

IOWA HIGHWAY RESEARCH BOARD (IHRB)

Minutes of October 29, 2010

Regular Board Members Present

A. Abu-Hawash
J. Berger
J. Joiner
R. Knoche
J. Moellering
M. Nahra

D. Schnoebelen
C. Schloz
J. Waddingham
B. Moore
R. Younie

Alternate Board Members Present

R. Kieffer for W. Weiss
D. Little for V. Dumdei
K. Mayberry for D. Ahart

Members With No Representation

J. Alleman

Secretary - M. Dunn

Visitors

Bill Rosener

Asphalt Paving Association

John Thomas

Hungry Canyons Alliance (HCA)

Donna Buckwald

Iowa Department of Transportation

Edward Engle

Iowa Department of Transportation

Sandra Larson

Iowa Department of Transportation

Mary Starr

Iowa Department of Transportation

Bart Bergquist

University of Northern Iowa

The meeting was held at the Iowa Department of Transportation Ames Complex, Materials East/West Conference Room, on Friday, October 29, 2010. The meeting was called to order at 9 a.m. by Chairperson Jay Waddingham with an initial number of 12 voting members/alternates at the table. Two members later joined the table bringing the total number of voting members to 14.

Agenda

No changes were made to the Agenda.

Motion to approve Minutes from the September 24, 2010, meeting by R. Younie. 2nd by R. Knoche.

Motion carried with 12 aye, 0 nay, 0 abstaining.

Two Members Joined the Table

FINAL REPORT TR-570, "Identification of Practices, Design, Construction, and Repair Using Trenchless Technology," Muhannad Suleiman, Lehigh University and Charles Jahren, Iowa State University/InTrans (\$174,980)

BACKGROUND

Trenchless technologies can be defined as a group of methods for constructing and rehabilitating underground utilities that require minimal surface excavation and provide important new alternatives to traditional open-cut methods of utility pipe installation. These techniques offer many unique advantages. Trenchless methods are becoming increasingly important as the number of utility pipes for water, gas, and telecommunications and storm and sanitary sewers increase beneath roads.

Trenchless construction allows installation or replacement of underground utility systems without open cut excavation. Recently, trenchless construction methods have significantly increased due to replacement needs on aging urban utility infrastructure systems and installation of new facilities beyond existing service areas.

OBJECTIVES

Objectives of this study focused on increasing limited technical data and knowledge of relationships between:

- Cutting mechanisms
- Conduit materials and dimensions
- Effects on soil properties and performance of subgrade soil and pavement systems
- Interactions between the installation equipment, pipe, and surrounding soil to permit improvements in the design and performance of pavements and underground structures adjacent to utility installations

BENEFITS

Earlier studies indicate that open cut utility restoration may decrease the life of the pavement by up to 50% and weaken subgrade soil surrounding cut areas leading to failures within two years. Research indicates that using trenchless technology reduces the cost of utility installation and remediation by \$1.5 billion per year. This cost savings passes to taxpayers and road users, and allows pipe to be installed deeper, avoiding areas of underground pipe congestion. These methods also have the potential to save both time and money.

Q: Did you find any soils that were particularly difficult to work with? Fine, heaving sands for example? Something that soil testing might indicate which mud should be used?

A: Sandy soil is particularly challenging, because mud that can seal the sand to stop leaks is needed; that's the main thing. There are also variable soils and random fills that might produce leaks.

Motion to Approve by R. Younie. 2nd by A. Abu-Hawash.

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

PROPOSAL *Iowa Local Technical Assistance Program (HR-296) 2010 Summary Report and 2011 Continuation Funding Proposal*, Keith Knapp, Iowa State University (\$130,000)

BACKGROUND

This proposal includes a summary of ongoing or completed initiatives and activities by the Iowa Local Technical Assistance Program (LTAP) in 2010, and a request for continuation of funding for FY 2011. The Iowa LTAP is managed through the Institute for Transportation (InTrans) at Iowa State University under an annual contract administered by the Iowa Department of Transportation (Iowa DOT). Funding for the Iowa LTAP and its related activities primarily comes from the FHWA and the Iowa Highway Research Board.

The Iowa LTAP mission is to foster a safe, efficient, environmentally sound transportation system through training, technical assistance, and technology transfer.

Bret Hodne, West Des Moines Public Works and Chair of the LTAP Advisory Committee, spoke to IHRB about Leadership Academy (an integrated program of LTAP) coursework that develops management leadership development and helps aspiring agency leaders throughout Iowa. Training is provided either online or through classes led by Iowa transportation professionals. Currently, 8 out of 11 training modules are completed and online. All 11 will be completed during FY2011. Certificates of completion are also under development.

OBJECTIVES

The primary objective of LTAP is to provide quality training events and technology transfer that are useful to local transportation agencies. These activities need to be completed within current LTAP funding in a manner that is effective and efficient. The goal to deliver activities when they are most needed by local transportation agencies, and in a format that is useful and useable, is a priority. For FY11, new avenues of online training, the infrastructure of a database and the exploration of new partnerships will be developed to achieve program goals.

