



## Long-Term Bridge Performance Committee Letter Report: February 20, 2015

### DETAILS

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February 20, 2015

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

Re: Fifth 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<sup>1</sup> on December 2, 2014.

As you know, 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 resulting from the effects of 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 meeting agenda consisted of briefings by FHWA staff and contractors,<sup>2</sup> and each briefing was followed by a question-and-answer period and discussion. The presentations included

- The status of the LTBP program;
- Reports summarizing the recent meetings of the committee's expert task groups on durability and preservation, evaluation and monitoring, and traffic and truck weights; and

<sup>1</sup> See Attachment 1.

<sup>2</sup> See Attachment 2.

- Updates on the following subjects:
  - Program organization and staffing,
  - Data collection protocols,
  - Field data collection,
  - Development of bridge practices timelines,
  - Bridge performance index,
  - Bridge deterioration models, and
  - Other related subjects.

At the conclusion of these open sessions, the committee deliberated in a closed session on its findings and formulated its recommendations, which are summarized here.<sup>3</sup>

### **LR05/01**

Once again, the committee recognizes the hard work of the LTBP team members and congratulates them for their many initiatives to date, especially in view of the limited funding and staffing they have experienced.

Of particular importance to the continuation of the program will be the historical data (such as design criteria, aggregate sources, and construction records) being gathered on selected bridges and the determination of the impact of these factors on long-term performance. This new understanding will need to be captured and communicated to bridge decision makers in a manner that helps maintain their interest in and support for the program.

More effective and efficient management of transportation assets has become critically necessary for bridge owners. The requirement of the Moving Ahead for Progress in the 21st Century Act (MAP-21) that owners produce transportation asset management plans is leading to their detailed review of how to maximize the use of resources during the life cycle of those assets. Owners will need guidance on how to approach each asset category.

The LTBP program can potentially help states meet asset management requirements by providing data, analyses, and products that can assist in the development of improved bridge specifications, designs, construction techniques, and materials. Detailed information about weather, traffic, and maintenance is especially noteworthy. Identifying the effect of such factors on long-term performance is critically important to managing bridge assets more efficiently and maximizing the use of limited resources.

Further, the committee greatly appreciates the positive reception FHWA's LTBP team has given our questions and suggestions. We recognize that it can be challenging for research managers to conduct reviews with outsiders and receive their comments, but

<sup>3</sup> The committee's advice is presented as a set of pairs of findings and recommendations. A committee finding is a conclusion based on the meeting's reading material, presentations, and discussions. A committee recommendation is a suggested action by the LTBP team as a consequence of this finding. Each finding–recommendation pair is given a unique designator (letter report number/recommendation number) to facilitate future referencing. The usual format of a finding–recommendation pair is a paragraph or paragraphs summarizing the committee's finding and a paragraph containing the committee's recommendation. The latter paragraph is italicized and indented from both margins.

we discern only openness and encouragement from the LTBP team as we perform our advisory role.

In this regard, we appreciate the time and effort you and the LTBP team are devoting to considering our letter reports and to responding to the recommendations they contain. The dialog thereby established exemplifies the collegial environment within which we hope always to operate together with your administration. To add further programmatic value to this dialog, we volunteer to establish and maintain a table of recommendations and responses so that everyone on your staff and our committee and expert task groups can easily track the status of individual items of advice and any follow-up actions that have been generated. We will unveil the initial version of this table at our next meeting.

*We invite you and your staff to contribute to this table at any time by providing us with additional or amplified responses to our recommendations and, perhaps most importantly, status reports on follow-up actions.*

## **LR05/02**

The committee received with great interest a status report on the continuing work to develop a bridge performance index. It was emphasized that this index is intended as an internal tool to help guide the further research in this program. We remain doubtful that one index can apply to all bridges and performance categories, and that it can remain an internal tool. The states are likely to apply this index to their own needs.

