IOWA HIGHWAY RESEARCH BOARD (IHRB)
Minutes of January 25, 2008

Regular Board Members Present

A. Abu-Hawash
J. Adam
J. Alleman
J. Berger
V. Dumdei
S. Gannon
K. Hornbuckle
J. Krist
B. Moore
M. Nahra
J. Rasmussen
S. Rinehart
J. Waddingham
D. Waid

Alternate Board Members Present

R. Knoche for J. Joiner

Secretary - M. Dunn

Visitors

Max Grogg	Federal Highway Administration
Ken Dunker	Iowa Department of Transportation
Ed Engle	Iowa Department of Transportation
Vanessa Goetz	Iowa Department of Transportation
Sandra Larson	Iowa Department of Transportation
Mary Starr	Iowa Department of Transportation
Shashi Nambisan	Iowa State University/CTRE
Kejin Wang	Iowa State University/CTRE
Paul Wiegand	Iowa State University/CTRE

The meeting was held at the Iowa Department of Transportation's East/West Conference Room, Materials Building, Ames, Iowa. The meeting was called to order at 9:00 a.m. with an initial total of 12 voting members/alternates at the table. Three Members joined the table later bringing the final voting total to 15.

Election of Chair and Vice Chair for 2008

In rotation, a city representative was elected to serve as the new chairperson.
Mark Nahra nominated Jeff Krist from Council Bluffs, IA, as Chairperson. 2nd by Jim Alleman.
Motion carried with 12 aye, 0 nay, 0 abstaining.

In rotation, an Iowa DOT representative was elected to serve as the new vice chairperson.
John Adam nominated Jim Berger as Vice Chairperson. 2nd by Mark Nahra.
Motion carried with 12 aye, 0 nay, 0 abstaining.

*** One Member joined the table.***

Approval of the minutes
Motion by M. Nahra to approve minutes from the December 6, 2007 meeting. 2nd by A. Abu-Hawash. Carried 13 aye, 0 nay, 0 abstaining.

*** Two Members joined the table.***

FINAL REPORTS

Final Report TR-552, "Timber Preservation Treatments for Highway Applications," Terry Wipf, Iowa State University/CTRE ($99,960)

PROBLEM
Timber can often be a cost-effective building material for new bridge construction. The durability of the bridge is greatly dependent upon proper attention to construction details and fabrication, as well as proper preservative treatment before, during, and after construction. The repair and replacement cost of deteriorated or damaged material is a considerable expense to highway agencies in Iowa, especially to county road departments.

OBJECTIVES
To evaluate the performance of different wood preservatives in the field and to review current specifications and testing procedures to determine if they provide the level of timber treatment required for acceptable performance.

The Iowa State University Bridge Engineering Center (BEC), in conjunction with the United States Department of Agriculture Forest Products Laboratory (FPL), evaluated the various types of wood preservatives used in Iowa. To encompass all aspects of timber bridge preservatives and to obtain comprehensive conclusions, several variables were studied during the evaluation processes including preservative type, age, exposure condition, bridge element location, engineering properties, environmental information, and handling issues. To satisfy these research needs, the project scope involved a literature review, identification of metrics, a questionnaire survey of Iowa counties, on site inspections, and a review of current specifications and testing procedures.

SUMMARY & CONCLUSIONS
Copper naphthenate is recommended as the plant-applied preservative treatment for timber bridge elements; it has been tested extensively by the FPL and has good handling characteristics, clean surfaces, and comparable availability. During the construction of timber bridges the Best Management Practices should be followed. Timber bridge maintenance programs need to be developed and implemented and should include routine inspections, evaluations, routine in-place treatment applications, and data management for fleets of timber bridges. Although the American Wood Protection Association standards are the basis for the specifications, the Iowa Department of Transportation specifications for preservative treatment are the regulating specifications for bridges constructed with state or federal funding in Iowa and are also recommended for all other bridges.

Q: Was hardware corrosion examined in this study or was that a peripheral study?
A: In terms of inspecting Iowa bridges, we did examine what was available; however, a lot of research has been done on corrosion over the last five years.

Q: Is corrosion cause/effect specific for preservatives and related metals?
A: Yes, there are extensive tables in the report.

