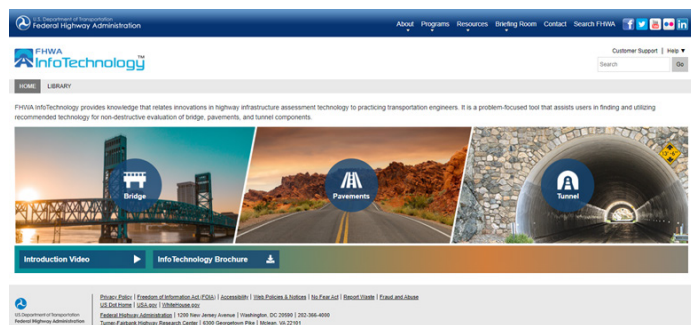# LTBP News

LONG-TERM BRIDGE PERFORMANCE (LTBP) NEWSLETTER

FEDERAL HIGHWAY ADMINISTRATION (FHWA) INFOTECHNOLOGY™ WEB PORTAL GOES LIVE

The FHWA InfoTechnology web portal[1] helps practicing transportation engineers, university students, and others learn about technologies used to assess highway infrastructure components.

Source: FHWA.[1]

Figure 1. Screenshot. Federal Highway Administration InfoTechnology website.

WINNERS OF INAUGURAL 2020–2021 STUDENT DATA ANALYSIS CONTEST

One paper was selected for the first-place award in the Bridge category of the first Long-Term Infrastructure Performance (LTIP) Student Data Analysis Contest. The student winner is Agnimitra Sengupta from The Pennsylvania State University for his paper titled, "A State-Based Hidden Markov Model Approach to Impact Echo Signal Classification."

Sengupta will receive an all-expense paid trip to attend the Transportation Research Board's (TRB's) 101st Annual Meeting in January 2022, where FHWA will recognize him at Lectern Session 1169.

The LTIP Student Data Analysis Contest is designed to encourage students to use the Long-Term Pavement Performance (LTPP) web portal, LTPP InfoPave™[2], and the LTBP Web portal, InfoBridge™[3], to address specific infrastructure issues and challenges. The LTPP Program has had a long tradition of holding a student contest; this was the inaugural year for the LTIP, or the joint LTBP and LTPP, student contest.

INFOBRIDGE: RECENT ENHANCEMENTS

The most recent version of InfoBridge[3], released in November 2021, features several usability enhancements, including tools and projects that resulted from research performed by the LTBP Program. For a complete list of new InfoBridge features and enhancements, visit InfoBridge Update Notes. The following sections highlight recent enhancements.

Asset Valuation—Users can enter their own unit cost value or choose from a list of unit cost values for all 50 States, the District of Columbia, and Puerto Rico to calculate replacement, existing, and remaining values of selected bridges. The replacement value is based on the deck area and the unit cost of replacement of the bridge. The existing value discounts the replacement value based on the condition ratings of the bridge's components and its Operating Rating.

The Asset Valuation tool also generates a summary of replacement, existing, and remaining values of bridges in each State. The Asset Valuation tool is available under Analytics.

Source: FHWA.[3]

*Figure 2. Screenshot. Asset Valuation tool on the InfoBridge web portal.*

Historical Changes to Concrete Shear Design—A new module was added to this tool. Historical reviews of concrete shear design development are available through the first edition of the American Association of State Highway and Transportation Officials *Load-and-Resistance Factor Design Specifications* under the Library menu.

Bridge Performance Transition Forecast—Users can generate a list of bridges that would transition from one condition to another over a specified period while exceeding a user-selected minimum probability of occurrence.

