

IOWA HIGHWAY RESEARCH BOARD (IHRB)

Minutes of January 27, 2006

Regular Board Members Present

J. Adam	J. Krist
T. Fonkhert	J. Rasmussen
J. Alleman	M. Nahra
R. Ettema	C. Schloz
J. Ites	A. Abu-Hawash
R. Schletzbaum	D. Short

Alternate Board Members Present

D. Maifield
R. Younie
M. Kerper
J. Berger
R. Knoche

Board Members with No Representation

None

Secretary

M. Dunn

Visitors

Sandra Larson	<i>Iowa Department of Transportation</i>
Ed Engle	<i>Iowa Department of Transportation</i>
Mark Kerper	<i>Iowa Department of Transportation</i>
Omar Smadi	<i>Iowa State University/CTRE</i>
Neal Hawkins	<i>Iowa State University/CTRE</i>
Tom Welch	<i>Iowa Department of Transportation</i>
Wilf Nixon	<i>University of Iowa</i>
Becky Hiatt	<i>FHWA</i>
Dave Claman	<i>Iowa Department of Transportation</i>
Duane Smith	<i>Iowa State University/CTRE</i>
Kimm Barnes	<i>USGS</i>
Bob Buckmiller	<i>USGS</i>
David Eash	<i>USGS</i>
Vanessa Goetz	<i>Iowa Department of Transportation</i>
F.W. Klaiber	<i>Iowa State University</i>
Paul Wiegand	<i>Iowa State University/CTRE</i>
David Lee	<i>University of Iowa</i>
David White	<i>Iowa State University</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 Jon Ites with 11 voting members/alternates at the table.

Agenda review/modification

- No changes were requested.

Approval of the minutes

- Roger Schletzbaum moved to approve the minutes. John Adam second. Carried with 11 yes, 0 no and 0 abstaining.

Introduction of New Board Members

- Four additional board members took their places at the table bringing the number of voting members to 15.
- Jon Ites began his term as chair of the board. He introduced the new members and alternates. An alternate for Dennis Short has not yet been selected.

Review/Select proposals from the second solicitation for FY 05-06

IHRB-05-08 Examination of Curing Criteria for Cold-in-Place Recycling

- One proposal was received in response to this RFP. The proposal was from H. Lee, The University of Iowa.
- Mark Dunn noted that the budget for the proposal indicated a total funding level of \$150,000 but the RFP funding level estimate was \$100,000. So the board might want to address the funding level.
- Dr. Lee was asked for a justification for the higher budget. He stated that the \$100,000 listed was not sufficient for employing two graduate students for the two years that the project entailed.
- Q: The difference seems to be for the additional grad student. But there is not a description in the proposal of what each of the grad students will be doing. We expected to see a justification, essentially, to warrant having two students instead of one. A: The data collection is occurring over a large geographical area. That combined with the extensive laboratory testing will require two students to get the work done.
- Comment: The board is not comfortable dealing with proposals written around supporting grad students. Rather, the board wants to see proposals that are written around how best to get the research done.
- Q: How has the board handled this in the past (where the budget comes in significantly higher than the level of funding listed in the RFP)? A: Normally the board has asked researchers to give a proposal that tells what can be accomplished with the funding listed, and then add what additional work could be completed with additional funds.

- R. Younie moved to ask Dr. Lee to resubmit the proposal with a \$100,000 budget that discusses what will be accomplished with that budget and what could be accomplished with an increase in budget. Second by J. Alleman.
- Comment: If a researcher is submitting a proposal that has a budget significantly more than that listed, they should call Mark Dunn to discuss prior to submitting. A: Mark Dunn stated that there is already a statement similar to that in the letter that goes out with the RFP.
- Carried with 15 yes, 0 no, and 0 abstaining.

IHRB-05-09 Performance Evaluation of Concrete Pavement Granular Subbase

- One proposal was received in response to this RFP. The proposal was from D. White, M. Suleiman, C. Jahren, H. Ceylan, and E. T. Cackler, Iowa State University/CTRE.
- John Adam requested that the RFP be revised to remove the environmental aspects of the research due to recent developments in the regulatory area. It was suggested that this should be done as a separate RFP at a later date when issues relating to these regulatory requirements become more clearly defined.
- The board asked Dr. White if it would be possible to revise the proposal, removing those portions (objectives 6 and 7) and, in their place, adding additional test sections for the remaining test criteria.
- Mark Nahra moved to ask that the proposal be revised (as described above) and resubmitted by Dr. White at the February, 2006 meeting. Clark Schloz second.
- Carried with 15 yes, 0 no, and 0 abstaining.

