IOWA HIGHWAY RESEARCH BOARD (IHRB)
Minutes of December 4, 2008

Regular Board Members Present

A. Abu-Hawash
J. Adam
J. Alleman
J. Berger
V. Dumdei
J. Krist
B. Moore
M. Nahra
J. Rasmussen
S. Rinehart
J. Waddingham

Alternate Board Members Present

C. Schloz for Steve Gannon
H. Lee for Kerri Hornbuckle

Members With No Representation

J. Joiner
D. Waid

Secretary - M. Dunn

Visitors

Bret Hodne	City of West Des Moines
Max Grogg	Federal Highway Administration
Charlie Purcell	Iowa Department of Transportation
Mary Starr	Iowa Department of Transportation
Robert Younie	Iowa Department of Transportation
Neal Hawkins	Iowa State University-CTRE
Shashi Nambisan	Iowa State University-CTRE
Hao-Che Ho	The University of Iowa-IIHR

The meeting was held at the Iowa Department of Transportation's Ames Complex, Materials East-West Conference room on Thursday, December 4, 2008. The meeting was called to order at 1 p.m. by Chairperson Jeff Krist with an initial number of 13 voting members/alternates at the table.

Agenda

No changes were made to the Agenda.

Approval of the minutes

Motion by J. Rasmussen to approve minutes from the September 26, 2008 meeting. 2nd by V. Dumdei. Motion carried with 13 aye, 0 nay, 0 abstaining.

PROPOSAL HR-296, "Continuation of Local Technical Assistance Program," Duane Smith, Iowa State University/CTRE ($147,175 for LTAP & $20,000 for Leadership Academy)

BACKGROUND
The Iowa LTAP manages six major tasks, or service areas. These tasks include:
- Maintaining mailing lists, distributing a quarterly newsletter and other technology transfer publications
- Providing a library of technical reference materials and information
- Acting as an information and referral service
- Conducting and/or arranging workshops and training sessions
- Evaluating the effectiveness of Iowa LTAP
- Safety Circuit Rider program

Bret Hodne, Director, City of West Des Moines Public Works, presented discussion on benefits of the LTAP Leadership Academy and future developments for 2009, including web-based and interactive instruction. The proposed budget requested from IHRB is roughly $20,000. This proposal also included a request for another presentation to IRHB in January 2009, specifically for funding the Leadership Academy.

Budget Increases:
2009 Base Budget $390,799 ($19,311) = 5.2%
2009 Leadership Academy $20,312 = 5.5%
2009 Base Budget Increase plus Leadership Academy $39,623 = 10.7%

LTAP OBJECTIVES
- Continue to diversify and to deliver quality customer services
- Communicate the program's value to LTAP partners and customers
- Develop a premier technology transfer network in Iowa and contribute to a national transportation network

Q: You're following the American Public Works Association (APWA) program and could receive reciprocity regarding their certification, correct?
A: Yes.
Q: Are they willing to allow LTAP classes to replace theirs?
A: We don't know the answer to that yet. We haven't developed our program enough to approach them concerning that. The APWA isn't really prescribing the classes we have to offer; the ten modules they have aren't specifically mandated by course content. Rather, they recommend modules. Their certification is pretty open. They review each program and put their stamp of approval on it; as long as there's an agency putting work into each of the modules, they're probably going to accept them without issue. We are seeing interest already in the modules we're planning specific to the needs of Iowa.

Q: Once you have this up and running, will you be lowering the estimated amount of funding needed?
A: We'll be feeding money back in for future development of modules and library activity, but it's difficult to answer right now without history.

C: There is also $140K from the Federal Highway Administration (FHWA) which is allocated through the re-authorization bill and our mainstay, the ISU Extension. Safety funds are also capped. We have asked that those be increased.

Q: Should the $20,000 for the Academy be kept separate? The executive committee discussed it and we have some excess funding in the city account and would like to commit those funds to this proposal.

C: I could see the advantage of pulling that portion out in support of the LTAP operations. As a county engineer, I see the advantages for our front-line supervisors as well.

Q: If we pull the funding out, will it delay the modules?
A: No, not if we come back in January 2009 for the Leadership Academy presentation.
C: I have no trouble giving them $20,000 to begin today.