BENEFITS

Iowa LTAP is a key venue for disseminating and implementing research. Many research projects become topics for technical and/or newsletter articles, workshop and seminar presentations, and reference materials. Multiple research and educational products demonstrate Iowa LTAP's important role in technology transfer.

In a 1994 study, *The Study of Benefits, Accomplishments and Resources of LTAP*, the FHWA documented a benefit-cost ratio of 8:1 for the project; for every dollar invested in LTAP there is an \$8 return. For an investment of \$130,000, a benefit return of over one million dollars is anticipated.

Q: How will you invoice attendees for classes? especially if classes are held on short notice?

A: This is another instance when being online provides automatic (or near to it) registration, and will significantly assist our enrollees.

Q: What if there isn't a company credit card?

A: We can process delayed billing and POs after the course has been held. We aren't planning to go completely electronic, but changes to simplify the process of registration are ongoing. For example, the ability to register multiple participants all at once, without the need to repeatedly enter similar registration information, will assist managers in saving time and avoiding errors on forms.

Motion to Approve by J. Joiner. 2nd by B. Moore.

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

FINAL REPORT TR-594, "Development of Non-Petroleum Based Binders for Use in Flexible Pavements," Chris Williams, Iowa State University/InTrans (\$75,000)

BACKGROUND

Most bituminous adhesives or binders used for pavement materials are derived primarily from fossil fuels. Recently, different vegetable oils have been investigated to determine their physical and chemical properties in relation to applicability for use as bio-binders in the pavement industry. Bio-binders can be used to decrease the demand for fossil fuel based bituminous binders. However, no research has been conducted until now that studies the applicability of the utilization of bio-oils as a bitumen replacement (100%) in the pavement industry.

OBJECTIVES

- Investigate rheological properties of fast pyrolysis liquid co-products (bio-oils) to determine the heat pre-treatment/upgrading procedure required to develop bio-binders from bio-oils.
- Modify superpave test procedures to comply with the properties of the developed bio-binders.
- Study chemical characterization of developed bio-binders and physical characterization.
- Determine the temperature and shear susceptibilities of developed bio-binders and compare with commonly used bitumen binders.

- Develop temperature performance grades for bio-binders and determine mixing and compaction temperatures.
- Study master curves for developed bio-binders and comparing to commonly used bitumen binders.

BENEFITS

As petroleum and oil reserves diminish, development of an alternative to fossil fuel-based binders becomes beneficial. Bio-oils offer a renewable and sustainable alternative and that can be produced from many natural resources. As this research has shown, bio-binders can become a viable replacement for bituminous binders.

Q: What is the scale of availability in Iowa?

A: We're working on a co-op situation and anticipating 30-35 plants in Iowa. However, haul loads are limited so there is an economic factor in new materials being transported on rural roads.

Q: What is the consistency of the final product? What are possible variables?

A: It depends on the percentage of bio-oil produced and the time of year. Different stages of development and product produce different requirements for processing and results.

C: By January of 2012, a new plant will be functional with expanded production capabilities in Iowa.

C: We've examined the binder aspect, now we need to consider requirements for the mix.

Motion to Approve by J. Berger. 2nd by R. Knoche.

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

FINAL REPORT TR-567, "Development of Stage-Discharge Relations for Ungaged Bridge Waterways in Western Iowa," Thanos Papanicolaou, The University of Iowa/IIHR (\$112,000)

BACKGROUND

Stage-discharge relations constitute a viable, alternative technique for accurately estimating flow for ungaged sites. In this research, pressure transducers and Large Scale Particle Image Velocimetry (LSPIV) techniques were utilized to develop stage-discharge relations at 11 sites in the Hungry Canyon Area (HCA) in southwestern Iowa under varying hydrologic conditions. Collected data were used to calibrate and verify an established hydrologic model providing a stage discharge relation for multiple hydrologic conditions.

OBJECTIVES

To establish stage-discharge relationships for 10 ungaged streams in the Hungry Canyons Alliance (HCA) region (western Iowa) by setting up a semi-automatic sensor network. The 10 streams selected were from small, medium and large sized drainage areas and representative of streams found in the area. Secondly, comparisons regarding discharge and findings were compared with other studies made by The University of Iowa and other research institutions with comparative and/or similar objectives.

BENEFITS

Discharge data will be used for multiple purposes, including operational decision making in the HCA about design of water-control and conveyance structures, input for hydraulic and hydrologic models, and calculation of sediment and other water quality constituents transport and loads, and decision making. This project documents the difficulties in measuring flows in ungaged streams with ice jams, steep banks, erodible beds, and floating debris.

Motion to Approve by K. Mayberry. 2nd by M. Nahra.

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

NEW BUSINESS

A new *Research News* (Iowa DOT Research and Technology Bureau newsletter, November 2010 issue), was recently published highlighting Intelligent Construction research in Iowa. The newsletter is available online at: www.iowadot.gov/research/index.htm.

ADJOURN

Motion to Adjourn by J. Joiner. 2nd by M. Nahra.

Motion carried with 11 aye, 0 nay, 0 abstaining.

The next meeting of the Iowa Highway Research Board will be held Thursday, December 9, 2010, in the East/West Materials Conference Room at the Iowa DOT. The meeting will begin promptly at 1:00 p.m.

Mark J. Dunn, IHRB Secretary