A typical feature for all tables in InfoBridge is that the list can be sorted in increasing or decreasing order by clicking on the column heading.
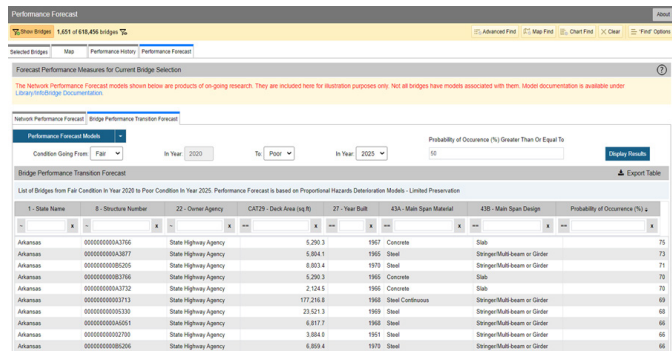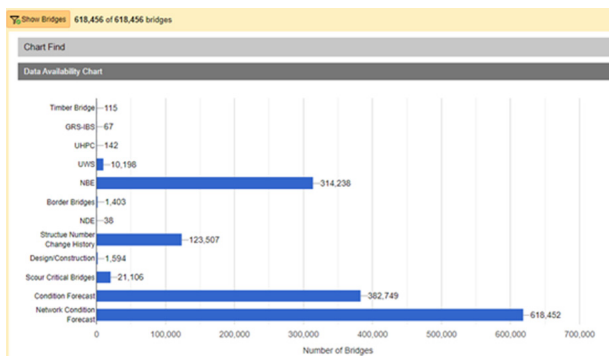

Source: FHWA.[3]

Figure 3. Screenshot. Bridge Performance Transition Forecast.

Experimental Bridges—Data collected on experimental bridges (nonvehicular traffic bridges specifically constructed for research) can now be viewed, downloaded, and analyzed. These data are made available under the LTBP data category only when "All Data" is selected.

Twelve Climatic Attributes—LTBP InfoBridge has been updated with 10 new climatic attributes from the National Aeronautics and Space Administration's (NASA's) Modern-Era Retrospective Analysis for Research and Applications (MERRA) Version 2[4]. Attributes for temperature, precipitation, wind, and humidity are included. The new attributes are available in the Selected Bridges table, Export Data feature, and Climate Data tab.

Chart Find—The Chart Find visualization and filtering feature provides information on available categories, forecast models, and data types for the selected bridges in a graphical bar chart format. Several available data groups can be selected to create a shortlist of bridges for further processing. Chart Find is available in the top right corner of the website next to Map Find.

Source: FHWA.[3]

*Figure 4. Chart Find visualization and filtering feature.*

Historical Graphs—The Historical National Bridge Inventory items trend graphs now include Channel Protection, Operating Rating, Inventory Rating, and Structural Evaluation.

RESEARCH UPDATE

Full-Scale Accelerated Bridge Performance Testing

The LTBP Program is conducting a test on a full-scale, steel girder bridge subjected to accelerated live and environmental loading at the Bridge Evaluation and Accelerated Structural Testing (BEAST®) laboratory at the Center for Advanced Infrastructure and Transportation at Rutgers, the State University of New Jersey.[5] The main objective is to understand the causes and rates of deterioration of different bridge components. (Please refer to the Winter 2020 edition of the LTBP Newsletter for details.)

Phase one of the testing is complete. After 2 million passes of a 60-kip tandem rolling load; 4,000 gallons of 6 percent brine solution application; and 85 rounds of freeze-thaw cycles, the deck is in a condition rating of 5. In phase two, each half of the deck will be overlaid with latex-modified concrete and ultra-high performance concrete and subjected to accelerated environmental and live loading to study overlay performance.
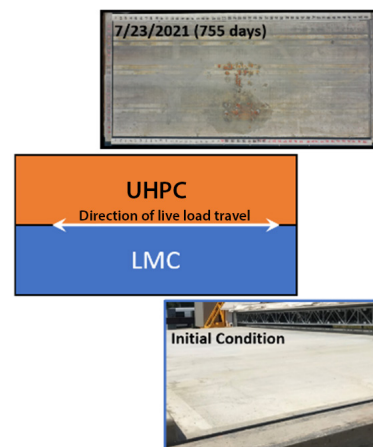
Source: FHWA.
UHPC = ultra-high performance concrete; LMC = latex-modified concrete.
Figure 5. Image. Accelerated Bridge Performance Testing—Phase Two.

