

# IOWA HIGHWAY RESEARCH BOARD (IHRB)

*Minutes of February 26, 2010*

## Regular Board Members Present

A. Abu-Hawash	V. Dumdei	B. Moore
D. Ahart	J. Joiner	M. Nahra
J. Alleman	R. Knoche	J. Waddingham
J. Berger	J. Moellering	W. Weiss

## Alternate Board Members Present

S. Schnoebelen for K. Hornbuckle  
W. Zitterich for J. Adam

## Members With No Representation

C. Schloz

## Alternates Present as Guests

J.D. King  
D. Maifield

## Secretary - M. Dunn

## Visitors

Donna Buchwald	Iowa Department of Transportation
Chris Brakke	Iowa Department of Transportation
Edward Engle	Iowa Department of Transportation
Sandra Larson	Iowa Department of Transportation
Mike Nop	Iowa Department of Transportation
Mary Starr	Iowa Department of Transportation
Ken Dunker	Iowa Department of Transportation
Shashi Nambisan	Iowa State University/InTrans
Bart Berquist	University of Northern Iowa

The meeting was held at the Iowa Department of Transportation's Ames Complex, Materials East/West Conference Room, on Friday, February 26, 2010. The meeting was called to order at 9 a.m. by Chairperson Jay Waddingham with an initial number of 13 voting members/alternates at the table.

## **Agenda**

Shashi Nambisan, professor and Iowa State University/InTrans director, spoke briefly regarding selection of a new Local Technical Assistance Program (LTAP) director. Two candidates are currently being considered. A formal job offer to one is expected in mid-March, 2010, with an anticipated start date of May 1, 2010.

Mark Dunn led a discussion regarding the clarification of the proposal "Development of Self-Cleaning Box Culvert Design – Phase III," (presented at the January 2010 meeting). There was some confusion following the meeting regarding the inclusion of a field testing component of a retrofit. Clarification: The original proposal included field evaluation funding for the **Pre**-retrofit condition, not the **Post**-retrofit condition. The Board re-approved the original proposal (no field component included) with stipulation that a field test would also be done. Dr. Muste will discuss additional funding needed with Mark Dunn, as well as field trial site selection.

**Motion to Approve "Development of Self-Cleaning Box Culvert Design – Phase III," as Presented at the January 2010 meeting by Dr. Marian Muste, with Mark Dunn Negotiating Accelerated Site Selection for Field Trial** by W. Zitterich. 2<sup>nd</sup> by W. Weiss.

Motion carried with 13 aye, 0 nay.

## **Approval of the Minutes**

Motion to approve minutes from the January 29, 2010 meeting by M. Nahra. 2<sup>nd</sup> by J. Joiner.

Motion carried with 13 aye, 0 nay, 0 abstaining.

**PROPOSAL *Shuck-Britson Agreement for Parallel Wing Headwalls for Single RCB's (LRFD)***, Stewart Nielsen, Iowa DOT, Office of Bridges and Structures (\$130,248)

The objective of this proposal is to develop LRFD English standards for parallel wing headwalls for single box reinforced cast-in-place concrete box culverts. The Office of Bridges and Structures requested a cost proposal from Shuck-Britson, Inc. to do the work under their Statewide On-call contract for bridge design work. The initial cost estimate for completing the work was \$185,777, however, a lower funding amount has been negotiated of \$130,248 through the Consultant Coordination Section of the Office of Bridges and Structures.

Q: Will these barrels also work with flared-end sections? Will we still have options for single-barrel standard?

A: Yes.

C: What we're doing here are just the headwall and wings. In the future we're also going to update the entire culvert sections barrels into LRFD standards.

Q: But we'll be using the barrel sections standards that are already out there, and this will be an optional headwall?

A: Basically, this design would fit existing barrel section and when we update, most of the changes will be internal. Everything will work to fit together.

Q: Will this be funded 100% County?

C: We're (Counties) the ones who will be using this the most. It allows us to save some right-of-way, etc.

C: The Iowa DOT is contributing in-kind through administration and development.

**Motion to Approve At 100% County** by M. Nahra. 2<sup>nd</sup> by J. Alleman.

Motion carried with 13 aye, 0 nay, 0 abstaining.

