

IOWA HIGHWAY RESEARCH BOARD (IHRB)

Minutes of October 27, 2017

Regular Board Members Present

A. Abu-Hawash
C. Poole
T. Nicholson
S. Okerlund
R. Knoche
P. Hanley
W. Weiss

R. Stutt
L. Bjerke
K. Mayberry
J. Thorius
M. Parizek

Alternate Board Members Present

C. Brakke
E. W. Klaiber

Members with No Representation

P. Assman

Secretary – V. Goetz

Visitors

Tammy Bailey
Brian Worrel
Francis Todey
Danny Waid
Wayne Sunday
Yang Zhang
Khyle Clute
Junxing Zheng
Orhan Kaya
Sunghawan Kim
Brent Phares
Brian Gelder
Keith Knapp
Alice Alipour
Halil Ceylan
Mohamed Elbatanouny
Ashley Buss
Dan King
Kymm Barnes
Jon Nania
Marian Muste

Iowa Department of Transportation
Iowa Department of Transportation
Iowa Department of Transportation
Iowa County Engineers Association
DOT- Retired
InTrans/Iowa State University
Wiss, Janney, Elstner Associates, Inc.
Iowa State University
Iowa Concrete Paving Association
United States Geological Survey
United States Geological Survey
IIHR – Hydroscience & Engineering

The meeting was held at the Iowa Department of Transportation Ames Complex, Materials East/West Conference Room, on Friday, October 27, 2017. The meeting was called to order at 9:00 a.m. by Ahmad Abu-Hawash with an initial number of 13 voting members/alternates at the table.

1. Agenda review/modification

2. Motion to approve Minutes from the September 2017 meeting

Motion to Approve by K. Mayberry; 2nd M. Parizek

Motion carried with 13 Aye, 0 Nay, 0 Abstaining

***Member joined the table

3. Final Report: TR-692, “Stream-Channel and Watershed Delineations and Basin-Characteristic Measurements using Lidar Elevation Data for Small Drainage Basins within the Des Moines Lobe Landform Region in Iowa”, Kimberlee Barnes, USGS, (\$108,068)

BACKGROUND

Because light detection and ranging (lidar) elevation data are available for Iowa and an automated process for enforcing drainage networks on 3-meter (m) lidar digital elevation models (DEMs) has been developed, accurate drainage networks can be delineated for the appropriate hydrologic enforcement of lidar DEMs and measurement of drainage-basin characteristics. Lidar refers to the process of scanning the earth with lasers from an aircraft to obtain accurate elevations. The lidar instrument measures distance to a reflecting object by emitting timed pulses of light and measuring the time difference between the emission of a laser pulse and the reception of the pulse's reflection(s). The measured time interval for each reflection is converted to distance, which when combined with position and altitude information from a global positioning system (GPS), inertial measurement unit, and the instrument itself, allows the derivation of the 3D-point location of the reflecting target's location.

Basin-characteristic measurements related to stream length, stream slope, stream density, and stream order have been identified as significant variables for the estimation of flood discharges, flow-duration discharges, and low-flow discharges in Iowa. The constant of channel maintenance (CCM) basin characteristic was a significant variable in the development of flood-estimation equations for the Des Moines Lobe landform region. CCM is a measure of drainage density calculated as a ratio of drainage area divided by the total length of all mapped streams in the basin. However, the placement of channel initiation points (the point where water begins to flow) based on lidar DEMs has always been a matter of individual interpretation, leading to variations in stream definitions between analysts. Thus, the testing of different quantitative stream initiation methods on hydrologically enforced lidar DEMs will provide different drainage-network delineations from which basin-7 characteristic measurements can be evaluated for the optimization of stream-channel delineations from lidar elevation data.

Department of Transportation, the Iowa Highway Research Board, and the Iowa State University, began a study in 2015.

OBJECTIVES

This report describes stream-channel and watershed delineations and basin-characteristic measurements using lidar elevation data and presents five different methods to define stream initiation points using 3-m lidar data for 17 streamgages with drainage areas less than 50 square miles (mi²) within the Des Moines Lobe landform region in north-central Iowa. For research and testing purposes, such relatively small basins were selected for the analysis in order to include data from a larger set of streamgages in the development of the regression equations, which 8 should provide better predictive accuracy than those equations developed with data from fewer streamgages. The five stream initiation methods evaluated include two qualitative methods and three quantitative methods in which streams were derived from profile curvature at three different initiation thresholds and one standard continuity threshold.

