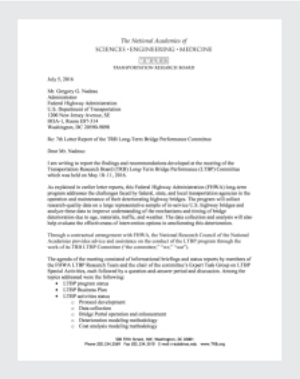

Long-Term Bridge Performance Committee Letter Report: July 5, 2016

DETAILS

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TRB
TRANSPORTATION RESEARCH BOARD

July 5, 2016

Mr. Gregory G. Nadeau
Administrator
Federal Highway Administration
U.S. Department of Transportation
1200 New Jersey Avenue, SE
HOA-1, Room E87-314
Washington, DC 20590-9898

Re: 7th Letter Report of the TRB Long-Term Bridge Performance Committee

Dear Mr. Nadeau:

I am writing to report the findings and recommendations developed at the meeting of the Transportation Research Board (TRB) Long-Term Bridge Performance (LTBP) Committee which was held on May 10–11, 2016.

As explained in earlier letter reports, this Federal Highway Administration (FHWA) long-term program addresses the challenges faced by federal, state, and local transportation agencies in the operation and maintenance of their deteriorating highway bridges. The program will collect research-quality data on a large representative sample of in-service U.S. highway bridges and analyze these data to improve understanding of the mechanisms and timing of bridge deterioration due to age, materials, traffic, and weather. The data collection and analysis will also help evaluate the effectiveness of intervention options in ameliorating this deterioration.

Through a contractual arrangement with FHWA, the National Research Council of the National Academies provides advice and assistance on the conduct of the LTBP program through the work of its TRB LTBP Committee ("the committee," "we," "our").

The agenda of the meeting consisted of informational briefings and status reports by members of the FHWA LTBP Research Team and the chair of the committee's Expert Task Group on LTBP Special Activities, each followed by a question-and-answer period and discussion. Among the topics addressed were the following:

- LTBP program status
- LTBP Business Plan
- LTBP activities status
    - Protocol development
    - Data collection
    - Bridge Portal operation and enhancement
    - Deterioration modeling methodology
    - Cost analysis modeling methodology

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    - State coordinators
    - Bridge timelines
- Bridge dynamic characterization
- 2016 NDE[1]/SHM[2] forum
- NDE overlay study
- 2017 workshop integrating NDE and SHM
- Pooled fund WIM[3] study
- TRB Bridge DAWG[4]

At the conclusion of these open sessions, the committee held a closed session to deliberate on its findings and formulate its consensus advice,[5] which follows:

LR07/1

The committee thanks the LTBP Team for responding to our request for a copy of the LTBP Business Plan ("the plan") and recognizes the effort required to develop it.

The plan is an insightful exposition of the FHWA's vision of how this long-term research into the performance of the Nation's highway bridges will yield results that can influence how such bridges will be designed, constructed, operated, and maintained in the future. The plan is also the blueprint for the design and implementation of near-term program activities, and the basis of annual operational plans for the activities underway. The plan will not be static, but will be updated regularly to reflect progress and address new challenges. We applaud the commitment of your LTBP Team to continually operate the program in accordance with an up-to-date business plan.

The document that we received is a well-organized first draft; we look forward to a finalized plan. As the plan's long-term vision, blueprint for near-term activities, and design of annual operational efforts are more fully developed, we look forward to more specifics concerning the products to be developed and the schedule and resources required.

We recommend that the plan be finalized, adopted, and implemented as soon as possible. We request a report at our next meeting on the status of this planning effort.

LR07/2

We understand that the deterioration and life-cycle cost modeling methodologies that LTBP is striving to develop are based on NDE data from cluster bridges and legacy bridge data, and could be used to manage bridge inventories and establish correlations with state-specific bridge performance data.

