and 98-percent reliability levels.
- Can be saved or printed for future reference.

Requirements to Use LTPPBind Online

Because LTPPBind Online is a Web-based tool, the user is not required to install any machine-specific software.^(1,9) The user will need an Internet connection to work on the LTPP InfoPave™ Web site and access the LTPPBind online tool.^(1,9) The user will also need to register (for free) in the InfoPave™ Web site to keep track of extracted and downloaded information using not only the LTPPBind Online tool but also InfoPave™ in general.^(1,9)

A complete user guide is available in FHWA publication number FHWA-HRT-17-010.⁽²⁾

Contact Information

For questions about LTPPBind Online, contact LTPP Customer Support Service Center at ltppinfo@dot.gov or submit questions using the customer support feature under the help tab of the menu bar of LTPP InfoPave™.⁽⁹⁾

References

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Additional Information

For additional information contact Larry Wiser, Office of Infrastructure R&D, 6300 Georgetown Pike, McLean, VA 22101-2296, (202) 493-3079.

Researchers—This study was performed by iENGINEERING Corporation.

Distribution—This Product Brief is being distributed according to a standard distribution. Direct distribution is being made to the FHWA Divisions and Resource Center.

Availability—The LTPPBind Online can be accessed via the InfoPave™ Web site located at <https://infopave.fhwa.dot.gov> under the “Tools” tab.

Key Words—LTPPBind, asphalt binder, pavement performance, climate data, pavement design.

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