**FINAL REPORT TR-517, "Evaluation of Safety Treatments For Roadside Culverts,"** Mark Dunn, Iowa DOT, Research and Technology Bureau (\$24,995)

## BACKGROUND

Roadside cross-drainage culverts have been shown to impact vehicle accident injury levels. Designers have commonly used three safety treatments to protect errant drivers from culvert accidents. These treatments have included: culvert extension, guardrail installation and grating. In order to define which safety treatment is the most appropriate, benefit-cost analysis has used accident cost reduction to estimate societal gains earned by using any safety treatment. Because installation costs are not well-defined (especially for extensions), it may be more appropriate to use these results at a policy-level decision-making level rather than on a project-by-project basis for treatment decisions. (Originally, funding was requested by David Little, Iowa DOT, District 2, for this project but because he was not able to be here to present the final conclusions, Mark Dunn presented in his stead.)

## OBJECTIVES

Objectives were to estimate accident costs for a wide range of roadway and roadside characteristics so that designers can calculate benefit/cost ratios for culvert safety treatment options under various particular scenarios.

## BENEFITS

This study shows that use of different culvert safety treatments should be flexible to roadway and roadside characteristics. It also shows that culvert extension and grating were the safety treatments found to produce the lowest accident costs for all highway scenarios modeled. Therefore, it is believed that the expanded adoption of culvert extension and culvert grates can improve overall highway safety.

Q: You said you had trouble determining the cost of the extension part of this? I wasn't sure why that was.

A: My understanding is that the ones we've done haven't been stand-alone projects; so if it was partly done with shoulder-widening (or some other aspect), it was difficult to separate materials costs from other activities charged in the overall cost of the project under each particular situation.

**Motion to Approve** by J. Joiner. 2<sup>nd</sup> by V. Dumdei.

Motion carried with 13 aye, 0 nay, 0 abstaining.

**\*One Member Joined the Table\***

**FINAL REPORT TR-586, "Pavement Thickness Design for Local Roads in Iowa,"** Hosin "David" Lee, The University of Iowa/IIHR (\$50,000)

**BACKGROUND**

To minimize the life-cycle cost of building and maintaining pavements, it is critical to determine the most appropriate pavement material and thickness for a given traffic level, subgrade condition and environmental factor. The 1993 "AASHTO Guide for Design of Pavement Structures" is most commonly used by states for designing pavement thickness for low-volume roads. Statewide urban design and specifications (SUDAS) currently utilizes a simplified version of the 1993 AASHTO *Pavement Design Guide in Iowa*, which is very conservative based on placement of the pavement on natural subgrade, distribution of truck classifications, and other design parameters. Therefore, this research sought development of a modified pavement design methodology to be used for determining local road pavement thickness in Iowa.

**OBJECTIVES**

The main objectives of this research are to: 1. identify the most critical design input parameters, 2. determine the minimum pavement thickness, and 3. develop new pavement design and sensitivity analysis (PD&SA) software which can provide the most appropriate design thickness for a broad range of pavement conditions.

**BENEFITS**

The most critical input parameters were identified and typical values for local roads in Iowa used to run the existing StreePave, WinPas, and APAI pavement design software packages. The prototype PD&SA software can be used to make comparisons from the pavement design catalog that was developed for the database. Through the pavement design sensitivity analysis, the prototype PD&SA software will help pavement engineers understand the impacts of the critical input parameters on the pavement design. This final report does not include the prototype software which will be validated and tested during the next phase.

Q: Have you thought ahead to the validation?

A: Additional sensitivity analysis using DARWIN and the Asphalt Institute software should be performed to be compared against the sensitivity analysis results from StreetPave, WinPas, and APAI software packages.

Q: Are there any field sites where history of traffic flow, substrate, etc., can be identified for comparison using the software to see how that pavement held up?

A: Yes. We can identify design performance compared to actual performance and this should be included in a future study.

C: The objectives included SUDAS pavement design procedures software, a final report and a new pavement design software manual; it was not completed. There's more left to be done before development of a prototype. Did you end up with some projected costs left over to be used in the next phase? Is there any money left over?

A: It did take longer than anticipated. All of the funding was used. However, prototype software was developed.

C: To summarize: The three software packages you analyzed get slightly different results; traffic had the highest impact and you've begun development of a database to plot the different results.

A: Yes.

Q: It looks like you're recommending future studies based on the current project's objectives. So for future study you recommend bringing in DARWIN for sensitivity analysis, you need to do more work on how to convert traffic levels, and we still need one method approach and also, we need the SUDAS design procedure.

A: We're not really developing a mechanistic procedure here. We're applying software and recommending slightly different thicknesses for various conditions. Basically, the committee member procedure developed will determine one single number. So, it's not methodology we're developing as much as procedures to arrive at a consensus from different software recommending slightly different thicknesses.

C: My concern is that the Board had competing proposals and the current report does not meet objectives, so during our review, we weren't really comparing apples to apples during the original selection. The competing proposal had all of the objectives in it for more funding, however, had it been known we were going to take this research into a Phase II, then maybe the competing proposal might have been submitted differently. It concerns me that we have to go to additional phases to meet objectives.

