IOWA HIGHWAY RESEARCH BOARD (IHRB)

Minutes of December 11, 2018

Regular Board Members Present

W. Dotzler
R. Knoche
S. Okerlund
A. Abu-Hawash
P. Geilenfeldt III
L. Bjerke
D. Sanders
B. Skinner
A. Bradley
M. Parizek
J. Thorius
C. Poole
W. Weiss
T. Nicholson

Alternate Board Members Present

Members with No Representation

P. Assman

Executive Secretary – V. Goetz

Visitors

Tammy Bailey	Iowa Department of Transportation
Katelyn Freeseman	Iowa State University/InTrans
John Shaw	Iowa State University/InTrans
Joseph Podolsky	Iowa State University
David Lee	University of Iowa

The meeting was held at the Iowa Department of Transportation Ankeny Complex, 2nd Floor Large Conference Room, on Tuesday, December 11, 2018. The meeting was called to order at 1:00 p.m. by Wade Weiss with an initial number of 14 voting members/alternates at the table.

1. **Agenda review/modification**

   V. Goetz stated under New Business John Shaw will give a five-minute update on the NCHRP Rural Transportation Research Road Maps.

   Motion to Approve by J. Thorius; 2nd L. Bjerke
   Motion carried with 14 Aye, 0 Nay, 0 Abstaining

2. **Motion to approve Minutes from the September 2018 meeting**

   Motion to Approve by M. Parizek; 2nd W. Dotzler
   Motion carried with 14 Aye, 0 Nay, 0 Abstaining

3. **Membership Update, Annual Calendar**

V. Goetz presented certificates of appreciation to all members that are leaving the Iowa Research Board December 31. Ahmad Abu-Hawash, who is the longest serving member in IHRB resent history. Dave Claman, Iowa DOT Office of Bridges and Structures will become the new regular member on the board. Michael Nop from the same office will be the new alternate member. Ron Knoche has been nominated by APWA IA Chapter to serve another three-year term. Rudy Koester from the City of Waukee will replace Bruce Braun as the city alternate. Paul Assman, Crawford County, District 3 rep's term ends December. Brandon Billings, has left Cherokee County and will no longer be on the IHRB. Brett Wilkinson, Buena Vista County Engineer will be the new regular member for County District 3. Laura Sievers with Lyon County has been elected to be the alternate. Myron Parizek, Benton County Engineer's term ends December as well. Todd Kinney with Clinton County will move up as the regular member for District 6. Anthony Bardgett, Delaware/Dubuque County Engineer was selected to serve as the new alternate.

V. Goetz state that the new calendar for the next four years has been updated to the Iowa DOT's IHRB web page. Discussion will continue about the change in venue for the December meeting. We have a choice of keeping it in Ames, return to the Ankeny location or moving to a venue in Des Moines to be in the same spot as the ICEA Annual Conference.

4. **Final Report – TR-714, "Guide to Life-Cycle Data and Information Sharing workflows for Transportation Assets",** David Jeong, Iowa State University, $50,000

BACKGROUND

Transportation project data are increasingly available in digital formats due to the adoption of such advanced computerized technologies as three-dimensional (3D) modeling and project administration systems. These technologies offer an opportunity to improve data and information sharing significantly between project participants and across various project development stages.

OBJECTIVES

The purpose of this work was to capture industry knowledge and experience with digital data and information sharing throughout the life cycles of different transportation assets, develop business process maps and data sharing maps for various project types, and offer guidance to practitioners on better ways to collect, manage, and store project data.

BENEFITS

The 15 process maps developed in this research can provide practitioners with a clear understanding of the activities and data sharing requirements throughout the life cycles of different types of projects (new construction, reconstruction, repair, and maintenance) and assets (signs, guardrails, culverts, pavements, and bridges). Additionally, the five exchange requirement matrices clearly show the participants who need data at different stages, the data that must be exchanged, and the actors that can provide the data.