A prime example is the set of LTBP data-collection protocols. These protocols are intended to direct and standardize the program's efforts to gather data to populate its database. These protocols thereby will facilitate the analysis of that data and ensure the reliability of the results and conclusions ultimately derived. Still, many of the protocols could find productive use elsewhere within the federal government, state agencies, universities, or wherever such collection and analysis of bridge data are conducted. We do not suggest rulemaking but rather proactive communication to encourage outside use of LTBP's protocols.

The committee believes that tools developed by LTBP staff and contractors for use within LTBP are likely to be of interest to states, academics, practitioners, and others for their own purposes. LTBP should develop versions of such tools as LTBP products for use by others, in keeping with LTBP's objective to provide data-driven decision-making tools to others.

*We suggest that the further development of tools to facilitate LTBP research include planning for their eventual use by the states. Such planning should anticipate the need to develop and validate software, documentation, and user manuals. We would welcome the incorporation of such planning into future briefings on tool development and will view these plans as part of LTBP product*

*development. Further, we recommend that LTBP's State Coordinators be actively involved in the planning for the development of these tools and in the testing of their usefulness.*

### **LR05/03**

The committee received an intriguing exposition on the use within LTBP's strategic plan for data analysis (the LTBP Strategic Performance Matrix) of analytical models to answer the states' high-priority questions concerning specific bridge topics. One such question, cited in the briefing as an example, was "How does live load affect the performance of untreated concrete decks?"

A key component of the planned effort to answer such questions is the development and use of deterioration models. As a substitute for field measurements of the deterioration of untreated concrete decks, LTBP will use electrical resistivity data to evaluate the analytical approach. A white paper is being drafted and will be provided to explain this process in greater detail and show the strengths of this approach.

*We look forward to receipt of this white paper and request that, after the paper is delivered to the committee, a telephone conference call be scheduled at a mutually convenient time to discuss its contents. We also request that the agenda of our next meeting include deterioration modeling as a topic for further discussion.*

### **LR05/04**

Two additional white papers are being developed: one on the performance of weathering steel bridges and one containing a glossary of terms to be found in all of the program's documents.

*As with the previously referenced white paper, we look forward to receipt of these white papers and request that telephone conference calls be scheduled at mutually convenient times for discussion of their contents.*

### **LR05/05**

The LTBP committee has always felt challenged to come up to speed on the LTBP program because we were established as an advisory committee in 2011, three years after the inception of the program. We were not present when the objectives of the program were first articulated and plans developed to achieve them. After five meetings, the committee's comprehension of what LTBP hopes to achieve, what forms these achievements (products) will take, and what plans and schedules guide their development is still incomplete.

The committee's meeting schedule initially consisted of a 2-day meeting every 6 months but was revised in 2012 to a 1-day meeting every 12 months and a 2-hour telephone conference at midyear. The initial schedule was better suited to enabling

the committee to become and remain current on the status of the program, and to offer advice while there was still time to resolve the difficulty or improve the outcome. The current schedule keeps the committee behind the latest developments and constrains our ability to have a constructive influence on the program.

Specifically,

- The committee is unable to keep abreast of progress, problems, new initiatives, and program changes that occur between meetings.
- Status update reports consume a large portion of the time available at meetings and thus limit time for development and deliberation of consensus recommendations.
- The committee's comments and suggestions are offered long after the situations that prompted them have been addressed.

We recognize that preparing for a meeting requires time and effort but hope that if this preparation is viewed as an investment in receiving the advice of outside experts, it will be seen as time well spent.

Telephone conferences have been attempted but are poor substitutes for committee meetings. While slideshow presentations can be delivered effectively, discussions and question-and-answer sessions seem forced and constrained. Speakers tread upon one another, background noises and side discussions intrude and often drown out the speaker, and interruptions occur as individuals join or leave the conference. We conclude from such experiences that single-topic teleconferences are useful but multi-topic ones fail to achieve their goals.