C: You talked about first-line supervisors, but I can see advantages of web-based instruction for application before people come on board. To me, leadership is important in many areas, not just first line supervisors.
A: Yes, we've seen advantages to providing instruction across the board for those who show interest, such as police officers, operations specialists, etc. Of course, some of the decisions regarding the Academy will need to be made by the agency/organization itself. Considerations such as who should attend and who should pay for it will need to be addressed internally.

Q: The $20,000 for getting the Leadership Academy started was in your request, included in the $167,175, correct? So the additional $20,000 base for the Leadership Academy would provide you the same level of money to accomplish both goals?
A: Yes.

Motion to Approve $147,175 for the continuation of the LTAP budget and offer an additional $20,000 for development of the Leadership Academy process within CTRE and the LTAP group by M. Nahra. 2nd by S. Rinehart. Motion carried with 13 aye, 0 nay, 0 abstaining.

FINAL REPORT TR-558, "Use of Ultra-High Performance Concrete," Muhannad Suleiman, Iowa State University/CTRE ($80,266)

BACKGROUND
In 2005, the American Association of State Highway Transportation Officials (AASHTO) issued seven "grand challenges" for a strategic bridge engineering plan. This strategic plan for bridge engineering identified extending the service life and optimizing structural systems of bridges in the United States, with the objective of producing safer bridges that have a minimum service life of 75 years and reduced maintenance cost. Material deterioration was identified as one of the primary challenges to achieving the objective of extended life.

In substructural applications (e.g., deep foundations), construction materials such as timber, steel, and concrete are subjected to deterioration due to environmental impacts. Using innovative and new materials for foundation applications makes the AASHTO objective of 75 years service life achievable. Ultra High Performance Concrete (UHPC) with compressive strength of 180 MPa (26,000 psi) and excellent durability has been used in superstructure applications but not in geotechnical and foundation applications. This study explored the use of precast, prestressed UHPC piles in future foundations of bridges and other structures and provides a complete set of results for the field investigation conducted on UHPC H-shaped piles.

CONCLUSIONS
• Driving stresses are well below allowable limits in UHPC piles in most conditions, and the required pile cushion thickness for UHPC piles may be eliminated or reduced compared to those used in practice for HPC or normal concrete piles.

• UHPC piles can be successfully cast in a precasting plant as designed.

• The laboratory test measurements confirmed that the theoretical approach followed for establishing the moment-curvature response of the UHPC pile section is satisfactory. Furthermore, results from PDA

measurements obtained during the driving of the UHPC and steel piles confirmed that the drivability analysis conducted in this study was adequate and that driving stress in both pile types can be accurately predicted.

• Observations and measurements during driving confirm that UHPC piles can be driven with the same driving equipment as steel piles of the same size and weight, which is of great benefit to the industry.

Q: Is UHPC used in the deck?
A: Yes.

Q: Is the precast industry in Iowa capable of generating these?
A: They can produce these but more time was needed than originally expected. A committee has been formed in conjunction with industry to examine some of these issues, so we have heightened expectations for future results.

Q: Why did you use the 'H' shape rather than the square shape currently used in precast construction?
A: It was easier for construction due to the special needs of this project.
Q: Do you encase this pile to protect it when finished?
A: This is basically a strong pile; corrosion isn't an issue. That aspect hasn't been tested yet.

Motion to Approve by J. Waddingham. 2nd by J. Adam.
Motion carried with13 aye, 0 nay, 0 abstaining.

FINAL REPORT TR-560, "Clear Zone - A Synthesis of Practice and Benefits of Meeting the Ten-Foot Clear Zone Goal on Urban Streets," Tom Maze, Iowa State University ($54,814)

BACKGROUND
The optimal clear zone space—the distance between fixed objects and the roadway edge—is of particular concern to urban communities. Urban roadways often have limited amounts of right-of-way available for establishing clear zones. As a result, urban communities must constantly weigh the cost of purchasing additional clear zone right-of-way against the risk of fixed object crashes. From 2004-2006, this type of crash on curbed roads represented 15% of all fatal crashes and 3% of all crashes in the State of Iowa. Many states keep the current minimum AASHTO recommendations as their minimum clear zone standards. However, other states have decided that these recommendations are insufficient and have increased the required minimum clear zone distance to better suit the judgment of local designers. The Iowa Department of Transportation currently recommends a 10-ft clear zone for most roadways.