IHRB-05-10 Field Evaluation of Timber Preservation Treatments for Iowa Highway Applications

- One proposal was received in response to this RFP. The proposal was from F. Wayne Klaiber and M. LaViolette, Iowa State University/CTRE; and C. Clausen and S. Lebow, USDA Forest Service, Forest Products Laboratory.
- Q: The [Army] Corps of Engineers has been requiring, for timber substructures on bridges, that we should only be using CCA treated material in that substructure or anywhere near the water. I don't know if the Corps has ever given consideration to the copper naphthanate that's now being used. Would the researchers address Corps of Engineering permitting for preservatives when we use them in a near stream environment? A: It should be possible to address those concerns without any difficulty.
- Mark Nahra moved to accept the proposal, Ahmad Abu-Hawash second.
- Carried with 15 yes, 0 no, and 0 abstaining.

Problem Statement, Continuation of TR-483, “Evaluation of Hot Mix Asphalt Moisture Sensitivity Using the Nottingham Asphalt Test Equipment”.

- Chris Williams, Iowa State University presented the background summary, objectives, and five tasks of the research plan; as well as benefits, Iowa DOT involvement, time schedule, and budget of the Phase II problem statement. The estimated budget for this 15-month project is \$75,000.
- John Adam moved to approve the problem statement and request a formal research proposal at the February, 2006 meeting; second by Bob Younie.
- Carried with 15 yes, 0 no, and 0 abstaining.

Problem Statement, “Clear Zone: A Synthesis of Practice and Benefits of Meeting the Ten-Foot Clear Zone Goal on Urban Streets”.

- Neal Hawkins, Iowa State University, CTRE presented the background summary, objectives and seven tasks of the research plan; as well as benefits, Iowa DOT involvement, time schedule and budget for the problem statement. The estimated budget for this one-year project is \$103, 084.
- Comment: This is complex issue. The public is demanding more context sensitive design. More communities want tree-lined streets and beautification projects. Also there is some research that indicates that a tree-lined street has a traffic calming benefit. So there are potential safety benefits if we can determine how best to do this process, while being mindful of the safety aspects of clear zones.
- Q: Is the research going to look at speed as a factor as well as just clear zone? We have speeds on roads going through towns of anywhere between 25 and 50 miles per hour. A: Absolutely. The size of the clear zone should be directly tied to average speeds.
- Q: It sounds as if there is a human factors influence on this topic. How will the research address that? A: We would like to address that more in detail. Review of crash data over ten years in the corridors studied will give us insight into the human performance aspect. There are random effects on that data and we can’t promise to have an answer at the end of this project. We would want to collaborate with other researchers in the human factors field, principally to look at what the drivers are actually doing. However, we’ve tried to keep the focus of this first project narrow. Later, we would look to more study of the human actions and behavior.
- Bob Younie moved to approve the problem statement and request a formal research proposal at the February, 2006 meeting; second by Jeff Krist.
- Carried with 15 yes, 0 no, and 0 abstaining.

Problem Statement, additional funding for TR-519, “Developing Flood-Frequency Discharge Estimation Methods for Small Drainage Basins in Iowa”.

- David Eash, USGS, presented a review of the accomplishments of the project so far, a description of the change in scope being requested from the board at this time, and a description of the website and interactive software development that is expected to be completed.

- Objectives of the amended project:
 - (1) Implement Stream Stats (web based interactive software) for 60% of the state.
 - (2) Develop two sets of regional equations. One set each for small and large basins. The small basin equations have been developed. In the modified project, these equations would be updated and coordinated with the development of the large basin equations.
 - (3) Define the same hydrologic equations for both the large and small basins.
 - (4) Develop the smallest drainage area range possible for the transition zone between small and large drainage basins. With coordinated development of the small and large basin equations, it should be possible to significantly decrease the size of the transition zone.

- Stream stats is an interactive, map based web application that has been designed for national implementation. It has been implemented for 3 states and work is underway to implement it in 18 additional states. David presented examples of the program.

- Data to support this program is currently available for approximately 45% of the state of Iowa. We expect to be able to complete another 15% of the state by 2008.

- For the remainder of the state, the data will come from manually digitized centerlines of gauged streams. We also will do a correlation between the manual measurements and the GIS measurements.