Written summaries provided in advance could easily substitute for the PowerPoint-assisted status briefings at meetings. Through incorporation of attachments previously prepared for other uses, written summaries could provide more detail than briefings about plans, progress, and accomplishment of activities. These written summaries could then serve as the basis of more substantive discussions during the meeting that, in turn, could lead to more helpful suggestions.

The committee's advice would be more timely and pertinent if our meetings were focused on matters confronting the program and confounding its progress rather than on information about issues faced and steps already taken. The committee would prefer to help guide the LTBP team while it is addressing questions for which the road ahead is being planned. We would welcome specific requests for feedback on any relevant topic at any time. To date, most requests have been for review comments on program documents, but at that stage it is too late to suggest alternative resolutions to the issues addressed.

Changes to the committee's meeting schedule and the content of our meetings would minimize or eliminate the problems we have cited.

*We request consideration of the following set of changes:*

- *Delivery to the committee every 3 months of written reports from LTBP staff or contractors on the status of ongoing activities; these reports should discuss progress, problems, initiatives, and changes,*
- *Elimination of status reports at meetings or substantial reduction of the time devoted to them, so that most of the meeting time can be devoted to deliberation on and development of consensus recommendations,*
- *Submission to the committee of (a) written requests for feedback on issues being addressed by the LTBP team while the resolution of the issue is in progress and (b) timely notification of the decisions made and follow-up actions taken, and*
- *Participation of the committee in regularly scheduled meetings of the LTBP team with the program's state coordinators.*

*We welcome and are willing to consider any alternative changes that you and your staff propose.*

#### **LR05/06**

At our first meeting, the committee learned that LTBP had assembled a list of high-priority topics on bridge performance, including decks, joints, bearings, foundations and scour, substructure components, and mechanically stabilized earthen walls. Although LTBP's resources are inadequate to address this list of worthy topics, the committee would like to know whether there is a shorter list that LTBP believes is feasible and intends to address.

While the committee realizes that the program's initial scope was focused on bridge decks in response to the states' input, we feel there are other bridge components whose mechanisms of deterioration deserve investigation if LTBP is ultimately to provide an improved understanding of how and why, over the long term, bridges perform as they do. A balance is needed between responding to an always changing set of critical issues facing bridge owners and conducting a disciplined and comprehensive research program aimed at improving bridge performance.

*We request a briefing at our next meeting on the high-priority bridge performance topics that the LTBP program is planning to address and the status of the plans being developed.*

#### **LR05/07**

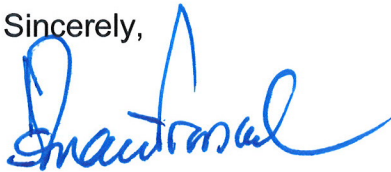
In the committee's January 27, 2014, letter report, we recommended the LTBP team develop and follow a business plan based on available funding and staffing. Although we expected to review such a plan at the December 2014 meeting, one was not presented. We appreciate the large task that the LTBP team is performing, which

encompasses various expectations from various stakeholders, but this long-term and multifaceted undertaking requires comprehensive planning.

*Once again, we request that the LTBP Team develop and follow a business plan so that the program's limited resources can be marshaled and applied to achieve the program's highest-priority objectives. Further, we request a briefing on this plan at our next meeting.*

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 Hamid Ghasemi, Susan Lane, Thomas Saad, Robert Zobel, and their colleagues for a highly informative and productive meeting.

Sincerely,



Ananth K. Prasad  
TRB LTBP Committee

- Attachment 1 Roster, TRB Long-Term Bridge Performance Committee
- Attachment 2 Agenda, Meeting of the TRB Long-Term Bridge Performance Committee, December 2, 2014



Attachment 1

**Roster**  
**TRB Long-Term Bridge Performance Committee**

Ananth K. Prasad, *Chair*  
Secretary  
Florida Department of Transportation

Malcolm T. Kerley, *Vice Chair*  
President  
NXL Construction Services, Inc.

