

IOWA HIGHWAY RESEARCH BOARD (IHRB)

Minutes of April 22, 2005

Regular Board Members Present

S. Dockstader	J. Joiner
R. Ettema	J. Krist
T. Fonkert	C. Marker
R. Gould	M. Nahra
J. Ites	R. Schletzbaum
L. Jesse	C. Schloz

Alternate Board Members Present

J. Berger for J. Adam
A. Abu-Hawash
D. Waid

Board Members with No Representation

L. Brehm
L. Greimann

Secretary

M. Dunn

Visitors

LaDon Jones	<i>Digital Control, Inc.</i>
Max Grogg	<i>Federal Highway Administration</i>
Gerry Ambrosion	<i>Iowa Department of Transportation</i>
Sara Buseman	<i>Iowa Department of Transportation</i>
Dave Claman	<i>Iowa Department of Transportation</i>
Ed Engle	<i>Iowa Department of Transportation</i>
Mike Heitzman	<i>Iowa Department of Transportation</i>
Sandra Larson	<i>Iowa Department of Transportation</i>
James Cable	<i>Iowa State University</i>
Vern Schaefer	<i>Iowa State University</i>
Muhannad Suleiman	<i>Iowa State University</i>
David White	<i>Iowa State University</i>
Steve Andrle	<i>Iowa State University/CTRE</i>
Shauna Hallmark	<i>Iowa State University/CTRE</i>
Zachary Hans	<i>Iowa State University/CTRE</i>
Dale Harrington	<i>Iowa State University/CTRE</i>
Neal Hawkins	<i>Iowa State University/CTRE</i>
Mike LaViolette	<i>Iowa State University/CTRE</i>
Omar Smadi	<i>Iowa State University/CTRE</i>
Bob Steffes	<i>Iowa State University/CTRE</i>
Larry Stevens	<i>Iowa State University/CTRE</i>
Paul Wiegand	<i>Iowa State University/CTRE</i>
Mohamed Elhakeem	<i>The University of Iowa</i>
Hosin "David" Lee	<i>The University of Iowa</i>
Thanos Papanicolaou	<i>The University of Iowa</i>

The meeting was held in the East/West Materials Conference Room at the Iowa Department of Transportation (Iowa DOT), Ames, Iowa. The meeting was called to order at 9:00 A.M. by Larry Jesse with 12 voting members/alternates at the table.

Agenda review/modification

- No additions or modifications.

Approval of the minutes

- Charles Marker moved to approve the minutes as submitted from the February 25, 2005 meeting. Roger Schletzbaum seconded. Carried with 12 yes, 0 no, and 0 abstaining.
- An additional voting member joined the table, bringing the voting member/alternate count to 13.

Final Report TR-461, “Fly Ash Soil Stabilization of Non-Uniform Subgrade Soils”

- Dr. David White, Iowa State University (ISU)/Center for Transportation Research and Education (CTRE), reviewed the research team; the funding partners; the main objectives; the report organization (2 volume final report); the reasons why to stabilize subgrade with fly ash; the direct causes of subgrade non-uniformity; the techniques to overcome subgrade deficiencies; the stresses, deflection and involved support factors which affect the performance of PCC pavement; the research approach, including collection of data from different subgrade or pavement reconstruction project locations and development of numerical models to simulate pavement performance in terms of pavement responses of stress and deflection; the major conclusions; and the proposed implementation.
- It was clarified that only Type C fly ash was used for the research because 90 - 95% of the fly ash in Iowa is Type C and Type F wouldn't be as effective.
- There was not a life cycle cost analysis done, however, it was estimated that the cost for fly ash in the last year was \$25/ton - delivered. The cost of incorporating fly ash was estimated at \$2.50 to \$3.00/sq. yd. (unit cost of approximately 15% fly ash subbase). Cement usually costs approximately \$80-\$90/ ton, so fly ash is three to four times less expensive than cement stabilization.
- It was felt that it would be beneficial to do a formal uncertainty analysis study to help quantify uncertainty in pavement foundations. The findings could help incorporate the information into the design process.
- The Board complemented the study with being well written and containing beneficial information
- Roger Gould moved to approve the final. Jeff Krist seconded. Carried with 13 yes, 0 no, and 0 abstaining.