Further clarification would be helpful of the role of these methodologies in the development

[1] Nondestructive evaluation.
[2] Structural health monitoring.
[3] Weigh-in-motion.
[4] Data Analysis Working Group.
[5] The committee's advice is presented as a set of pairs of findings and recommendations. A finding is a conclusion based on the meeting's reading materials, presentations, and discussions. A recommendation is an action suggested as a consequence of this finding. Each finding–recommendation pair has a designator (letter report number/finding–recommendation number) to facilitate future referencing. The usual format of a finding–recommendation pair is one or more paragraphs summarizing the committee's finding and a paragraph containing the committee's recommendation. The recommendation is italicized and underlined.

of data-driven decision-making tools, and of any requirement for state agencies to perform their own data collection and analysis before the tools can be used.

We recommend that the plan explain how these methodologies will be calibrated and used and that it define the research results and products that LTBP will deliver so that state agencies can ascertain what they may be required to develop in order to use these products.

LR07/3

There are certain elements that, if added, could improve the plan.

The committee suggests that the next version of the plan include

- *A glossary of the terms used;*
- *Terms that are more descriptive than "treated decks" and "untreated decks";*
- *A graphical mechanism, such as the dials on a motor vehicle's dashboard, to communicate quantifiable progress in all efforts;*
- *A description of the role and quantification of the value of the RABIT[6] bridge deck assessment tool as a cost-saving system for LTBP field data collection and analysis; and*
- *A list of other efforts focused on bridge performance and an assessment of the potential for coordination.*

LR07/4

We appreciate receiving a live demonstration of the LTBP Bridge Portal ("the portal"). The demonstration was interesting and confirms our belief that the field monitoring data that LTBP is collecting to complement other types of data will be viewed ultimately within the highway bridge community as the program's principal product.

In the future, such demonstrations would have enhanced positive impact if more specific queries were used to show state agencies how they would benefit from use of the portal to access NDE and inspection data above and beyond basic inventory data. Such focused queries would answer skeptical users' typical question of an unfamiliar new tool: "What's in it for me?"

We recommend that further live demonstrations of the portal use sample queries that are more relevant and attuned to the interests and needs of the targeted audience. We request a status briefing on this enhancement at our next meeting.

LR07/5

As a user interface with the LTBP database, the portal works well as a research tool but, as is the case with all such tools, practice and coaching are required to learn how to take full advantage of its power. If the portal is to be used widely as a source of data for highway bridge research, design, operation, and maintenance, its navigation and search capabilities must be intuitive and easy to handle.

The committee recommends that a plan be developed for simplifying the use of the portal as a source of information concerning the LTBP program and the highway bridges being studied.

[6] http://www.fhwa.dot.gov/research/tfhrc/programs/infrastructure/structures/ltbp/ltbpresearch/rabit/index.cfm.

LR07/6

We concur with the LTBP Team's decision to replace treated decks with steel girders as the "next step" in LTBP research, because the protocols for data collection on steel girders are ready, the types of steel girders have been defined, and some data collection is already underway. This change of research subject will widen the focus of LTBP research to include untreated decks, joints, bearings, girders, and interactions between decks and girders.

We also concur that some change is needed because protocols for documentation, visual inspection, and NDE data collection for decks treated with asphalt overlays are not ready. However, research could proceed now on decks treated with other types of overlays, and later on decks treated with asphalt overlays -- when the protocols for documentation, visual inspection, and NDE data collection of such decks are ready.

We recommend that LTBP proceed to study steel girders as the next step in LTBP research and consider also proceeding to study treated decks where feasible (all overlays except for asphalt). Furthermore, we recommend that research addressing asphalt overlays on bridge decks be reinstated as soon as the necessary protocols are developed.

LR07/7

We share with the LTBP Team the conviction that outreach to the highway bridge community is important in increasing awareness of the benefits to be derived by the states through participation in LTBP's data gathering and use of the data. Outreach can emphasize that LTBP stands ready to help each state develop a risk-based asset management plan to improve or preserve the condition and performance of its highway bridges, as mandated by the MAP-21[7] legislation. The value of collecting legacy data and developing new investigative tools can be explained to the bridge community and the general public through this outreach.

We recommend that audience-specific webinars highlighting the benefits to be derived from the program be developed as part of LTBP's outreach to AASHTO's[8] SCOH,[9] to the state agencies directly, and to the public.