The stream initiation methods were then used to define channelized flow paths on the hydrologically enforced lidar DEMs, creating multiple sets of selected basin-characteristic values measured for each streamgauge.

Motion to Approve by S. Okerlund; 2nd T. Nicholson
Motion carried with 14 Aye, 0 Nay, 0 Abstaining

- 4. Final Report: TR-717**, “Use of Polymer Overlays or Sealers on New Bridges”, Mohamed Elbatanouny, WJE, (\$25,000)

BACKGROUND

Constructing concrete bridge decks with extended service lives is of paramount importance for Departments of Transportation as decks are directly exposed to deicers, cracking, reinforcement corrosion and surface deterioration affect the overall service life. Further, the quality of the deck impacts the public through ride quality, bridge appearance and maintenance-related delays. Progressive deterioration of concrete bridge decks can result in poor ride quality as well as a decrease in concrete resistance to deicers.

One option to ensure long-term durability and extend service life of concrete bridge decks is preventive maintenance using polymer overlays and sealers. Polymer overlays and sealers provide protection from deterioration mechanisms by inhibiting both the ingress of chlorides and chemicals and also reduce corrosion rates by limiting moisture. Identifying the optimum time to install polymer overlays or sealers is key to maximizing the benefit-to-cost ratio of this type of preventive maintenance.

OBJECTIVES

The main objective of this study was to develop guidelines for Iowa DOT that can aid in identifying optimum timing for application of polymer concrete overlays or sealers on new bridge decks and its effect on expected service life. The criteria for selecting polymer overlays, sealers, or using both was defined. The research also provides a framework to include assessment of cost-benefit ratio as a factor for application of such systems.

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

- 5. STIC Final Report: ST-001**, “Implementation of Sedimentation Mitigation Using Streamlined Culvert Geometry”, Marion Muste, University of Iowa, University of Iowa, (\$58,029)

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

- 6. Secondary Road Research Engineer Update**, Danny Waid, Iowa County Engineers Association Service Bureau.

- 7. Iowa LTAP Update**, Keith Knapp, Iowa State University

- 8. PROPOSAL**: “Development of Iowa Pavement Analysis Technique”, Halil Ceylan, Iowa State University, (\$250,000).

OBJECTIVES

The primary objective of this proposed research study is to develop an IPAT tool for Iowa county pavement management and decision-making. Specific objectives established to achieve this primary objective include the following:

- Find the best way to model a pavement's life time and make predictions as to when it will reach the end of its service lifetime (arrive at minimum service level)
- Take into consideration all available data such as pavement history and structure, materials, traffic, truck volumes, local development, etc., for model development
- Be able to absorb and integrate condition data from multiple sources such as the Iowa Pavement Management Program (IPMP), engineering field assessments, inspector team distress evaluations, etc.
- Be able to compute an remaining service level for every paved segment and provide a mile vs. RSL tally
- Develop a methodology supporting predictive and consequence analysis

DISCUSSION

Q. How does this fit with that discussion support tool that was developed, was there an online tool for that?

A. There is benefit of that tool and that's more specifically for about how to select preservation treatment where this is more into the design aspect of it.

Q. One of the slides said you were going to build an excel data base to house all the pavement related data? Why would you go excel verses the existing IPMP data?

A. This was actually for just processing the data and the remaining service life, it's not the platform.

Q. I was surprised not to see a Co PI from the IPMP group involved in this, since this is a pavement management project and all the data is coming from the IPMP with all the experience working with the data.

A. I think one of the things we wanted moving into this was accepting a lot of different data sources with IPMP being one of those. There are going to be a lot of different data sources we want to make sure to be fed into this project.

Motion to Approve by W. Weiss; 2nd K. Mayberry

Motion carried with 14 Aye, 0 Nay, 0 Abstaining

9. New Business

Part of our Project Development is to do Literature searches for the topics that are selected for the next year plan. V. Goetz stated since we no longer have a Librarian available at the DOT, Research office has a contract with a consultant to do Literature Searches for our topic development and project development. Since it is a lot costlier than having our own staff do this, not every project will go out for a literature review but we want to make sure we are not doing duplicate research that is being done somewhere else.

10. Adjourn

The next meeting of the Iowa Highway Research Board will be held December 7, 2017 in the East/West Materials Conference Room at the Iowa DOT. The meeting will begin promptly at 1:00 p.m.



Vanessa Goetz, IHRB Secretary