- This is a three year project. The total cost of the project is \$438,000 (after subtracting \$22,000 of remaining project funds that will be carried over). The USGS will be funding 45% of the project leaving a request to the IHRB of \$240,900. After Stream Stats has been fully implemented (possibly in 2009), there will be an annual fee to maintain the database, estimated at \$7,000. The requested cost share to the research board would be just under \$4,000. This could come as part of the annual HR-140 proposal. Also, once the digital streams data is completed for the remaining 40% of the state, the estimated cost of processing and implementing the data into the program is about \$86,000; of which the IHRB would be requested to provide about \$47,000.

- Q: It seems like we've been trying to zero in on accuracy for these stream estimates for a long time, and the topographic data appears to be key. I've heard discussions about other digital models, statewide such as LIDAR. Is it possible, if there is something more accurate, to incorporate it into the Stream Stats information at a later date? A: Yes. Right now we'll be using the best available data. But later, new more accurate data could easily be incorporated. The regression equations would have to be modified somewhat to take into account the new information.

- Q: Have you looked at who is going to be using the information and the possibility that we share the costs with those organizations. Is DNR helping to pay for this too? Have any other states had just the DOT paying for the development? A: It's kind of depended on who has led the efforts to implement Stream Stats. For example in Massachusetts, where it was first developed, the emphasis was on low-flow estimation. We haven't heard anything from the DNR about interest in the process. We had proposed a low flow study a few years ago, but they lacked the funding to proceed.

- Q: From what I've seen on the web, it appears that the USGS has been in the position of trying to make it work out in each state where you can find the funding. If you went to DNR and said

that USGS will be funding part and IHRB will be funding part, will DNR still turn you down? A: They haven't been approached recently.

• Q: We have the regression equations for flooding. Do they have nothing similar for low flow currently? A: No. The last report that was done was in 1976 – it's more of a look-up map. You input a drainage area and you can calculate a 7Q10 low-flow statistic. There were not really regression equations worked out in the same manner. The proposal I had given them a few years ago would have required collecting a lot of baseflow discharge measurements in the field over several years. There is a need to update that.

• Q: I notice you have a GIS style table in the software for interacting with it. What is the underlying engine for the GIS? Is it ArcInfo or one of the industry standards? And is it easy to bring in additional topographic data? A: We are using standard programs, including ArcInfo and ArcIMS. So yes it is very easy to bring in additional data later.

• Comment: I'm still concerned about the cost. Ohio is one of the states following the process of implementing this; and it says they are going to do the total implementation for \$120,000 paid for the DOT. Ohio and Iowa are similar sizes. It seems to me that they must have some money coming from their DNR or whoever is in charge of the NPDES program. A: I don't know how that is working in Ohio. But I know that several states are just implementing Stream Stats; they are not developing the regression equations along with Stream Stats. I think that might be what Ohio is doing. In this project, 55% of the cost is for Stream Stats work and the remainder is for regression analysis and publication of reports.

• Q: If this board asked you to talk to DNR about merging forces to help fund this project; would a one-month delay be a sever problem for you? A: No, that's not a problem. I'd be happy to contact them. We're looking at a March 1 start date.

• Q: Can you also talk to the DNR about scalability with their LIDAR and the opportunities to be able to get a better base map? A: Yes, if that data is available. They are currently shopping around for funding for that project too. Perhaps it would be a good project to look at for a future study.

• The Board asked Dave Claman (Iowa DOT Office of Bridges and Structures – Preliminary Design) for comments from his Office's perspective. A: The possibility of the DNR providing funding is very small – they don't have any money for this type of work. The Stream Stats program is a perfect match to redo the small and large basin equations so that they work together and a user will be able to click on a bridge and read off the discharge numbers. That's a good thing. The board can decide to publish the report as is or fund the additional work to get a full 60% of the state covered by Stream Stats. Counties in the Stream Stats covered areas will have point and click capabilities, and counties outside those areas will have equations based on the same regional data to work with.

• Mark Nagra made a motion to accept the problem statement and to have the researchers bring back a formal proposal to the board at the February, 2006 meeting; second by Roger Schletzbaum.

• Carried with 14 yes, 1 no, and 0 abstaining.

• Several board members indicated that they would still like to have the researchers contact the Iowa DNR about participating in the project.