LR07/8

Speculation on the extent to which LTBP's funding will be reduced under the FAST Act[10] appeared to pervade this meeting's presentations and discussions. We share the LTBP Team's concern for the viability of the program under reduced funding levels, and believe that preparation for this eventuality is the key to securing adequate funding for LTBP's highest priority elements. LTBP's activities could be delineated with specificity, prioritized by their expected products, and quantified by the resources they require. On this basis, contingency plans could be developed indicating (*a*) which activities would be reduced and (*b*) the resulting diminishment of their costs and products if LTBP's funding were reduced by various percentages. The details of such plans are necessary in preparing to cope with painful

[7] Moving Ahead for Progress in the 21st Century Act.
[8] American Association of State Highway and Transportation Officials.
[9] Standing Committee on Highways.
[10] Fixing America's Surface Transportation Act.

decisions, but they could also heighten awareness of the importance of maintaining a sustaining level of funding to ensure that the full potential of LTBP's products will be realized.

We recommend that LTBP's activities be delineated, prioritized, and quantified and that contingency plans be developed for continuation of the program at high, medium, and low levels of funding reductions. We recommend further that this contingency planning be undertaken immediately and the plans shared with those who will decide LTBP's new funding level.

LR07/9

LTBP's data collection protocols, although incomplete, already exceed 300 pages. They are a significant program product whose value might not yet be fully appreciated. Explanations of how these protocols are and will be used by LTBP and others, as well as lessons learned and best practices that have already emerged from the field monitoring efforts that validated them, could help demonstrate the program's potential to deliver products needed by state agencies.

We recommend that LTBP expand its outreach activity to include more detailed information on what has been accomplished and what is planned. While the protocols that have been developed and published to date should be highlighted, other accomplishments deserve attention as well. Among them are the LTBP Bridge Portal and the WIM pooled fund partnership.

In closing, as before, we recognize that the preparations for this meeting required extensive effort by many people. We appreciate everyone's efforts and particularly thank Hoda Azari, Hamid Ghasemi, Susan Lane, Yamayra Rodriguez, Robert Zobel, and their colleagues for a highly informative and productive meeting.

Sincerely,

Bruce V. Johnson
Chair
TRB LTBP Committee

Attachment 1: Roster, TRB Long-Term Bridge Performance Committee
Attachment 2: Agenda, Meeting of the TRB Long-Term Bridge Performance Committee, May 10–11, 2016

ATTACHMENT 1

TRB Long-Term Bridge Performance Committee

Membership Roster
(Attendees of the meeting on May 10–11, 2016, are listed in bold italicized type)

Bruce V. Johnson, Chair
State Bridge Engineer
Oregon Department of Transportation

R. Scott Christie
Deputy Secretary for Highway Administration
Pennsylvania Department of Transportation

Matthew M. Farrar
State Bridge Engineer
Idaho Transportation Department

Karl H. Frank
Chief Engineer
Hirschfeld Industries, Austin, Texas

Gregg C. Fredrick
Assistant Chief Engineer
Wyoming Department of Transportation

Malcolm T. Kerley
President
NXL Construction Services, Inc., Richmond, Virginia

John M. Kulicki
Chairman Emeritus
Modjeski and Masters, Inc., Mechanicsburg, Pennsylvania

Richard D. Land
Quality Practice Leader, Complex Bridges
AECOM, Sacramento, California

Sandra Q. Larson
Director, Systems Operations Bureau
Iowa Department of Transportation

Paul V. Liles, Jr.
Roswell, Georgia

Samer Madanat
Xenel Professor of Engineering
University of California, Berkeley

Ananth K. Prasad
Senior Vice President and National Transportation Practice Leader
HNTB Corporation, Tallahassee, Florida

Kenneth D. Price
Vice President—National Bridge Practice
HNTB Corporation, Chicago, Illinois

LIAISONS

Patricia Bush
Program Manager for Bridges and Structures
American Association of State Highway and Transportation Officials, Washington, D.C.

Waseem Dekelbab
Senior Program Officer, TRB National Cooperative Highway Research Program, Washington, D.C.