An ideal process map and suggestions for improvement have been proposed to further streamline the workflow throughout the project life cycle and reduce duplicate data collection efforts in the operation and maintenance phases. Properly transferring the necessary asset data in the appropriate format can help enhance productivity and reduce operation costs.

DISCUSSION
Q. Was there a TAC to this project?
A. Yes

Motion to Approve by R. Knoche; 2nd L. Bjerke
Motion carried with 14 Aye, 0 Nay, 0 Abstaining

5. **Final Report – TR-736, "Performance Evaluation of Recent Improvements of Bridge Abutments and Approach Backfill",** Mohamad Elbatanouny, Wiss, Janney, Elstner Associates, Inc., $50,000

BACKGROUND
Approach slabs are designed to transfer traffic from the roadway to the deck of a bridge smoothly. At the joint with the roadway, the approach slab will often rest on a sleeper slab or the subbase. At the joint with the bridge deck, the approach slab will rest on the abutment. Two types of abutments are common: integral, where the abutment moves with the girder supporting the superstructure due to length changes, and stub, where the girder may move freely relative to the abutment due to the presence of a bearing. An expansion joint between the approach and both abutment types is required to facilitate movement and backfill is placed behind the abutment during construction A bump at either end of the bridge deck often forms due to differential settlement between the approach slab and the bridge abutment. These bumps hinder ride quality, cause damage to the vehicles and bridge decks, and are costly to repair and maintain. Differential settlement is typically caused by the presence of voids beneath the approach slab. Voids may be initiated by the longitudinal displacement of an integral abutment, which crushes the backfill material behind it, or by poor compaction of the original backfill material. They grow due to erosion and poor drainage. To address the bump, Iowa DOT completed a detailed research study in 2005. The standards were revised based on the conclusions. Currently, Iowa DOT specifies that the expansion joint lay between the approach slab and the bridge deck. Granular backfill and subdrains are used under the approach slab to prevent erosion.

OBJECTIVES
The main objective of this study was to determine whether or not the revisions made since 2005 to the approach slab design standards used by Iowa DOT have improved the resistance of bridge approaches to bump formation. The performance of eight bridges was assessed and issues not addressed by current design standards were identified. This research provides recommendations for improving bridge approach design and construction to prevent the commonly-observed deterioration mechanisms.

BENEFITS
1. A new maintenance plan incorporating more frequent inspection and/or maintenance should be implemented to improve the condition of the joints.
2. A joint sealant capable of tolerating the large differential movements between the barriers and the approach slabs should be applied in existing bridges. For new bridges, methods eliminating this differential movement should be applied, such as casting the barriers as part of the approach slab system.
3. More stringent procedures for sealing access ports and a reliable cleaning method are required for access ports to be reliable sources of information in future inspections.
4. GPR surveys should be included in future inspections if voiding under slabs is a primary

concern due to the technique's effectiveness and reliability.
5. A comparative study of the advantages and disadvantages of the different types of abutments across their life cycle should be conducted.
6. A possible new design detail for a modified stub abutment is shown below. This will eliminate the joint between the approach slab and abutment and will eliminate the paving notch. New designs addressing the failure of the joint between the barrier and the approach slab, the differences between measured and designed expansion joint widths, and other challenges should be considered.

Motion to Approve by A. Abu-Hawash; 2nd T. Nicholson
Motion carried with 14 Aye, 0 Nay, 0 Abstaining

6. **2018 LTAP Update,** Keith Knapp, Iowa Local Technical Assistance Program
   Q. How much of your trainings are done in the Ames facility vs around the State?
   A. We do several series in six locations, as much as we can we get information out all over the State.