Final Report for TR-412, “Development of a Computer Controlled Underbody Plow”

- Dr. Wilfrid Nixon, The University of Iowa, discussed the background of this research – i.e. Why is there a problem?; the approach to a solution; a system concept; electronic control of hydraulics; expert system control and system integration.
- Effective operation of an underbody plow is difficult. The operator has to make frequent adjustments to the downward pressure on the blade to effectively cut the ice without excessive blade wear.
- The first effort was to provide pressure and position information to the driver in real time. But this had a challenge of adding to the driver’s attention load. So if the adjustments could be done automatically, it would result in a safer environment in the cab of the truck as the operator would have one less thing to concentrate on.
- The approach was to automate the underbody plow. The funding for actual implementation of this on a truck was not available. So the computer portion of this was bench-tested.
- A system of rules and fuzzy logic was used to develop the computer control program for the plow.
- Conclusions: The concept has been proven workable. Computer control has been verified in bench-tests. Next steps are being considered and recommendations for partnerships between the DOT and private industry to move forward.
- Todd Fonkert moved to accept the final report; second by Mark Nahra. Carried with 15 yes, 0 no and 0 abstaining.

Final Report for TR-489, “Innovative Solutions for Slope Stability Reinforcement and Characterization in Iowa Soils”

- Dr. David White, Iowa State University, discussed the background, objectives and results of this research.
- This final report consists of three volumes. Volume I is essentially an expanded executive summary. Volume II summarizes the in-situ testing investigation. Volume III is the pile reinforcement portion of the report.
- The investment in this research was about \$200,000 – the savings from implementing the results of this research will be over \$1,000,000 on just one of the projects last year.
- Part 1 of the research was in-situ testing and analysis, developing and validating use of the borehole shear test device. Part 2 of the research focused on the reinforcement aspect of the project: how small diameter micro piles were used to reinforce slopes and development of a design guide for doing that.

- The borehole shear test device was developed at ISU in 1967. It hadn't seen widespread use in Iowa before. With this device, one can get field measurements of soil strength (normally this would only be possible in a laboratory setting).
- Most of the slope failures investigated were in southern Iowa. For each site the areas were profiled for soil types and shear strengths to determine the probable causes of the slope failures. Researchers then used a back-calculation procedure to determine the right combination of cohesion and friction angle was to represent failure conditions for that slope.
- Conclusion: The borehole shear test device measures the peak or softened shear strength. This approach provides an improvement to the whole process of doing slope stability analysis in Iowa. Researchers also learned a lot about weathered shale which is responsible for a lot of slope instability in Iowa. The results of the tests indicated that there is not a significant correlation between how weathered the shale is and the strength of the soil.
- On a specific project (new construction) the consulting firm had recommended remediation to increase the factor of safety against slope instability. That remediation would involve 3 to 5 million dollars worth of improvements. Working cooperatively with the Iowa DOT and the consultant the using the process and equipment described above, the researchers came up with some recommendations that saved a large part of that money.
- Part 2 of the project considered the use of slender micropiles as a slope reinforcement technique. The main technical problem was that evaluating a pile subjected to loads imposed by a moving slope is fairly complex. So lab tests were performed to determine what the loads on a pile are and what orientation should be used for pile placement.
- Conclusions: Slender pile elements can be installed with relatively simple construction equipment. The research documented a design approach for the piles. Traditional materials can be used.
- Implementation: From part 1, the borehole shear test can be used effectively to cut earthwork costs while providing a good safety factor against slope failures. From part 2, the design approach developed in this research along with the experimental work should lead to their use in some field projects in the future. The researchers envision that these slender piles would be effective on relatively shallow slopes, especially in cases where added drainage is not expected to be effective.
- Q: The report was written with metric units. Does the board have any requirements for research reports to be written in dual units? A: The board has not, historically, had requirements for the format of research reports. There are firm requirements for the format of proposals. It would be good to have a requirement for dual units.
- Q: Have you narrowed down the failure size boundaries – is there a maximum and a minimum sized area that you would recommend these piles? A: The depth is very important. Going deeper than about 15 feet could require additional technology and might not be economical. As far as the foot-print, you could go about as big as you like. Probably the thing to do would be to reinforce it before manipulating the grade; then come back in after the piles have set up and regrade it.
- Q: When do you install the pile: After the slope is reshaped or is the pile put in and soil added? A: The best approach is to put the pile elements in first (you might have to do a little grading to gain access to the site for the equipment), then come back and do the final shaping.

- Q: How do you decide on the spacing and number of rows of piles? A: Start by getting the information on the soil strength and stability conditions of the slope. Then you factor up to get the factor of safety you want; with kind of an iterative process. You choose a reinforcement size, then backcalculate to the factor of safety that you want.
- Bob Younie moved to accept the final report. Second by Clark Schloz. Carried with 15 yes, 0 no, and 0 abstaining.

