

# **IOWA HIGHWAY RESEARCH BOARD (IHRB)**

*Minutes of March 31, 2017*

## **Regular Board Members Present**

W. Weiss  
R. Stutt  
P. Assman  
K. Mayberry  
J. Thorius  
M. Parizek  
A. Abu-Hawash

K. Jones  
C. Poole  
S. Okerlund

## **Alternate Board Members Present**

D. Sprengeler  
B. Braun  
A. McGuire  
T. Kinney

## **Members with No Representation**

L. Bjerke

## **Secretary – V. Goetz**

## **Visitors**

Tammy Bailey  
Khyle Clute  
Chris Brakke  
John Hart  
Bob Younie  
Danny Waid  
Jeremy Ashlock  
Gordon Smith  
Brian Keierleber  
Sunghwan Kim  
Dale Harrington  
Peter Taylor  
Ping Lu  
Bob Steffes  
Halil Ceylan  
Neal Hawkins

Iowa Department of Transportation  
Iowa Department of Transportation  
Iowa Department of Transportation  
Iowa Department of Transportation  
Iowa Department of Transportation  
Iowa County Engineers Association  
Iowa State University  
Iowa Concrete Paving Association  
Buchanan County  
Iowa State University  
Concrete Pavement Tech Center  
Concrete Pavement Tech Center  
Iowa State University  
Iowa State University  
Iowa State University  
Iowa State University

The meeting was held at the Iowa Department of Transportation Ames Complex, Materials East/West Conference Room, on Friday, March 31, 2017. The meeting was called to order at 9:00 a.m. by Ahmad Abu-Hawash with an initial number of 12 voting members/alternates at the table.

## **1. Agenda review/modification –**

**a. Item 6: Add discussion about Proposed RFP IHRB-17-04: Cost Benefit Analysis of Milled-In Pavement Markings**

**2. Motion to approve Minutes from the February 2017 meeting**

**Motion to Approve** by K. Jones; 2<sup>nd</sup> M. Parizek  
Motion carried with 12 Aye, 0 Nay, 0 Abstaining.

**3. Match Funding Proposal: “Self-Heating Electrically Conductive Concrete Demonstration Project”, Halil Ceylan, Iowa State University, (\$358,870)**

**BACKGROUND**

Snow and ice removal are expensive components in winter road maintenance for Iowa Department of Transportation (IA DOT) as well as Counties and Cities in Iowa. Self-heating pavement systems used for melting the ice or snow on the surface are being explored (Ceylan et al. 2014). Recent research studies at Iowa State University by the PROSPER team have successfully demonstrated the potential for developing Electrically Conductive Concrete (ECON) for self-heating concrete pavement applications.

Concrete is considered as a good electrical insulator in dry condition. Conductive materials with extremely high conductivity values can be used to replace aggregate materials in normal concrete to achieve conductive concrete.

**Objective**

The primary objective of this research is to do a full-scale field demonstration of the ECON technology and its efficient deicing benefits for Iowa city and county roadways and state highways. An upcoming construction project by the city, county, or state DOT will be identified in consultation with the project TAC for the ECON field demonstration. One site of interest to Iowa DOT that has been recently identified is the shoulders on I-80 Eastbound near Council Bluffs (Pottawattamie County) for implementation/demonstration of ECON technology.

**Discussion**

Q. What kind of current are you running, is there any chance of anyone getting electrocuted?

A. If you are standing on the slab there is no danger, we use alternating currents.

Q. Does it have to be heated to 90 degrees to function?

A. No, we use 45 degree Fahrenheit.

Q. Are we close to identifying a potential demonstration?

A. We had a meeting with a lot of colleagues, we would like to have this site close to the University so we can use it as a resource site and get back and forth easily. Two potential sites are on I-80 and a sidewalk on DOT campus or a rest-stop.

Q. Are there any concerns about the frost or heave with the subgrades?

A. We have not seen any concerns and have not seen any problems.

Q. What was the thickness of the layer pavement and would it be the same for bridge decks? 3 ½ inches for a bridge deck would work?

A. The Des Moines National Airport slab is 7 ½ inches thick with 4 inches of regular concrete and the electric layer is only 3 ½ inches which is more than enough for us. Yes, 3 ½ inches would work on a bridge deck.

Q. Do you have any concerns about the durability long term effect as the surface starts to crack?

A. Actually we have benefits, when we use this technology we don't have to rely on the icy chemicals that is a great benefit the life of the structured systems. We are adding fiber to the mix that is all a part of the mechanical properties like preventing cracking. This is a lot better concrete compared to our regular concrete.

**Motion to Approve by W. Weiss; 2<sup>nd</sup> J. Thorius**  
Motion carried with 12 Aye, 0 Nay, 0 Abstaining.

**4. PROPOSAL:** *“Concrete Overlay Performance on Iowa’s Roadways TR-698 Phase 2B: Optimized Joint Spacing for Concrete Overlays with and without Structural Fiber Reinforcement – Field Demonstration and Verification”*, Peter Taylor, Iowa State University, (\$117,500)

**Background**

This proposal is Phase 2B of the study “Optimized Joint Spacing for Concrete Overlays With and Without Structural Fiber Reinforcement” for transverse and longitudinal joints. Phase 2A includes software analysis using BCOA ME and Pavement ME to provide joint spacing options for various traffic levels and thicknesses with and without fibers. Phase 2A also includes field testing of existing concrete overlays to determine where the concrete overlay has deployed a crack below the saw joint. University of Illinois researchers will provide assistance during Phase 2A for non-destructive testing using a MIRA device or Ultrasonic Pulse Velocity (UPV) device on concrete overlays that have fibers in Illinois. Information gathered from testing existing pavements will be combined with analytical information from the pavement software to determine the optimized joint spacing for various concrete overlay thicknesses. The optimized joint spacing determined in Phase 2A will require field validation. Phase 2B is proposed to test the various optimized longitudinal and transverse joint spacing and includes field validation through testing and monitoring newly constructed overlays with and without fibers. Phase 2B will take into consideration the information learned during Phase 1 to develop test sections for new concrete overlays.