Final Report TR-504, “Extensions to the Iowa Culvert Hydraulics Software - The Design of Energy Dissipators”

- Dr. LaDon Jones, Digital Control, Inc., demonstrated the major items added to the software, including the 3 methods added for designing energy dissipators on the outlet of the culvert to help

deal with erosion, on-line help/users' manual and technical information, additional method for estimating design flow (USGS, Lara 1987 data), head water elevation, export feature, and plotting improvements.

- Dave Claman, Iowa DOT Office of Bridges and Structures, worked closely with Dr. Jones on the project. Many of the additional changes came through suggestions to Dave Claman from users of the software.
- The project was completed under budget.
- The Version 2 software will be made available on the Bridges and Structures web site (where the first version is located); notification of the web address will be sent. The new software is compatible with Version 1.
- Todd Fonkert moved to approve the final software. Jon Ites seconded. Carried with 13 yes, 0 no, and 0 abstaining.

Final Report TR-470, “Development of a Method to Determine Pavement Damage Due to Detours and Haul Roads”

- Dr. Omar Smadi, ISU/CTRE, explained the Iowa DOT and legal review and feedback; the project objective; the Iowa DOT method used in the past; the methods used by other states; the two basic methods reviewed, including the condition based method and the Iowa traffic (gas tax) based method; the results; the conclusions; and the recommendations.
- There was a concern that the gas tax method doesn't consider roads that weren't designed to handle the increased traffic level. A recommendation made during development meetings for the report, regarding this issue, was to have an alternate approach (possibly similar to that used by Minnesota) that would be used in its place under those circumstances.
- Another of the project's recommendations was that a committee be formed with DOT, county and city representatives to use the research to formalize a new set of procedures (including the above mentioned alternative approach) and establish guidelines for traffic determination and assumptions, including annual review of requirements.
- It was felt that there were positives in this approach because the state could more accurately budget detour costs and the counties and cities would be aware of the amount to expect.
- It was clarified that this is a proposed guideline and that no legislation is involved; there will not be a change to the Iowa Code language.
- Another issue discussed was if the gas tax paid to maintain/improve roads was felt to be too low for an area to start with, then the reimbursement calculations would in turn be too low - then with the added problem referred to earlier of a road not designed to handle the increased level of traffic caused concern for the counties and cities. The assumption of a certain number of cents per gallon per mile caused apprehension of the gas tax method. It was stated that the portion of the DOT's earned gas tax for a specified road would be transferred to the county or city or the agreed upon alternative method could be chosen.

- Jeff Krist moved to approve the final report. Scott Dockstader seconded. Carried with 13 yes, 0 no, and 0 abstaining.
- Jon Ites and Charles Marker (plus four more, so that each district is represented) were recommended to serve as county representatives on the committee which would establish the guidelines for the implementation. City and DOT representatives will also be included.

Problem Statement, “Developing a Rural and Urban Roadway Lighting Practical Design Guide for Iowa”

- Dr. Omar Smadi, ISU/CTRE, introduced the problem statement as addressing the following topics on the list to be prioritized for FY 05-06: 3.01 Develop guidelines for removal of roadway lighting when no longer needed and 3.02 Developing a Rural and Urban Roadway Lighting Practical Design Guide for Iowa. The problem statement is being presented to the Board outside of the prioritization process due to availability of funding from outside sources.
- Mr. Neal Hawkins, ISU/CTRE, presented the role lighting has as one of the visual components on the roadway, the balance of economics with safety and operations, visual examples of lighting locations, night accident/fatality statistics for Iowa and nationwide, the main research objectives and tasks, the schedule, the budget and partners.
- There was a concern expressed about the liability that may be placed on the different jurisdictions with a written document in place which may be considered a standard by some and used in a legal issue against an entity. It was asked that the proposal and the final report both emphasize that it is not a standard and that the jurisdiction responsible for the lighting/signing in an area cannot be held liable resulting from the written information in the guidelines. It was also asked that the project advisory committee address the issue as the guidelines are being developed. There is protection under Iowa Code 668.10 currently for traffic control devices and snow removal policy. It was asked that this project have similar consideration.
- It was stated that removal of lighting and alternatives to lighting will also be considered in the research.
- Jeff Krist moved to approve the problem statement and invite a proposal to be submitted to the Board. Mark Nahra seconded. It was again asked that the proposal and final report contain a statement which emphasizes the report contains guidelines and is not a standard. Carried with 13 yes, 0 no, and 0 abstaining.