7. **Continuation Proposal,** "Development of Quality Standards for Inclusion of High Recycled Asphalt Pavement content in Asphalt Mixtures – Phase IV", David Lee, University of Iowa, $247,480

BACKGROUND

One of the most critical barriers to a high-RAP mix design is meeting the volumetric mix design criteria specifications due to the large amount of fine aggregate material introduced by the RAP materials. Fractionating is a process gaining popularity where RAP is screened into two or three different sizes. Coarse fraction normally includes less minus No. 200 and a lower asphalt content. The coarse fraction could still contain particles finer than the screen size because it may be a conglomerate of fine RAP particles (Shannon et al. 2016). Past studies have confirmed that the overlays containing 30 percent RAP have been performing equal to, or better than, virgin mixes for most measures of pavement performance. It was also reported that in-service performance of asphalt pavements containing up to 50 percent RAP in projects with diverse climates and traffic has been very positive (West and Marasteanu 2013).

OBJECTIVES

The main purpose of the proposed research is to develop a mix design procedure for high RAM mixtures with both rejuvenators and fractionated RAM materials for Iowa DOT and local public agencies by thoroughly understanding complex interactions between fractionated RAM and rejuvenators. Main objectives of:

1) Examine the effects of various rejuvenators and different methods of RAP stockpile fractionation on the volumetric mix design properties.

2) Evaluate long-term oven aging of both laboratory and field rejuvenated/fractionated high RAM mixtures.

3) Develop specifications for evaluating asphalt mixtures with rejuvenators and high fractionated RAM contents.

BENEFITS

By developing a new mix design procedure for high fractionated RAM mixtures with rejuvenators and performing extensive laboratory tests and building/monitoring field test sections during the proposed study, the high rejuvenated/fractionated RAM mixtures will be ready for implementation upon the completion of the proposed project. Initial phase of the proposed study will generate an inventory of RAP and RAS materials stockpiled in Iowa and provide the optimum equipment/method for fractionating them. Experimental phase of this study will help the industry build pavements using high rejuvenated/fractionated RAM mixtures and assess its performance. Identifying the optimum fractionated structures of RAM and most appropriate rejuvenators for designing high RAM mixtures resistant to both low temperature cracking and rutting while improving environment conditions and reducing the production cost of asphalt concrete mixture, could be regarded as the most significant achievements sought in this study. For portable plant operations, processing and handling of the processed fractionated RAP materials will be considered. The goal at portable operations is to leave the site as found, which is with no left-over RAP stockpiles. The value of the fractionated RAP materials (fine vs coarse RAP materials) and the cost of moving unused fractions to another project site vs. inventory/aesthetics cost of leaving material behind will be identified. The proposed research will help pavement engineers not only specify the most appropriate RAM gradations and rejuvenators but also fractionated RAP materials stockpiling and handling operations for the given conditions in Iowa.

Motion to Approve by W. Dotzler; 2nd L. Bjerke
Motion carried with 14 Aye, 0 Nay, 0 Abstaining

8. **Continuation Proposal, "Performance Evaluation of Very Early Strength Latex Modified Concrete (LMC-VE) Overlay – Phase III,** Kejin Wang, Iowa State University, $173,404

BACKGROUND

Bridge deck overlays have been adopted as an effective deck service life extension tool by Iowa DOT since the 1970s. High performance Concrete (HPC-O) and Type O PCC (PCC-O) are the most commonly used materials for rigid overlays. Although having many advantages, HPC mixes often have high content of cementitious materials and a low water-to-binder ratio, which leads to a high tendency for shrinkage cracking and requires great caution for curing. A three-day wet curing procedure is specified in Iowa standard specifications. To meet such a specification, interruption of traffic often becomes inevitable. To control shrinkage of HPC, another IHRB research project (TR 690, Investigation into Shrinkage of High Performance Concrete Used for Iowa Bridge Decks and Overlays) has been conducted, where various shrinkage control methods were employed and their effects on fresh and hardened concrete properties were investigated. The research results indicate that while reducing shrinkage of concrete, these shrinkage control methods had also influenced other concrete properties.