Sreenivas Alampalli  
Director, Structures Evaluation Service Bureau  
New York State Department of Transportation  
*and*  
Chair, TRB Expert Task Group for LTBP Bridge  
Evaluation and Monitoring

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

Karl H. Frank  
Chief Engineer  
Hirschfeld Industries

Gregg Fredrick<sup>4</sup>  
Assistant Chief Engineer  
Wyoming Department of Transportation

Bruce V. Johnson  
State Bridge Engineer  
Oregon Department of Transportation  
*and*  
Chair, TRB Expert Task Group for LTBP Bridge  
Durability and Preservation

Jugesh Kapur  
Senior Associate Bridge Engineer  
Burns and McDonnell  
*and*  
Chair, TRB Expert Task Group for LTBP Bridge  
Traffic and Truck Weights

John M. Kulicki  
Chairman and CEO  
Modjeski and Masters, Inc.

Richard D. Land  
Retired (formerly Chief Deputy Director; California  
Department of Transportation)

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

Paul Liles<sup>5</sup>  
Assistant Director, Bridges and Structures  
Georgia Department of Transportation

Andrzej S. Nowak  
Chair, Department of Civil Engineering  
Auburn University

Kenneth D. Price<sup>5</sup>  
Vice President, National Bridge Practice  
HNTB Corporation

<sup>4</sup> by telephone

<sup>5</sup> absent

Attachment 2

**Agenda**  
**Meeting of the TRB Long-Term Bridge Performance Committee**  
**December 2, 2014**

This committee provides an ongoing peer review of the Long-Term Bridge Performance (LTBP) Program, which is a 20-year research effort to measure and monitor the performance of a nationally representative sample of bridges. The committee reviews the LTBP Program's plans, operations, progress, and products and provides advice to FHWA on the program's strategic plan; data definition, standardization, quality control, and collection efforts; sampling plan; and overall R&D program management and direction.

- 0730–0800      Continental Breakfast
- 0800–0815      Administrative matters  
                    *Ananth Prasad*  
                    Attendees' self-introductions  
                    Welcome of new members  
                    Review of *Staff Notes*  
                    Adoption of agenda
- 0815–0830      Committee's Role, Scope, and Operations  
                    *Ananth Prasad*  
                    Review of Letter Report 4  
                            *Robert Raab*  
                    FHWA Response to Letter Report 4  
                            *Hamid Ghasemi*
- 0830–0930      Expert Task Group Reports  
                    Traffic and Truck Weights (BT&T)  
                            *Jugesh Kapur*  
                    Durability and Preservation (BD&P)  
                            *Bruce Johnson*  
                    Evaluation and Monitoring (BE&M)  
                            *Sreenivas Alampalli*
- 0930–1000      LTBP Staffing and Organization  
                            *Rob Zobel*  
                    Data Collection  
                            *Rob Zobel*  
                    RABIT™ Bridge Deck Assessment Tool Status  
                            *Rob Zobel*
- 1000–1015      Break

- 1015–1145      LTBP Protocols  
                       *Sue Lane*  
 Training of Contractors  
                       *Sue Lane*  
 Paper Studies  
                       *Sue Lane*  
 LTBP Bridge Portal  
                       *Rob Zobel*  
 Synopsis of State Coordinators' Meeting  
                       *Bruce Johnson*  
 LTBP Bridge Practices Timelines  
                       *Sue Lane*
- 1145–1245      Lunch
- 1245–1315      Closed Session: Biases and Conflicts of Interest
- 1315–1500      Weathering Steel Study  
                       *Jennifer Righman McConnell*  
 Weigh-in-Motion Study  
                       *Tom Saad*  
 LTB Performance Index  
                       *Sue Lane*  
 Strategic Performance Matrices  
                       *Rob Zobel*  
 Deterioration Models  
                       *Rob Zobel*
- 1500–1515      Next steps, scheduling of next meeting  
                       *Ananth Prasad*
- 1515–1530      Break
- 1530–1700      Closed Session: Findings and Recommendations
- 1700–1730      Closing Remarks  
                       *Ananth Prasad*
- 1730              Meeting Adjourned