The 10-ft clear zone recommendation was taken from a 1988 study by Dan Turner of how poles and trees affected accidents; other factors were not considered. Some states follow the 10-ft clear zone, some use 18", and some use the *Roadside Design Guide*. It is anticipated that research should be done on roadways where the speed limit is 40 mph or greater.

CONCLUSIONS
• It was found that the minimum, average, and 15th percentile setback distances do not have a statistically significant relation to fixed object crashes at the 90% confidence interval.
• Within 45m of an intersection, roadways were found to have a statistically significant increase in the number of fixed object crashes at the 90% confidence interval.
• A consistent fixed object offset helps reduce the number of fixed object crashes.
• A weak relationship was found between the number of fixed object crashes and the posted speed limit.
• There is no significant relationship between the density of fixed objects and the number of fixed object crashes.

• When minimizing the number of fixed object crashes is a primary goal, a 5-ft clear zone is the most effective setback distance.
• When minimizing the cost of fixed object crashes is a primary goal, a 3-ft clear zone is the most effective setback distance.
• In the incremental cost analysis, the greatest benefits accrued when the setback distance was increased to 3-ft and to 5-ft from the curb. On roadways with higher speeds or with a higher ADT, increasing the setback did not result in large cost savings.

Q: Looking at interstate speeds, it appears that barriers are set back less than ten feel from the highway.
A: On the interstate, the distance for clear zone is eight feet.

C: In urban areas, ten feet is considered the goal, but 15 feet is preferred.

Motion to Approve by B. Moore. 2nd by J. Alleman.
Motion carried with 13 aye, 0 nay, 0 abstaining.

FINAL REPORT TR-569, "Quantitative Mapping of Waterways Characteristics at Bridge Waterways,"
Marian Muste, The University of Iowa/IIHR ($85,891)

BACKGROUND
Government engineering offices expend considerable effort monitoring the state's 25,000 bridges, most of which span small waterways. In fact, the need for monitoring is actually greater for bridges over small waterways because scour processes are exacerbated by the close proximity of abutments, piers, channel banks, approach embankments, and other local obstructions. The bridges are customarily inspected biennially by the county's road department bridge inspectors. It is extremely time-consuming and difficult to obtain consistent, reliable, and timely information on bridge/waterway conditions for so many bridges. Moreover, the current approach of gathering survey information is not uniform, complete, and quantitative.

The methodology and associated software (DIGIMAP) developed through this project provide a non-intrusive means to conduct fast, efficient, and accurate inspection of the waterways in the vicinity of the bridges and culverts. The technique combines an algorithms image of registration and velocimetry using images acquired with conventional devices at the inspection site. The data and information are recorded in a digital format, enabling immediate and convenient tracking of the waterway changes over short or long time intervals.

CONCLUSIONS
• The technique produces quantitative maps of the waterway characteristics (i.e., information about flow distribution, velocity magnitude, channel shape, bank characteristics, and accumulation of sediment, debris and vegetation) in digital format.

• Repetition of the digital mapping commensurate with the processes evolving in the watershed allows for early detection of the hydrodynamic and morphologic changes upstream and downstream of the bridge with an emphasis on quantifying changes in channel direction and shape, as well as capturing the evolution of the vegetation and in stream sedimentation/erosion processes.

• The comparison of the current bridge inspection and monitoring methods with the DIGIMAP-based methodology indicates that the new procedure assembles quantitative information on the waterway hydrodynamic and morphologic features with considerable reduced effort, time, and cost. It also improves the safety of the bridge and culvert inspectors operating during normal and extreme hydrologic events. The data and information are recorded in a digital format, enabling immediate and convenient tracking of the waterway changes over short or long time intervals.

