

## IOWA HIGHWAY RESEARCH BOARD (IHRB)

*Minutes of June 24, 2022*

### **Regular Members Present**

J. DeVries  
C. Burke  
R. Koester  
R. Knoche  
A. Bradley  
W. Weiss  
T. Roll  
J. Fantz  
W. Rabenberg  
A. McGuire

### **Alternate Members Present**

Z. Gunsolley  
D. Snead

### **Members with No Representation**

J. Hauber  
D. Sanders  
M. Rydl

### **Executive Secretary**

V. Goetz

### **Visitors**

Tammy Bailey	Iowa Department of Transportation
Derek Snead	Jones County Engineer
Peter Taylor	Iowa State University
Jacob Ferro	Mills County Engineer
Khyle Clute	Iowa County Engineers Association Service Bureau
Brian Moore	Iowa County Engineers Association Service Bureau
Paul Wiegand	SUDAS/IPWSB Iowa State University
Jeremy Ashlock	Iowa State University
Chris Cromwell	Federal Highway Administration
Ravi Kiran Yellavajjala	North Dakota State University
Brennan Dolan	Iowa Department of Transportation

The meeting was opened on June 24, 2022 at 9:00 a.m. by Chair Andrew McGuire with an initial number of 12 voting members/alternates.

### **AGENDA**

#### 1. Agenda review/modification

STIC Excellence award nomination discussion.

Motion to Approve by W. Weiss 2nd by D. Snead

Motion carried with 12, 0, 0

#### 2. Minutes Approval from the May 20, 2022 meeting

Motion to Approve by W. Weiss 2nd by R. Koester  
Motion carried with 12, 0, 0

3. ST-011 Final Report: "Iowa DOT Updates to Statewide Design Guidance, Kevin Luecke, Tool Design", \$119,269.46, (15min).

**Discussion**

Q. Is the speed limit talking only about roads or also speed limit in relation to bicycle trails?

A. The speed limit we referenced were related to motor vehicle speeds and the impacts related to Pedestrians and Bicyclist safety.

Motion to Approve by A. Koester 2nd by J. DeVries  
Motion carried with 12, 0, 0

4. TR-765 Final Report: "Evaluation of Penetrating Sealers for Concrete", Peter Taylor, Iowa State University, \$149,308, (15min).

**Discussion**

Q. How would local agencies or DOT perform these tests?

A. The test is simple, any testing lab around this area should be able to test.

Motion to Approve by W. Weiss 2nd by T. Roll  
Motion carried with 12, 0, 0

5. Additional Funding Request: TR-797, "Feasibility of Granular Road and Shoulder Recycling Phase II: Gradation Optimization for Improved Performance", Jeremy Ashlock, Iowa State University, \$9,598 (15min).

Motion to Approve by R. Knoche 2nd by R. Koester  
Motion carried with 12, 0, 0

6. TR-813, Proposal IHRB-3176: "An Economical and Sustainable Dust Suppressant for Gravel Roads", Ravi Yellavajjala, Arizona State University, \$99,482, (15min).

**Abstract**

Fugitive dust is a result of synergistic activity between wind and traffic that pulverizes the large soil clumps into finer dust particles. Fugitive dust is aggravated by low humidity and the movement of large farm vehicles that is typical in late spring in rural regions. All the current dust suppressants either adsorb water from the atmosphere or bind finer dust particles into larger particles to lower the fugitive dust. Our idea is to synthesize hydrogel crystals from corn starch and soy protein isolate, which can be mixed with water before application that can both absorb free moisture from the atmosphere and agglomerate the dust particles due to their favorable gelation properties. Moreover, the hydrogel crystals will be synthesized to withstand several wet-dry cycles that are common in the Upper Midwest. Due to the inherent gelation properties, the hydrogel crystals do not leach out of the soil during precipitation. From a feasibility standpoint, the salt sprayer trucks that are not used in the late spring can be slightly modified for the application of these hydrogel crystals, relegating the need for huge initial capital investment in the Upper Midwest states.

### Discussion

Q. How much product will this take?

A. For our preliminary study, we used the weight of hydrogel equal to the weight of the calcium chloride. As of now, we do not have a clear understanding of what is the ideal quantity of hydrogel that can be used.

Q. What type of cost comparison would you estimate at this point?

A. Corn is cheap both short-term and long-term as Iowa is the largest corn producer and these hydrogels do not corrode bridges and cars. We do not have exact numbers, but we strongly believe that our product will be quite inexpensive.