Q: Are there availability issues?
A: That is addressed in the tables. It is really sporadic; copper naphthenate is the best place to start.
C: Being oil-borne, it performs best.

Motion to Approve
Motion by J. Berger. 2nd by D. Waid.
15 aye, 0 nay, 0 abstaining.

DISCUSSION SECOND ROUND PROPOSALS FROM RFPs

IHRB 07-07 *Pavement Thickness Design for Local Roads in Iowa*:
Hosin "David" Lee, The University of Iowa, CEE ($50,000)
Shashi Nambisan, Iowa State University, CTRE ($53,000)

C: I spent time reading through both proposals; the Iowa State proposal contains two phases and is over budget. I found The University of Iowa proposal responsive to our RFP in both budget and expected delivery product.

Q: Will the model for pavement thickness for SUDAS be applicable for rural roads?
A: I don't see why we couldn't use that model for farm-to-market roads. The advantage to this is that it might give some guidance to counties in regard to zoning regulations and planning their sub-division streets. That's the advantage I saw from having this done through SUDAS.

Q: Does the researcher believe he can accomplish both tasks to incorporate into SUDAS?
A: That was his summation; it still has to be accepted by the SUDAS board.
C: Will this be an insertion to replace the existing portion of SUDAS?
A: That was my understanding.

C: [From the proposal] *...the main product anticipated is the new SUDAS pavement design procedure and software.* This is what was asked for in our IHRB 07-07 RFP. What the RFP required (referencing proposal objectives)…3) *synthesis of local road pavement thickness determination procedures in adjoining States, and* 4) *development of a new SUDAS pavement design procedure.* I found The University of Iowa proposal in line with our 07-07 RFP to find an optimum design for paving thickness.

Q: Is he going to optimize findings based on industry and AASHTO's newest standards? For design projects to be reflected on paper in SUDAS is quite a lengthy process. Will SUDAS need to generate all the pages or will the researcher generate those charts? For the resources we're giving him, I'm not sure how much we'll be getting out of this research (when considering the last two tasks).
A: We spent some time discussing this when we put the RFP together and took a hard look at the cost; as I recall, the discussion was that $50K was adequate when looking at existing models and getting them combined into something that could be used in the SUDAS specifications. CTRE's proposal is four times the agreed amount. In looking at what was drafted in the RFP and the discussion, I believe Dr. Lee's proposal is in accord with our RFP.
C: The incorporation of this design procedure into SUDAS should be handled by the SUDAS staff and committees, and would not be the responsibility of the researcher.

Motion to Approve 07-07 ***Pavement Thickness Design for Local Roads in Iowa*****,** Hosin "David" Lee, The University of Iowa, CEE ($50,000) by M. Nahra 2nd by J. Berger.
12 aye, 2 nay, 1 abstaining.

IHRB-07-11 ***Impact of Low Shrinkage Mixes on Late-age Random Cracking in Pavements with Use of Early Entry Sawing*****, Kejin Wang, ISU/CCEE ($40,000)**

C: This proposal is responsive to the RFP

Request Vote to Approve by chairperson J. Krist.
15 aye, 0 nay, 0 abstaining.

FINAL REPORT TR-559, "Improved Method for Determining Wind Loads on Highway Sign and Traffic-Signal Structures," Asghar Bhatti, The University of Iowa ($45,253)

PROBLEM
The AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals* (2001 and 2003 interim specifications) have recently been revised through a major research project conducted under the auspices of the National Cooperative Highway Research Program (NCHRP 17-10). The 2003 document includes updated provisions and criteria for extreme wind loads and new provisions and criteria on fatigue design, however, these are essentially based on a static strength design approach. The structures designed in this manner may have adequate factor of safety against strength failure but their response to aeroelastic phenomena is largely unknown.

OBJECTIVES
The main objective of the proposed study is to use Computational Fluid Dynamics (CFD) tools to determine the wind loads by accurate numerical simulations of air flow characteristics around large highway sign structures under severe wind speeds conditions. Fully three-dimensional Reynolds-Averaged Navier-Stokes (RANS) simulations are used to estimate the total force on different panels, as well as the actual pressure distribution on the front and back faces of the panels. In particular, this study investigates the effects of aspect ratio and sign spacing for regular panels, the effect of sign depth for the dynamic message signs that are now being used on Iowa highways, the effect induced by the presence of back-to-back signs, the effect of the presence of add-on exit signs, and the effect of the presence of trucks underneath the signs potentially creating "wind tunnel" effect.