Danielle Kleinhans
Concrete Reinforcing Steel Institute, Schaumburg, Illinois

William F. McEleney
Director
National Steel Bridge Alliance, Cranston, Rhode Island

Ted M. Scott III
Director of Engineering
American Trucking Associations, Alexandria, Virginia

ATTACHMENT 2

Agenda
TRB Long-Term Bridge Performance Program Advisory Committee (BCOM)
May 10–11, 2016
Room 250, NAS Building
2101 Constitution Avenue, NW, Washington, D.C. 20418

This committee provides ongoing advice to FHWA's Long-Term Bridge Performance (LTBP) Program.

Tuesday, May 10 **BCOM Chair: Bruce Johnson, presiding**		
8:00–8:15 a.m.	Welcome, Attendees' Self-Introductions, Review of *Staff Notes,* Adoption of Agenda	*Bruce Johnson (Oregon Department of Transportation), Rob Raab (TRB), Hamid Ghasemi (FHWA)*
8:15–8:30 a.m.	BCOM's Role, Scope, and Operations	*Rob Raab* *Bruce Johnson*
8:30–8:45 a.m.	BSPEC[11] Chairman's Report	*Jugesh Kapur (Burns and McDonnell)*
8:45–9:15 a.m.	LTBP Program Update	*Rob Zobel (FHWA)*
9:15–9:30 a.m.	LTBP Protocols Report	*Yamayra Rodriguez (FHWA)*
9:30–10:10 a.m.	LTBP Data Collection Update	*Sue Lane (FHWA)*
10:10–10:15 a.m.	Break	
10:15–11:00 a.m.	LTBP Business Plan Update	*Rob Zobel*
11:00–11:15 a.m.	State Coordinators' Summaries and Bridge Timelines	*Sue Lane*
11:15 a.m.–noon	***BCOM Discussion and Guidance***—Refocus of Efforts, Data Collection, Business Plan, State Coordinators' Summaries, and Timelines	*All (discussion)*
Noon–1:00 p.m.	Lunch	
1:00-1:15 p.m.	Bridge Portal Update	*Rob Zobel*
1:15–1:45 p.m.	Update on LTBP Data-Driven Deterioration Modeling Methodology (DMM) and Cost Analysis Modeling Methodology (CAMM)	*Haotian Liu (Rutgers), Yun Bao (Rutgers), Hooman Parvardeh (Rutgers)*
1:45–2:15 p.m.	Bridge Dynamic Characterization—LTBP Needs	*Hamid Ghasemi, Frank Moon (Rutgers)*
2:15–2:45 p.m.	***BCOM Discussion and Guidance***—Bridge Portal, Dynamic Characterization, DMM, and CAMM	*All (discussion)*

[11] Expert Task Group for LTBP Special Activities.

2:45–3:15 p.m.	2016 NDE/SHM Workshop, NDE Overlay Study, and 2017 TRB Workshop Integrating NDE and SHM	*Hoda Azari (FHWA)*
3:15–3:30 p.m.	Break	
3:30–4:15 p.m.	Pooled Fund WIM Study	*Tom Saad (FHWA), Jeff Purdy (Pennoni)*
4:15–4:30 p.m.	Closing Remarks	*Hamid Ghasemi*
4:30–5:00 p.m.	Closed Session—Committee Disclosure and Review of Biases and Conflicts	*Rob Raab*
5:00 p.m.	Adjourn for the Day	

Wednesday, May 11 **BCOM Chair: Bruce Johnson, presiding**		
8:00–8:15 a.m.	Chairman Recap	*Bruce Johnson*
8:15–8:45 a.m.	TRB Bridge DAWG	*Bruce Johnson, Rob Raab*
8:45–11:00 a.m.	***BCOM Discussion and Guidance***—Pooled Fund WIM Study, Protocol Development, NDE Overlay Study, NDE/SHM Workshop, Bridge DAWG, Other Items—BSPEC Feedback	*All (discussion)*
11:00 a.m.–noon	Closed Session—Committee Consensus on Findings and Recommendations	*Bruce Johnson, Rob Raab*
Noon–1:00 p.m.	Lunch	
1:00–2:00 p.m.	Closing Remarks	*Bruce Johnson, Hamid Ghasemi*
2:00 p.m.	Adjourn	