Q: This is looking at surface velocity based on the image of the movement of that spot on the surface; but are you extrapolating that to subsurface estimates?
A: The surface velocity to depth measurement velocity equals the discharge measurement. We have a cross-section at the location.

Q: Is the cross-section of the profile of that point in the stream generated from imagery or natural measurement?
A: We can compare how points move through a survey; that's how we can re-construct the site.

Q: Can you detect scour?
A: With this method we cannot detect scour; however, if you have a channel flow and if that flow goes over a bump, you have a change in velocity. That change in velocity is reflected on the surface and with that information you can back-track that velocity, estimating changes in the bottom/bump. The inference is that if velocity increases, the bump has increased; if it decreases, you have scour. This is an inexpensive way to diagnose the process. The next proposal would use this technique to track sediment at culverts.

Q: After the images are taken, what would it cost at a bridge location?
C: There are changes coming which will require us to cross-section every bridge inspection site: upstream, downstream and (I think) under the bridge. This would mean survey crew time as opposed to bridge inspector time.
A: We would go together and evaluate. We could work with a monitoring company and train them to implement this practice. The cost would depend on the cost of the first measurement. Each situation would be different; for us, it would basically mean two days of work; the image would be analyzed for up to three weeks.

C: The images wouldn't need to be taken from the same exact location. Also, the camera equipment was 'off-the-shelf.'
A: Correct – the county could replicate this and we would be happy to assist whenever possible.

C: This technology appears to have potential for adapting to the situation; what we're trying to track is whether is stream is moving or changing its alignment.

Motion to Approve by B. Moore. 2nd by J. Berger.
Motion carried with 13 aye, 0 nay, 0 abstaining.

IHRB SELECTION OF CHAIR (Iowa DOT) and VICE-CHAIR (County) for 2009

Nomination to appoint James Berger acting Chairperson by V. Dumdei. 2nd by S. Rinehart.
Moved nominations cease and cast a unanimous ballot for James Berger by M. Nahra.
Motion to stop nominations for chair carried with 13 aye, 0 nay, 0 abstaining.
* Vote to appoint James Berger acting Chairperson for dates from January 1, 2009 through December 31, 2009.
Motion carried with 13 aye, 0 nay, 0 abstaining.

Nomination to appoint Brian Moore acting Vice-chair by M. Nahra. 2nd by J. Adam.
Moved nominations cease and cast a unanimous ballot for Brian Moore by J. Waddingham.
Motion to stop nominations for Vice-chair carried with 13 aye, 0 nay, 0 abstaining.
* Vote to appoint Brian Moore acting Vice-chair for dates from January 1, 2009 through December 31, 2009.
Motion carried with 13 aye, 0 nay, 0 abstaining.

REVIEW OF BUSINESS PLAN
The general consensus is that the business plan is working well. No changes were made to the plan.

NEW BUSINESS
Mark: An IHRB fund summary sheet and a copy of the final rankings for 2008 have been handed out. Several projects were approved this year that used a high amount of funding that were out of IHRB's normal cycle. One was the extra funding for the Flood Profiles, another was the LRFD Standards (there are others).

The question is whether or not to pursue Innovative projects or to go forward with RFP projects. In this situation it is an 'either/or' decision that needs to be made.

Perhaps it would be better to delay innovative projects rather than remove them. I will provide an update on the Secondary Road Fund to the Board at the January meeting. Also, Street funding not used since 1989 on Street projects and put back into the un-obligated funds were not recorded; updated figures will be provided to the Board at the next meeting (140K).

* The general consensus is to move forward with those RFP projects already considered and voted on during the RFP process. Last year, the cap on Innovative projects was 75K/each with $250,000 total. Several of the RFP projects are very important to the counties. The Single-Barrel Box is a project is one example.

Board Consensus: Hold Innovative projects and do another round of RFPs.

ADJOURN

Motion to Adjourn
Motion by M. Nahra. 2nd by C. Schloz.
Motion carried with 13 aye, 0 nay, 0 abstaining.

The January 2009 meeting of the Iowa Highway Research Board will be held **FRIDAY, January 30, 2008 at 9:00 a.m. in the East/West Materials Conference Room at the Iowa DOT.**

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Mark J. Dunn, IHRB Secretary