LTBP STAFF MEET WITH TRB LTIP ADVISORY COMMITTEE, EXPERT TASK GROUP ON BRIDGES

LTBP Program staff met with the TRB LTIP Advisory Committee in November 2021 and the TRB Expert Task Group (ETG) on Bridges in December 2021. Both the committee and ETG consist of representatives from State departments of transportation (DOTs), academia, and industry. At the meetings, the LTBP staff provided updates on enhancements to InfoBridge, ongoing research projects, communication and outreach activities, and data collection efforts.

INFOBRIDGE WEBINARS

LTBP staff provide on-demand, online webinars on InfoBridge. The InfoBridge users include bridge owners, researchers, consultants, and students. To date, several webinars have been presented to DOTs, researchers, and university students and professors. Webinars can be tailored to meet audience needs. To schedule a free webinar for your colleagues, please contact Shri.Bhide@dot.gov.

LTBP SESSION AT 2022 TRB ANNUAL MEETING

FHWA will present a session on the LTBP Program at the 2022 TRB Annual Meeting: Session 1169 will take place from 4–5:30 p.m. EST on Monday, January 10, 2022.

The session will provide updates on the LTBP Program's Accelerated Bridge Performance Testing and the November 2021 release of InfoBridge. Additionally, a presentation will be given by the first-place winner of the 2020–2021 LTIP Student Data Analysis Contest.

The session is sponsored by the TRB Standing Committee on Structures Maintenance (AKT40) and cosponsored by the TRB Standing Committees on Bridge and Structures Management (AKT50), Bridge Preservation (AKT60), and Testing and Evaluation of Transportation Structures (AKB40). If you are at the annual meeting, we invite you to attend the session.

LTBP DATA COLLECTION WORKSHOP UPDATE

LTBP program staff conducted a virtual Data Collection Workshop during February and March 2021. The objective of the workshop was to receive input from the bridge community's subject matter experts to assist FHWA in assessing the LTBP Program's future data collection efforts.

A summary report on planning, conduct, and outcomes from the workshop will soon be published. If you have any questions or would like to learn more about the workshop, please contact robert.zobel@dot.gov.

RECENT PUBLICATIONS

Workshops and Reports:

Summary Report Long-Term Bridge Performance Program Data Collection Workshop, FHWA, FHWA-HRT-22-015, forthcoming in December 2021.

United States-Japan Bridge Engineering Workshop: Innovative Bridge Design and Preservation, FHWA, FHWA-HRT-21-067, July 2021. [PDF]

Corrosivity of Water-Soluble Sulfate Ions in Simulated Pore Water Solutions and Different Types of Grout Samples, FHWA, FHWA-HRT-21-052, May 2021. [PDF]

"An Application of Convolutional Neural Network for Deterioration Modeling of Highway Bridge Components in the United States" by Liu, H., Nehme, J., and Lu, P, *Structure and Infrastructure Engineering*, 2021.

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1. FHWA. n.d. "FHWA InfoTechnology" (web portal). https://infopave.fhwa.dot.gov/infotechnology/, last accessed December 9, 2021.

2. FHWA. n.d. "LTTP InfoPave" (web portal). https://infopave.fhwa.dot.gov/, last accessed December 9, 2021.

3. FHWA. n.d. "LTBP InfoBridge" (web portal). https://infobridge.fhwa.dot.gov/, last accessed December 9, 2021.

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5. Rutgers Center for Advanced Infrastructure and Transportation. 2019. "The BEAST" (web page). https://cait.rutgers.edu/facilities-equipment/the-beast/, last accessed December 9, 2021.

Distribution—FHWA's *LTBP News* is being distributed per a standard distribution. Direct distribution is being made to the FHWA Divisions and Resource Center.

Availability—This newsletter may be obtained at https://www.fhwa.dot.gov/publications/ltppnews.

Key Word—Infrastructure, bridges, research, Transportation Research Board, ultra-high performance concrete, InfoBridge, InfoBridge Updates, Coatings and Corrosion Laboratory, bridge component forecast methods.

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