**Objective**

The objective of Phase 2B is the verification of the Phase 1 optimized joint spacing with and without fibers results, through testing and periodic field monitoring of newly constructed concrete overlay projects. When possible, field monitoring will be completed with non-destructive testing equipment such as the MIRA device or UPV device.

New concrete overlay projects will include test sections with various joint spacing for various thicknesses and overlay types. Based upon performance data, the Phase 2B recommendations will be modified if necessary to correspond to actual joint development.

**Discussion**

Q. How many projects are you hoping to do?

A. We are looking at 6 or 7 projects built.

**Motion to Approve by P. Assman; 2<sup>nd</sup> K. Jones**  
Motion carried with 12 Aye, 0 Nay, 0 Abstaining.

**5. PROPOSAL:** *“Low-Cost Rural Surface Alternatives Phase IV: Frost Depth Monitoring and Prediction”*, Jeramy Ashlock, Iowa State University, (\$299,921)

**Background**

Moisture from precipitation and freeze-thaw cycles combined with inadequate drainage leads to saturated conditions which can damage unbound roads, and in severe cases, make

them impassable. The physical mechanisms of freeze-thaw action are currently well understood, but difficult to model or predict. To be effective, prediction methods must address multiple issues simultaneously, including water migration – especially in the unsaturated vadose zone above the water table, energy balance and heat transfer from the environment above and below the roadway surface, and variations in seasonal precipitation. To be accurate, predictive models must also be able to be updated with changing weather data as it becomes available

Many transportation agencies in the US, Canada, France, Finland, Norway and Sweden impose load restrictions on vehicles to mitigate damage during thaw weakening in the spring season. Reliable forecasting of thaw depth and roadway strength during thaw periods will be beneficial for both the transportation industry and Iowa county engineers, since it will provide a rational basis for setting and lifting SLR dates in accordance with the subsurface temperature and moisture conditions unique to each year and location.

### **Objective**

In response to a request by the TAC of Project TR-664 for additional phase projects, as well as interest expressed by a focus group of several county engineers, the research team proposes to instrument and monitor four additional granular-surfaced roadway sections around Iowa. To help DOT and county engineers better plan their resources and load restrictions by being able to predict the frost susceptibility and frost boil severity in any given year, it would be the project will obtain data for different regions and soil conditions around Iowa. It will also develop predictive models to determine the maximum and minimum frozen soil depths at a given date using freely available climate data, and thereby forecast the starting date and duration of the thaw period as well.

Motion to Approve by J. Thorius; 2nd K. Jones  
Motion carried with 12 Aye, 0 Nay, 0 Abstaining

## **6. RFP:**

**a. IHRB-17-02: “Improving Concrete Patching Practices on Iowa Roadways”, \$175,000**

Motion to Approve by K. Jones; 2nd P. Assman  
Motion carried with 12 Aye, 0 Nay, 0 Abstaining.

**b. IHRB-17-03 PROPOSAL: “Modernization of Iowa Transportation Program Management System”, Steve Devies, ICEASB, \$405,364.63**

Motion to Approve by W. Weis; 2nd M. Parizek  
Motion carried with 12 Aye, 0 Nay, 0 Abstaining.

**c. IHRB-17-04: “Cost Benefit Analysis of Milled-In Pavement Markings”**

**DISCUSSION:** Presentation by Neil Hawking and Omar Smadi, Iowa State University and John Hart, Office of Maintenance, Iowa DOT. The purpose on the presentation was to share with the IHRB current project by Iowa DOT to switch operations and pavement marking program for interstates. The proposed RFP will be revised for future review and approval based on new information learned.

**d. IHRB-17-07: “Develop an Improved Selection Methodology for Safety Improvements at Public Highway-Railroad Grade Crossings”, \$90,000**

Motion to Approve by C. Poole; 2nd K. Mayberry  
Motion carried with 12 Aye, 0 Nay, 0 Abstaining.

**7. Innovative Project Award Recipient Presentation** – The IHRB in partnership with the Midwest Transportation Center and the Iowa DOT awarded 4 grants for Innovative Project Proposals in the fall of 2017. This presentation is one of the awarded projects.

*“Initial Characterization of Geopolymer Based UHPC Material Properties”*, Ping Lu, Iowa State University

Discussion;

Q. Is the testing done here at Iowa State University?

A. Part of the testing will be done in China and part testing at Iowa State University.

Q. Will you be able to do some of the mixing here?

A. No

Q. Will you get the opportunity for you to verify the process of mixing?

A. A researcher and myself from our team will go over to China to actually see how they are mixing the materials, document testing, and to ensure they are following the established protocol.

Q. This funding isn't only by the Iowa Highway Research Board?

A. This project is funded by the IHRB, MTC and State funding.

## **8. New Business**

Vanessa stated the deadline for submitting new topics for FY18 is March 31, 2017.

Vanessa stated there is a change in the board membership. Scott Reinhart who was the district three alternate has left Palo Alto County. Paul Assman, Crawford County, is going to resume the role of being the regular member and Brandon Billings from Cherokee County will be the alternate for District three for the counties.

## **9. Adjourn**

The next meeting of the Iowa Highway Research Board will be held Friday, April 28, 2017 in the East/West Materials Conference Room at the Iowa DOT. The meeting will begin promptly at 9:00 a.m.



---

**Vanessa Goetz, IHRB Secretary**