Interim Report for TR-514, “Development of a Manual of Practice for Roadway Maintenance Workers”

- Duane Smith, Iowa State University, CTRE, presented a draft copy of the maintenance manual.
- He discussed the members of and recent additions to the steering committee. These groups have all added significantly to the draft.
- The text is relatively complete and edited. Graphics are getting close.
- The original project completion date was 30 December, 2005. However, because of added review this has been extended to 30 April 2006. The plan currently is to have all of the text and illustrations complete by the end of March and the final draft ready for printing by the end of April.
- Duane asked the board members to review the drafts that were handed out and provide comments back to him in a couple of weeks.

Determination selection process for proposals from Innovative RFP.

- Mark Dunn discussed the recent RFP and the response we’ve gotten back. There will be a significant number of proposals to be evaluated at the next meeting.
- Each one will need to have a presentation, discussion and vote. The board is going to want to evaluate all of the proposals before making decisions on which ones to accept and this will take a significant amount of time. So the board needs to discuss how best to approach the evaluation process. Since the agenda will already be quite full, this may need to continue on into the next month’s meeting.
- Q: How do you envision the prioritization process to proceed? A: It’s going to be a difficult task to compare proposals that are entirely different from one another.
- Another issue that has come up has to do with intellectual property concerns. The board has historically operated openly. So someone who has a proposal that involves something that is sensitive in an intellectual property sense runs a risk if the project is not funded. Mark Dunn will contact all of the proposers to explain that if they submit a proposal, it will be open to public view. The proposers will have the opportunity to withdraw the proposal prior to its distribution. In the future, this statement will be made in the RFP.

- Q: Would it be possible to do a prescreening of the proposals by a select committee or ad hoc group? A: Another possibility would be to have no presentations at the first meeting, just narrow down the list of proposals; then invite the selected researchers to present at the following meeting.
- Comment: This method would allow the board to review and comment. You could have a brief discussion on each one and then an up or down vote on bringing it back for an oral presentation at the following meeting. That would also provide some extra time to consult with others who might be more knowledgeable about the specific subjects.
- Comment: My concern is that if we don't fully understand what the innovative idea is, we may not give it a fair review. A: That would be the fault of the person creating the proposal – it is up to them to be informative and persuasive.
- Q: Is there a boilerplate type of ranking guideline we can use to help us evaluate this? A: Yes, there is a form that we have had available to help evaluate competitive proposals in our regular process. It could easily be modified to use in this process. This form has some good questions you can ask of the proposal to help you in your evaluation.
- Q: Are there timing issues? A: The board originally set this up to be in late winter based around the semester schedule. This would provide funding at the time that fits in with hiring of students to work on the projects in the summer.
- Q: Is there a limit on how long the proposals can be? A: The board has not limited them for page length in the past. We've simply required them to follow the format guideline and they generally come in with a consistent size (10 to 15 pages).
- Comment: We're bound to come up with proposals that have significant interest to one or another of the groups here and not to the others. That's something we're going to have to grapple with.
- Mark Dunn will be sending the proposals out to the board in a separate packet prior to the regular board packet. So board members will be able to begin review as soon as possible after they are received.
- Based on the discussion here today, it looks like the consensus is for the board to evaluate proposals at the next meeting and decide which ones to invite back for a presentation at the following meeting.
- Q: Will these be funded in this fiscal year or next? A: By the time the projects are approved and a contract put into place it will be quite close to the beginning of the next fiscal year.

New Business

- The annual report has been completed. There are hard copies available here at the meeting as well as back at the Research and Technology Bureau office. Also, copies can be downloaded from the website.
- Dave Eash has available the expanded proposal of continuation of HR-140 that was requested of him at one of the last meetings.

- Q: Can we make a decision on the metric/English dual units issue? A: We're looking at setting up a report formatting guideline. If and/or when we get that finished we'll include the dual units requirements. Q: Should we have dual units or just English units? A: For the benefit of researchers who may be presenting their work at other venues such as TRB, dual units would be best. Dual units are required for most of those organizations.

Mark Nahra moved to adjourn the meeting. Clark Schloz second. Carried with 15 yes, 0 no, and 0 abstaining.

Date of Next Meeting: The next meeting will be held Friday, February 24, 2006 AT 9:00 a.m. in the East/West Materials Conference Room at the Iowa DOT, Central Complex in Ames, Iowa.

Mark J. Dunn, IHRB Secretary