

IOWA HIGHWAY RESEARCH BOARD (IHRB)

Minutes of February 24, 2012

Regular Board Members Present

A. Abu-Hawash
J. Berger
V. Dumdei
R. Knoche
J. May

E. Steffensmeier
T. Wipf
R. Younie
K. Mayberry
J. Moellering

Alternate Board Members Present

T. Simodynes

Secretary - M. Dunn

Members with No Representation

C. Schloz
R. Kieffer
W. Weiss
J. D. King
D. Schnoebelen

Visitors

Vanessa Goetz
Lori Pflughaupt
Mike Nop
Brent Phares
F. W. Klaiber
Travis Hosteng
Sri Sritharan
Kam Ng
Lisa Rold

Iowa Department of Transportation
Iowa Department of Transportation
Iowa Department of Transportation
Iowa State University
FHWA Iowa Division

The meeting was held at the Iowa Department of Transportation Ames Complex, Materials East/West Conference Room, on Thursday, February 24, 2012. The meeting was called to order at 9:00 a.m. by Chairperson Ron Knoche with an initial number of 8 voting members/alternates at the table.

Agenda

No changes were made to the Agenda.

Motion to approve Minutes from the January 2012 meeting by R. Younie. 2nd by K, Mayberry.
Motion carried with 8 Aye, 0 Nay, 0 Abstaining.

******One Additional Member Joined the Table, Total of 9 Voting Members at the Table.******

FINAL REPORT TR-584, "Development of LRFD Procedures for Bridge Pile Foundations in Iowa: Volume III: Recommended Resistance Factors with Consideration of Construction Control and Setup, Sri Sritharan, Iowa State University/InTrans (\$70,000)

BACKGROUND

The overall scope of this research was to develop regionally calibrated LRFD resistance factors for bridge pile foundations in Iowa based on reliability theory, focusing on the strength limit states, along with incorporating the construction control aspects and soil setup into the design process. This was attained after examining the current pile design and construction procedures used by Iowa DOT and developing the appropriate LRFD recommendations that are consistent with the available local database and bridge design practices. This scope was achieved based on two parts: a) the recently developed local database of Pile Load Tests (PILOT), and b) ten full scale instrumented pile Static Load Tests (SLTs) at bridge sites located in different geological conditions in the State of Iowa. The volume I report of this project provided a detailed description of the PILOT database, while the volume II report presented the results of the full-scale pile tests and associated geotechnical investigations. This report in the third volume of this series focuses on the calibration of the LRFD resistance factors for static and dynamic pile analysis methods as well as for dynamic formulas. Using the outcomes of this research, a design guide to be used by the Iowa DOT and county engineering offices is currently under development, which will be presented in the next and final volume.

OBJECTIVES

- Literature Review and Collection of Important Historical Information
- Analysis of Data and Preliminary Recommendations
- Verification and Final Recommendations
- **Overarching objective**: To examine the current pile design and construction procedures in Iowa, and recommend changes and improvements that are consistent with available pile load test data and LRFD bridge design practice.

POTENTIAL NEXT STEP

- Verify pile design procedure using production pile data
- Increase mixed soil resistance by integrating setup
- Investigate alternative piles option in sand
- Develop/verify LRFD method for other piles:
 - Timber piles
 - UHPC piles

DISCUSSION

Q: Do you think in the future there are some changes coming from AASHTO?

A: We are pushing the established set up estimation and how it can be integrated into the design. Right now AASHTO does not provide a set up option because there is no methodology available to be used. That is why we had to write two papers: How to establish a set up and how to incorporate design.

Motion to Approve by T. Wipf. 2nd by A. Abu-Hawash.
Motion carried with 9 Aye, 0 Nay, 0 Abstaining.

******One Additional Member Joined the Table, Total of 10 Voting Members at the Table.******

FINAL REPORT TR-604 Field Testing and Evaluation of a Demonstration Timber Bridge, Brent Phares, Iowa State University/InTrans (\$88,336) (15 min)

BACKGROUND

Previous load tests conducted on glued-laminated timber bridges with asphalt wearing surfaces found that the bridges with the most significant amount of wearing surface deterioration had two characteristics in common: 1) average to moderate relative deflections between adjacent glued-laminated deck panels and 2) cupped deck panels resulting from differences in moisture content between the top and bottom of the deck panels.