Final Report TR-512, “Measuring Pavement Profile at the Slip-form Paver

- Dr. James Cable, ISU/CTRE, reviewed the project objectives; the equipment evaluated, including the GSI self propelled unit and the RTP lasers; the benefits and drawbacks of each type of technology; information on laser technology coming in the near future (in prototype stage currently); and the conclusions of the research. The Technology Transfer Summary was handed out. Guidelines will be added to the final report and a new one will be submitted for distribution.
- The technology showed good indication of the profile immediately after the paver and the sense was that the contractors may be willing to use it as a trouble shooting tool if there are issues during paving and problems with making profile, however, the cost for the equipment is approximately \$150,000 if purchased or the service would need to be contracted. The profile

right behind the slipform paver did not give a good indication of what the final profile would be - it varied too greatly after each of the subsequent steps. Plus, if it is used too far back, it is too late to make corrections in the paving.

- Jim Berger moved to approve the final report. Mark Nahra seconded. Carried with 13 yes, 0 no, and 0 abstaining.

Proposal, “Evaluation and Enhancement of Longitudinal Joint Forming in PCC Pavement”

- Dr. James Cable, ISU/CTRE, explained that some concerns were discussed prior to the meeting and that the Board’s review of the proposal is being postponed.

Update on TR-532, “Evaluation of Transverse Joint Forming Methods in PCC Pavement”

- Dr. James Cable, ISU/CTRE, gave a brief update on TR-532 progress. A paving project near Ft. Dodge has been chosen for the project and paving is anticipated to start May 9. The positioning of the material from Australia that was anticipated for the project, conflicts with the location of the paver vibrators, so it will not be used. The project will test 3 variations of a metal device with which Dr. Cable and Bob Steffes have worked.
- Testing for Dr. David White’s project TR-516, “Measurement of Seasonal Changes and Spatial Variation in Pavement Subgrade Support Properties - A Link to Pavement Performance” will also be incorporated into this paving project.

Problem Statement, “Research for Integrated Pervious Pavement System for Management of Stormwater Quality and Quantity”

- Core samples of pervious pavement with different mix designs were passed around during the presentation.
- Paul Wiegand, ISU/CTRE PCC Center, and Dale Harrington, ISU/CTRE SUDAS, presented the key principles; the overall goals; a photo showing the open pore structure allowing high rates of water transmission; diagrams showing pervious pavement being used for attenuation and infiltration and a typical cross section of pervious concrete pavement; photo samples showing pervious concrete with different water contents; the different application uses; photos of pervious concrete being placed and the joint roller being used; the project location; the research plan objectives; the schedule, the budget and separate descriptions of phases 1 through 4; and the potential benefits of the proposed research.
- It was clarified that the Iowa City parking lot project referenced in the presentation would not increase the amount of requested funds for the project.
- It was asked how the information would be extrapolated from parking lot to highway application.
- The water quality information would compare, however, the main difference would be in loading. It is found that the more porous it is, the less strength it has. It needs to have a mix with approximately 3500 psi in 7 days or 4000 psi in 28 day to have an application with highway use, while still maintaining porosity and water quality reduction. The denser it is, the more strength it has. A latex mix has been tested to have a higher psi. Japan has also tested different admixtures to increase strength. Sand is being realized as becoming more important in gaining strength.