Due to the high cost of traffic control for heavily traveled urban highways, it is highly desired to reduce the traffic interruption as much as possible by getting the work done at night or on weekends. To meet this need, thin epoxy overlays were tested recently with good success and it has been adopted as a bridge preservation tool for decks which are still in good or fair conditions. In addition to the reduction of traffic interruption during construction, epoxy overlays can also further reduce the dead load of bridge deck and chloride penetration when compared with HPC. However, when an overlay of considerable thickness is needed and when significant patching is required, another overlay system, a high-early-strength latex-modified concrete overlay, has been proven as a better choice. LMC-VE has been used successfully when a bridge lane can be

closed for 1 to 2 days such as over a weekend, and in many situations, a lane can be closed only for 8 hours or less, necessitating only a night closure.1 Researchers have indicated that compared with other early strength overlays, LMC-VE overlay is more durable - less prone to shrinkage induced problems and having higher resistance to chloride ion penetration. When LMC-VE is placed on hydro-demolition prepared bridge deck surfaces, a service life of the deck can be expected to be over 75 years, and the high initial cost of a LMC-VE can be offset by its extended service life2. Thus, use of LMC-VE overlays appears a better choice for expedited construction, shrinkage control, and chloride intrusion reduction than that of HPC overlays. Several States (e.g., Virginia, Ohio, Missouri, Kentucky, etc.) have already explored the applications of LMC-VE overlays in their bridge construction projects. It is an opportune time for Iowa to investigate LMC-VE overlays as the Phase III of Project TR 690.

Currently, Iowa DOT is planning to try a LMC-VE overlay at a district 2 bridge (BRFN-015-4(18) -39-32, Emmet 119, IA 15 over Black Cat Creek, letting on 11/20/18). This will be the first trial placement of LMC-VE overlay in Iowa. Documenting the construction procedure, evaluating the short term and long-term performance, and summarizing the experience and lessons learned from the project is essential for future bridge deck overlay decision making and provides design and construction guidance for future practice.

OBJECTIVES

The overall goal of this proposed research is to explore the potential use of LMC-VE in Iowa bridge overlays. This will be achieved through a study of the first Iowa LMC-VE overlay practice on the IA 15 over Black Cat Creek Bridge. Our specific approaches to this defined goal include the following:

(1) To document and identify the benefits and problems in construction of the LMC-VE overlay at the selected bridge. The documentation will include the information on the uses of materials, construction conditions and procedures, and QA/QC methods and procedures.

(2) To evaluate the key engineering properties (such as compressive and flexural strength, tensile adhesion bond strength, chloride penetration resistance, and fiction index) of LMC-VE using standard and accelerated test methods.

(3) To monitor the field performance of the constructed LMC-VE overlay up to 5 years.

(4) To conduct a life cycle cost analysis in a comparison of the LMC-VE overlay with a conventional

(5) To analyze the research results, understand LMC-VE performance, and provide insights and recommendations for future use of LMC-VE overlays for Iowa bridges.

BENEFITS

As mentioned previously, the IA 15 over Black Cat Creek Bridge overlay project will be the first trial placement of LMC-VE overlay in Iowa. The results obtained from this proposed research project are essential for future Iowa bridge deck overlay decision making. The experience and lessons learned from this project can help develop guidance for the design, construction, and QA/QC of LMC-VE construction practice. If successful, LMC-VE will be expected to improve the longevity and life cycle cost of Iowa bridges, thus meeting the demand for growing traffic, increasing driving speed, and enhanced safety of sustainable transportation infrastructure in Iowa.

Motion to Approve by A. Abu-Hawash; 2nd R. Knoche
Motion carried with 14 Aye, 0 Nay, 0 Abstaining

9. New Business

John Shaw gave a five-minute presentation on the NCHRP Rural Road Transportation Research Roadmap.

10. Adjourn

The next meeting of the Iowa Highway Research Board will be held Friday, February 22, 2019 at 9:00 a.m. in the East/West Materials Conference Room at the Iowa DOT.

Vanessa Goetz, IHRB Executive Secretary