C: That was my point, but I understand that as you get into the research, that you can end up with a need for more design and further work to achieve the end product. We need a design manual and the software product.

Mark: Part of the design software is already developed. A discussion within the TAC involved the discrepancy within different originally planned design procedures and how to arrive at one number. The question was did we need to gather additional information in order to determine what that final number should be? And that was where the recommendation that we look at AASHTO and DARWIN came into play. It was not part of the original objectives. This will require quite a few additional runs to add those into the cost of the software itself. It was the TAC recommendation not to publish the software at this time until a way to find a number was found using the three programs agreed upon. This is how project direction has changed slightly, at the direction of the committee.

Q: Is this a way to choose a new program, or a way to build a new one?

Mark: This was never intended to build a new design program. This is considering current ones to come up with a design procedure. There may not have been clear direction on how we were going to end up with that from those three numbers. Before we present a second phase of this, I want to be sure we'll have clear direction on how we're going to come up with one number from five software packages (instead of from three). We'll need to determine design values for SUDAS before we put any more effort and money into this.

C: At least at this point you have a better direction of where this is going to end up.

Mark: We do have a good idea from the sensitivity analysis, the most critical factors. Another question that came up through the life of the project is what factors are inherent in design methods that can't be controlled, such as concrete strength, for example. I don't know that we've gotten a clear answer using only two programs for designing the equivalent thickness of pavement if they're using two concrete strengths which could have a big effect on outcomes.

Q: Did the TAC say that this project is essentially completed?

Mark: We felt the need to present it as-is, and that another phase would be needed to review additional software in order to get to the point of putting forth a SUDAS design method.

Q: So the recommendation is to approve this as-is and Phase II would be presented in the future as a non-competitive proposal?

Mark: Yes, that is the intent. Phase II will require determination of a sound way of arriving at one number, using two additional programs, before I'd recommend returning to the Board for funding. In reference to the other proposal submitted for this, I haven't gone back and looked at that, but in my opinion based on some things that have come up through the project, I believe these issues would have developed with that one as well. Would they have had funding requested for these additional things that have come up? Well, it may have been easier to add additional funding or perhaps modify the proposal, but because of the focus of the RFP, these issues would probably have been there regardless of who was doing the work.

C: It still seems as though the main objective is to come up with a single methodology to develop objective asphalt and concrete numbers for incorporation into SUDAS for an objective comparison.

Q: As a representative of the TAC, do you think we're on the right track?

Mark: That's why I think we need to step back and figure out exactly how we're going to determine what will be a valid number. At this time, I would not recommend Phase II. We need time to sit down and really work on that aspect of it. This is the biggest issue we need to deal with before moving forward. We need to answer the question of how we get from five design methods down to one—and how to determine the one we pick is the most appropriate for our use. My recommendation is to approve the report as it stands because there were outside factors that led to incompleteness of the objectives that were originally intended.

C: Maybe industry representatives should not be on the TAC. I believe in industry input, but let's not have arguments and debates on the committee.

Mark: I think that might be a more efficient way of moving forward; to periodically share results with them and ask them for comment while reducing the number of industry people on the advisory committee.

Q: What do you feel is a more proficient way to proceed? Should we have the Iowa DOT summarize the work yet to be completed and then open that up competitively? Or do you feel that we should have Dr. Lee and his group propose Phase II and the level of work to be done and the cost to accomplish that?

Mark: I feel that Chris Brakke and a few others from SUDAS should probably determine exactly what it is we need, but I think putting it back out to competitive bid halfway through the project probably isn't the most efficient way to do it. In hindsight, it would have been good to address some of these issues ahead of time, but trying to have someone else pick up where Dr. Lee left off doesn't seem an efficient way to proceed.

Q: What was the difference in funding requests?

A: I think it was significant. This one was \$50K and I think the other one was over \$100K. So we may have to invest more funding.

Mark: One of the issues with the other proposal was they didn't feel they could meet objectives for the \$50,000 stated in the RFP, and rather than address that, they proposed an amount they thought it would take to complete the project in its entirety. In the past, we've directed people to add on a secondary proposed budget over the amount specified in the RFP if they believe it will take more in order to meet objectives; or at least work with me to identify that as a concern. Unfortunately, that didn't happen on the first time around.

C: The work completed to date has been good for the \$50,000. It sounds like we should approve this as-is and have the committee get together and focus, then give more specific objectives for Phase II.

C: We would provide information to SUDAS to put their design guide together. The decision to incorporate is made by the SUDAS committee.