- There were concerns expressed about the use of deicing materials and sand for winter maintenance and the possibility of those gradually clogging the concrete. Also, the possibility of having the system contain the maximum amount of water and become frozen to the point where ice freezes on the surface and is bonded with the ice held internally within the pavement matrix, thus possibly being more difficult to remove.
- The material is considered so porous that it has not been known to hold water; what is more of a concern is if the subgrade does not have good drainage which could cause problems above. The deicing issue will be tested in this project. Belgium and Japan have done deicing; however, due to the short amount of time, no conclusions are available yet.
- It was clarified that in the comparison of pervious pavement and conventional concrete pavement in the parking lot project, there will be a drainable base under both pavements; however the base under the conventional concrete pavement will not be as thick. It is not typical contractor practice to put a drainable base under a parking lot. There is a need for a drainable base with the use of pervious pavement from the stand point of water quality. There could be adjustments made to the design plan if the Board desired.
- Although it costs more to put in the drainable base, many driveways in the Charlotte, North Carolina area are starting to use pervious pavement because it saves on not putting in a water retention system; it also helps keep the water from flowing onto the street and making it a stormwater system.
- It was clarified that the problem statement is being presented to the Board outside of the prioritization process due to availability of funding from outside sources. The IHRB is being asked for approximately 40% of the funds; the other 60% is from the following groups: ISU Facilities Planning and Management, Iowa Concrete Paving Association, Iowa Ready-Mix Concrete Association, PCC Center/ISU, Civil, Construction, and Environmental Engineering/ISU, and the DNR.
- There was concern expressed about the foreign concept of introducing water into the pavement and embankment since current practices focus so much on keeping water out. With this being opposite of the current mindset, it was questioned if it was something that would ever be used on the roadway. The potential benefits from use in parking lots were recognized, however, it was questioned if the Board should be funding research for parking lots.
- It was responded that, through the years, it has become more understood how important water control in the subbase is to the life of the pavement. The key to the success of this project in highway application is to get the water down as quickly as possible and out; it forces the development of a very good drainable system underneath - either into the soil or to an outlet.
- Another benefit of porous concrete is that it is being found out to be one of the quietest concrete pavements. Development of quieter pavements is currently one of the top priorities in the paving industry. In some of the higher populated areas across the country, there is approximately one million dollars per mile being spent on noise walls.
- It would be helpful to know if this technique, with a quality drainable subbase, could replace the lateral drains that are being put in to handle drainage currently. It was suggested that it may be useful information to also have a portion of the field test without a good drainable base to see how it responds.

- It was stated that one of the big issues is the stormwater management. The permeable concrete just gets the water down to the subbase quicker and off the roadway. The drainable system which is anticipated to be used isn't much different than the one used now.
- The issue of traction was discussed. The friction tests are quite promising compared to other current types of pavements. There are no tests showing how long the pavement will keep its porosity and friction levels, and yet remain quiet.
- Concern was expressed for taking on a project so far from current practice and with so many unknowns. It was felt that it may just introduce another challenge into the paving process with directing water into the location from where it is currently attempted to be kept. It was suggested that it may be better to gain more information from existing projects prior to the Board funding such a large project, even though there are potential partners included in the current problem statement.
- It was added that in some of the European pavements, the porous concrete has been used as an overlay, not a full depth pervious pavement. This approach still helps move the water off quickly, which helps with skid resistance and lowers chances of hydroplaning; it also still helps with noise reduction.
- This project was not intended to solve all of the questions on the new technology, it was proposed to gain information from this first application and see how it may be incorporated into mainline transportation in the future.
- On the public side, it was mentioned that cities do have an issue of paving parking lots. This, however, was realized as not being a highway issue.

Motion:

- Mark Nahra moved to deny the problem statement at this time and have the technology monitored to see what potential it has for highway application.

Additional discussion:

- There was concern expressed that if it is held back that it may put Iowa behind the curve on technical advancements.
- It was added that there is a storm water requirement which needs to be met. This technology has the possibility of allowing the water drained from the streets to be treated.
- The concept of buying into such a new technology so quickly was a concern. With knowing that the drainable pavements that have been developed out of asphalt were noisier, the concept of this pavement being quieter while maintaining skid resistance was mentioned as a point of apprehension. The amount of money requested for all the phases was thought to be substantial for so many uncertainties, especially considering the other areas of research which have priority to the Board as a whole.
- It was suggested that this topic be submitted into the group of topics to be prioritized.