Q. What is the stability of this product when heated, is it stable for some time?

A. It is stable up to 100 F. We did not investigate further and have no understanding of what UV light can do to these hydrogels.

Q. Are they using high pressure sprayer in the case of calcium fluoride?

A. Yes. It may not be necessary for hydrogels.

Q. If it is extremely dry is it not going to work?

A. Yes, it will work. Unlike calcium chloride, the hydrogels are also effective at low relative humidity.

Motion to Approve by W. Weiss 2nd by W. Rabenberg

Motion carried with 12, 0, 0

7. TR-814, Proposal IHRB-3522: "Concentration Preserving Deicing Solutions for Higher Ice Melting", Ravi Yellavajjala, Arizona State University, \$109,697, (15min).

### Benefits

**Mobility:** Snow and icy pavements disrupt the smooth flow of traffic rendering the traffic network dysfunctional. This may result in heavy economic losses, and discomfort to the public. Commercial vehicle operators lose about 32.6 billion driving hours each year due to the traffic delays caused by bad road conditions resulting in a loss of \$2.2 to \$3.5 billion. The proposed concentration preserving deicers will melt more amount of ice per unit weight of deicing materials even at low temperatures improving the mobility on Iowa roads during the winter season.

**Safety:** According to the United States Federal Highway Administration (FHWA), about 10%, 8%, and 9% of weather-related crashes that occurred between 2005 and 2014 can be attributed to snow/sleet, ice, and snow/ slush on pavements, respectively. The number of fatalities that are caused by snow/ sleet on pavements alone in the last 20 years is considerably high. The proposed concentration preserving deicing solutions will be effective in loosening the ice that will contribute to the easy removal of snow from the roads contributing to better safety during winter months.

**Sustainability:** Polyols and hydrogel crystals are generally considered non-toxic materials. In fact, polyols are derived from corn and soybean which are renewable resources. Super absorbent cellulose fibers are also made from renewable resources. Utilizing materials from renewable sources makes the proposed deicing materials sustainable in the long run.

**Technology:** Each year, the Iowa department of transportation spends around \$14 million on the deicing of pavements. It imports 200,000 tons of rock salt and employs upwards of 800 snowplows for winter maintenance of roads. The outcomes of this project will improve the deicing procedures in the state of Iowa by reducing the consumption of rock salt, and lowering the corrosion of snowplows.

### Discussion

Q. The friction or the skid numbers would be reduced, is this a temporary reduction?

A. Yes, an additional snowplow is recommended

Q. Have you looked into using sugar beets?

A. Yes, in the TR 754 project we investigated the efficacy of sugar beets for deicing. They were found to slightly outperform corn juice.

Motion to Approve by W. Weiss 2nd by W. Rabenberg  
Motion carried with 12, 0, 0

8. July RFP IHRB-3044: "A Decision-Matrix Tool for Culvert Grade Control Selection"

Motion to Approve by D. Sneed 2nd by R. Knoche  
Motion carried with 12, 0, 0

9. New Business

- a. Idea #3794 Discussion: Statewide Historical Bridge Survey Update

**Discussion**

Q. The Lansing Bridge, will you keep any of the pieces as far as the mitigation package?  
A. Yes, we will retain a few pieces.

Motion to Approve by D. Sneed 2nd by R. Knoche  
Motion carried with 12, 0, 0

- b. 2022 STIC Incentive Project Solicitation: To submit ideas by July 15, visit the STIC Campaign now open.  
[https://ideas.iowadot.gov/subdomain/stic-incentive-funds/end/campaign\\_overview?qmzn=iKFrYf](https://ideas.iowadot.gov/subdomain/stic-incentive-funds/end/campaign_overview?qmzn=iKFrYf)
- c. July IHRB RFP – IHRB-3624 - Performance Monitoring of Two-Course Bridge Deck Utilizing Ultra High Performance Concrete (*\*\*\*this agenda item was added after the meeting and reviewed via electronic correspondence\*\*\**)

Motion to Approve by D. Sanders 2nd by J. Hauber  
Motion carried with 14, 0, 1

10. Adjourn

The next regular meeting of the Iowa Highway Research Board is scheduled for July 29, 2022 in person in the East/West Materials Conference Room at the Iowa DOT.

TB/VG