Subsequent laboratory testing of a full-scale glued-laminated timber bridge concluded that relative deck panel deflections could be reduced by means of physical connection at the deck panel joints.

Various connection details were investigated, including steel dowels, glass fiber dowels, a steel plate placed at mid-panel depth, and plywood overlay. It was concluded that, based on the test results and the constructability of all the alternatives considered, the plywood overlay was the most viable option.

OBJECTIVES

- Evaluate the effectiveness of the plywood overlay alternative at reducing differential panel deflections
- Evaluate the effect of the plywood overlay alternative on the global response of the structure
- Evaluate the performance of the plywood overlay alternative at reducing or eliminating the deterioration of the asphalt wearing surface.

CHALLENGES

Two challenges exist to address the reflective cracking issue:

1. Developing an asphalt mixture that “absorbs” the strain developed in the wood paneling under loading.
2. Maintaining the elastic properties of the asphalt mixture at low temperatures to combat the strain in the wood paneling.

Future Asphalt Alternatives:

- Sawing and Sealing
- Crack Sealing with routing
- Paving membrane
- 3-layer paving system
 - 1) asphalt base course on deck
 - 2) waterproof membrane
 - 3) asphalt wearing course on membrane

Discussion

Q: Have you reviewed how well or poorly asphalt keeps water away from the surface of your wood?

A: Some of the bridges we tested had a moisture barrier in 2002-2003 and it didn't seem to make a difference. It is a problem and it's hard to keep moisture away.

Q: Have you considered doing two layers of plywood?

A: We have. Alternating the directions, that would be another potential step.

Motion to Approve by E. Steffensmeier. 2nd by V. Dumdei.

Motion carried with 10 Aye, 0 Nay, 0 Abstaining.

FINAL REPORT TR-605, Evaluation of the Buena Vista IBRD Bridge: A Furthering of Accelerated Bridge Construction in Iowa, Brent Phares, Iowa State University/InTrans (\$70,044) (15 min)

BACKGROUND

The importance of accelerated bridge construction (ABC) technologies has been realized by the Federal Highway Administration (FHWA) and the Iowa Department of Transportation (DOT) Office of Bridges and Structures. This project, which involved the construction of a two-lane single-span precast box girder bridge, is another in a series of ABC bridge projects undertaken by the Iowa DOT.

OBJECTIVES

- Assist the Iowa DOT and Iowa county engineers in demonstrating the benefits of precast, post-tensioned bridge components and provide an opportunity for them to design and construct more cost-effective, durable bridges
- Perform testing and evaluation of precast bridge components to assess overall design, construction, and structural performance.

BENEFITS

The successful implementation of the approach demonstrated with this project may have far-reaching implications in Iowa where proven rapid construction techniques could result in significant cost reductions.

Key Findings:

- Pre-assembly of various precast elements save time
- Bridge was completed in 18 days - actual bridge construction only took 4 days
- Maximum measured bridge deflection measured during testing indicated very small differential movements between adjacent box beams

Motion to Approve by R. Younie. 2nd by A. Abu-Hawash.
Motion carried with 10 Aye, 0 Nay, 0 Abstaining.

NEW BUSINESS

County Engineer Focus Group Update:

*Meeting was held February 22, 2012.

*About 50 attendees. (1/2 were county personnel)

Voting Results (Top 7)

- **Guidelines on Sign Maintenance and Removal – Including Review of Iowa Tort Law (60)**
- **Roadway Stabilization (47)**
- **Standards for Rating RCBCs Classified as Bridges (HR-239, Part V) (34)**
- **Criteria for How/When to Upgrade/Downgrade Roadways (31)**
- **Subgrade Design Specifications/Design Manual (29)**
- **Pavement Recycling/Reconstruction within Existing ROW (25)**
- **Evaluate the Benefit of Internal Curing Concrete in Structures (21)**

ADJOURN

Motion to Adjourn by V. Dumdei. 2nd by T. Wipf.

Motion carried with 10 aye, 0 nay, 0 abstaining.

The next meeting of the Iowa Highway Research Board will be held Friday, April 27, 2012, in the East/West Materials Conference Room at the Iowa DOT. The meeting will begin at 9 a.m.

A handwritten signature in black ink that reads "Mark J. Dunn". The signature is written in a cursive style with a horizontal line extending from the end of the name.

Mark J. Dunn, IHRB Secretary