Second and vote:

- Clark Schloz seconded. Carried with 9 yes, 4 no, and 0 abstaining.

Problem Statement, “The Effects of Headcut and Knickpoint Propagation on Bridges in Iowa”

- Dr. Thanos Papanicolaou, The University of Iowa/IIHR, discussed the definitions of headcuts and knickpoints, impacts of the two, information that current literature reveals, project objectives and methods, instrumentation proposed for monitoring, diagrams showing turbulent flow structure, anticipated outcomes, and conclusions of the proposed research.
- This project is being presented to the Board outside of the prioritization process due to availability of funding from an outside source. This problem statement addressed the following topic on the list to be prioritized for FY 05-06: 4.02, The Effects of Headcut and Knickpoint Propagation on Bridges in Iowa.
- It was mentioned that projects with outside funding or those with immediate need are allowed by the Business Plan to be reviewed by the Board throughout the year.
- The project will look at indicators, such as depositional areas, which may cause headcuts or knickpoints to be formed.
- It was clarified that the total amount of funding for the project is \$80,000; the funding portion requested from the IHRB is \$64,000.
- There was support expressed for the project due to the unpredictable migration of headcuts and knickpoints and the effect they have on bridges and culverts.
- Charles Marker moved to approve the problem statement and invite a proposal to be submitted to the Board. Roger Gould seconded. Carried with 8 yes, 1 no, and 4 abstaining.
- One member left the meeting, bringing the voting member/alternate count to 12.

Final voting for the prioritization of research topics for FY 05-06

- There was discussion on closely related topics. If two of the topics are closely enough related, the Board will make a decision to have them combined or not as the RFPs are being developed instead of during the ranking process.
- As stated earlier, 3.01, 3.02, (both related to the same prospective project) and 4.02 were taken off the list due to problem statements which were approved previously in the meeting. Both of the problem statements were presented to the Board due to additional funding being made currently available from outside sources.
- There were two members not present who had submitted their voting numbers on paper to Mark Dunn. The Board discussed if the votes of just those present should be allowed, or if those stated above should also be allowed. One of the county seats was without representation at the meeting, which was also taken into consideration.
- Charles Marker moved to accept the votes by proxy. Scott Dockstader seconded. Carried with 10 yes, 2 no, and 0 abstaining.
- Mark Nahra moved to have the voting by proxy allowance for the annual ranking vote added to the Business Plan. Jim Berger seconded. Carried with 12 yes, 0 no, and 0 abstaining.

- Each year, the Board is invited to solicit support for any topic of special interest prior to voting. No special topics were highlighted.
- The initial ballot and list, with short descriptions, of brainstormed and past topics of interest were e-mailed to members and alternates prior to the meeting. Ballot (one per regular member seat) results that were returned were compiled by Mark Dunn and results of the overall ranking were sent to members and alternates on the April Board packet CD. At the meeting, each regular member seat was allowed to vote on each topic he wanted to have included in the final priority list. Each seat was allowed a total of 20 votes, with no more than 4 votes going toward any one topic (voting done by show of fingers for number of votes as topic was read aloud).
- The voting results were recorded, sorted and handed out later in the meeting. The top 20 - 25 will be considered the final research topic priorities for FY 05-06. Mark Dunn, with the assistance of the author of the topic idea, will develop RFPs for the top selections to be reviewed at the June meeting.

Finalize location of the IHRB 2005 May traveling meeting

- After reviewing the location options, it was decided by consensus of the Board to have the meeting in Atlantic with a tour of some of the Hungry Canyons projects following the meeting. Details on hotel options, lunch and tour will be sent with the May Board packet.

New Business

- None

Scott Dockstader moved to adjourn the meeting. Roger Schletzbaum seconded. Carried with 12 yes, 0 no, and 0 abstaining.

Date of Next Meeting: THE NEXT MEETING WILL BE HELD FRIDAY, MAY 20, 2005 AT 9:00 A.M. IN THE CONFERENCE ROOM AT THE IOWA DOT DISTRICT 4 OFFICE IN ATLANTIC, IOWA.

Mark Dunn, IHRB Secretary