Mark: Paul Wiegand is part of SUDAS and is working to come up with recommendations.

**Motion to Approve With Future Collaboration From Mark Dunn on Developing Phase II Scope for Project Completion** by V. Dumdei. 2<sup>nd</sup> by A. Abu-Hawash.

Motion carried with 14 aye, 0 nay, 0 abstaining.

**FINAL REPORT TR-578 Phase III, "Validation of the Mix Design Process for Cold In-Place Rehabilitation Using Foamed Asphalt,"** Hosin "David" Lee, The University of Iowa/IIHR (\$42,044)

**BACKGROUND**

During the previous study, the mix design procedure was developed and validated for cold in-place recycling using foamed asphalt (CIR-foam). The CIR using engineered emulsion (CIR-EE) mix design procedure is complex and requires special equipment that is not commonly available. Currently, no standard mix design procedure is available for CIR using emulsified asphalt (CIR-emulsion) in Iowa. The current flat application rate for standard emulsion should be reviewed to determine if changes would improve the performance of the

CIR. It is critically needed to determine if the CIR-foam mix design process can be applied to CIR-emulsion with some minor adjustments.

## OBJECTIVES

The main objective of this study was to determine if the CIR-foam mix design process can be applied to CIR-emulsion with some minor adjustments.

## BENEFITS

One of the most significant benefits is to provide pavement engineers with a rational mix design procedure to assist them in selecting the most appropriate CIR technology, types and amounts of stabilization material for existing pavement conditions.

**Motion to Approve With Revision** by J. Berger. 2<sup>nd</sup> by M. Nahra.

Motion carried with 14 aye, 0 nay, 0 abstaining.

## NEW BUSINESS

Edward Engle, Secondary Road Coordinator, Iowa DOT Research and Technology Bureau, made a short presentation regarding a new review and evaluation form to be filled out by the Operations Research office during project progression and at completion. It includes requirements that the TAC meet at least quarterly and a checklist to be used when the researcher sends in quarterly reports. This new process was developed at the request of Iowa DOT Research and Technology Bureau Director Sandra Larson.

The intent is to provide the IHRB with more information about work that researchers are doing when competitive proposals are presented. This is expected to begin immediately, and includes projects currently underway. The inquiries are not difficult to provide answers for. After the form is initially filled out, there are only four items to be updated during subsequent reporting. These are all things that are actually written into the Addendum for each project.

Q: How is the TAC put together?

Mark: Typically, we have researchers put together a TAC, although quite often they come to me and ask for recommendations; I will make suggestions, especially for the DOT side of things, or recommend a city or county engineer.

Q: Will the TAC leader fill this out?

Mark: The evaluation will be done by our office. We have a quarterly reporting system and this will help us determine who submitted quarterly progress reports for the TAC and Board's review. This is a way of documenting that experience.

Ed: This is mechanics for keeping our office and TAC updated. For instance, the primary objective of the quarterly reports is to go to the TAC so they know what is happening with the project.

**REMINDER:** We will be collecting and finalizing project topics for next year's consideration. You'll be receiving an email in the next couple of weeks with the list. However, I haven't received many new topics so please email those to me if you have them. I will send out a reminder note next week with an attachment summarizing projects from last year that received at least one vote (unless completed); also, topics that did not receive at least one vote from last year's ranking will be compiled into a document for your consideration. Please review the listings. If items aren't re-submitted they will come off the list for FY10. Sometime in mid-March, I will send an updated, complete list for voting before the April 29, 2010 meeting.

C: One suggestion as we get into this: We have proposals, and if we end up with multiple bids, we need to rigorously examine the funding requested so we don't end up with a low bid. Maybe we should be evaluating competitive bids somewhat differently.

C: We had three projects left over from last year: High Rap, HMA joints and roundabouts.

Mark: We're still planning on moving forward with those; they will be funded through this year's funding. I will update the list. They won't be on the topic list for FY10 funding.

ANNOUNCEMENT: The UHPC Waffle Deck Bridge project team is doing a load test for precast panels this afternoon at 1 p.m. and you're all invited. However, please make sure you obtain a parking pass or you risk getting a ticket. Next week, they're going to test the individual panels to failure.

Brian Moore gave a brief update on the project.

## **ADJOURN**

### **Motion to Adjourn**

Motion by J. Berger. 2<sup>nd</sup> by B. Moore.

Motion carried with 14 aye, 0 nay, 0 abstaining.

**The next meeting of the Iowa Highway Research Board will be held on Friday, February 26, 2010, in the East/West Materials Conference Room at the Iowa DOT.**

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**Mark J. Dunn, IHRB Secretary**