SUMMARY & CONCLUSIONS
For panels of complex shapes or for multiple signs panels the pressure distributions can be highly non-symmetrical. As a result, besides the mean force acting on the panel, strong rotational moments can also be present. These moments are practically impossible to estimate using empirical formulae.

For cases when back-to-back type signs are present, the safety coefficient in the Iowa DOT formula should be increased by 30%. However, the effect of the moments on the panel is much tougher to be accounted for. We recommend performing a CFD analysis for cases when moments can be high.

The pressure distribution data should be used to conduct a detailed aeroelastic structural analysis of traffic sign structures. We propose using advanced finite-element codes (e.g., ANSYS, 2005) for structural analysis of the typical structures (e.g., cantilevered mast arm traffic signal and its supports) subject to the loads estimated using CFD.

C: The Iowa DOT worked on this with the researchers and we have confidence in these results. They provided everything we asked of them.

Q: Does the Office of Bridges and Structures have any recommendations on future work?
A: There is potential for additional work; right now, we're looking at doing some installation of sensors on DMS. Once we have results from these sensors we can make a determination for future work.

Q: What about putting holes in sign panels?
A: There is a concern about holes in signs; it affects the surface, lettering and interferes with the purpose of the sign.

Motion to Approve
Motion by A. Abu-Hawash. 2nd by M. Nahra.
15 aye, 0 nay, 0 abstaining.

NEW BUSINESS
Mark Dunn: For the last three years we've had an open call for innovative proposals; the Board needs to determine if that will continue again this year and, if so, we should determine the level of funding. If we continue this process, the amount suggested is $200K. Last year the funding level was $150K.

Q: What was the number of projects funded?
A: The first year we funded four; last year two.

C: It's roughly 10% of our annual budget.

C: This is a good way for innovative proposals to come forward.

Q: Primarily, we're setting money aside?
A: With modification of the Board procedures, RFPs use the predominant amount of our funding. This is a way to assure that innovative ideas can be considered; in the long range, this process pays off.
C: This is an opportunity for new researchers who may have some specialized expertise to do research and learn our funding process. I think to a degree we've seen that.

Mark: One additional item I'd like feedback on is if we should set a funding limit; I'd like to see a cap, although I'm not certain what that number should be. Maybe $75K?

C: 75K was going to be my suggestion.
Mark: That would leave funding available to provide opportunities for others.

Q: Could we have a percentage maximum depending on the project?
Mark: I think we should have a $75K cap and if more funds are needed, researchers need to solicit funding from other sources or present another proposal.
C: In the past, industry or pooled fund studies have been good funding sources; for example, with HR-140, "USGS Gaging Station" studies, we're paying 55% and USGS is funding the rest.

C: 'Cap' may not be the word we want to use.

Mark: Language can be added that does not reflect a *hard* cap; however, if more than $75K is needed, other funding sources should be found. This is for small scale funding. We need some guidance and a funding range for most projects. There are other processes and places where funding partnerships can be generated.

An invitation for submission of research topics FY08-09 was sent yesterday (Thursday, January 24, 2008). I'll have more feedback on that sometime during the first week of March; a list should go out early in March for ranking next year's projects.

From last year's ranking, all but two out of the top ten ideas were funded. We are discussing IHRB RFP 07-03 *Infrastructure Impacts of Iowa's Bio-Economy*, geared around ethanol plants, this afternoon. Volunteers are needed to help put that RFP together.

Also, 07-04, *LRFD Pile Design,* will be discussed later today and sent out shortly.

ADJOURN
Motion to Adjourn
Motion by J. Alleman, 2nd by J. Berger.
Motion carried with 15 aye, 0 nay, 0 abstaining.

The February 2008 meeting of the Iowa Highway Research Board will be held **FRIDAY, February 29, 2008 at 9:00 a.m. in the East/West Materials Conference Room at the Iowa DOT.**

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Mark J. Dunn, IHRB Secretary