IOWA HIGHWAY RESEARCH BOARD (IHRB)

Minutes of October 28, 2005

Regular Board Members Present

J. Adam
L. Brehm
S. Dockstader
R. Ettema
J. Ites
R. Schletzbaum
E. Jaselskis
L. Jesse
J. Joiner
J. Krist
C. Marker
C. Schloz
A. Abu-Hawash

Alternate Board Members Present

M. Kerper
J. Berger

Board Members with No Representation

T. Fonkert
M. Nahra

Secretary

M. Dunn

Visitors

Brian Keierleber	*Buchanan County*
Max Grogg	*Federal Highway Administration*
Ed Engle	*Iowa Department of Transportation*
Sandra Larson	*Iowa Department of Transportation*
Mike Heitzman	*Iowa Department of Transportation*
Chris Brakke	*Iowa Department of Transportation*
Francis Todey	*Iowa Department of Transportation*
Ben Behnami	*Iowa Department of Transportation*
James Cable	*Iowa State University*
Omar Smadi	*Iowa State University/CTRE*
Neal Hawkins	*Iowa State University/CTRE*
Duane Smith	*Iowa State University/CTRE*
Paul Wiegand	*Iowa State University/CTRE*
Tim Morris	*Iowa State University/CTRE*
R. Chris Williams	*Iowa State University*
Bob Sperry	*Story County*

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

- Jon Ites moved to approve the minutes as submitted from the September 30, 2005 meeting. Clark Schloz 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.

Proposal for continuation of HR-296, "Local Technical Assistance Program"

- Bob Sperry, Story County Engineer, described the structure of the program and their activities over the last year.

- LTAP has an advisory board made up of representatives from federal, state and county and private organizations. With Greg Parker's departure from the IHRB, the program is needing a new IHRB representative to be on the advisory board.

- The Iowa Roads Scholar program has been very successful in the last year. There are four levels of training accomplishments in the program. There are currently more than 11,000 participants entered in the program, with 382 people attaining scholar status. Included in those successes were one person each reaching the top levels, Senior Road Scholar and Master Road Scholar.

- LTAP provides a link to research, principally through the Technology News (a quarterly newsletter) articles. This last year they have provided access to projects such as Modified Beam in Slab Bridge, Slag and Fly Ash in HPC, Iowa Drainage Manual, Traffic Studies Handbook, and Fly Ash for Sub-grade Stabilization. Many of these projects were overseen by the IHRB.

- Another link to research provided by LTAP comes from the project level technology transfer summaries. Most recently, these have included Best Practices for Bridge Approaches, Ultra Thin PCC Overlays, Influence of Sub-grade Non-Uniformity on PCC Pavement Performance, Implementing M-E Pavement Design Guides, and Measuring Pavement Profile During Construction.

- LTAP Workshop participation was approximately 3000 last year with approximately 2500 expected in the coming year. Bob listed the courses that will be available in the upcoming year.

- Funding for the LTAP program in Iowa is shared between FHWA, Iowa DOT (safety funds), IHRB, and ISU Extension. The proposed funding level for the Iowa DOT this year is $100,000 which represents about 33 percent of the total.

- Jeff Krist moved to approve the proposal. John Adam seconded. Carried with 13 yes, 0 no, and 0 abstaining.

Proposal, " Performance Evaluation of Rubblized Pavements in Iowa"

- Dr. Halil Ceylan, ISU discussed the background of Phases I and II; this proposal is for phase II of the research.

- Dr. Ceylan discussed the various types of fracturing methods and performance issues these methods are intended to address. Normal overlays are subject to reflective cracking over time. Rubbilization and crack-and-seat methods reduce or eliminate reflective cracking problems.

- Phase I showed that a mechanistic design method could be employed to determine optimum lift thickness based on the amount of structure remaining in the underlying material. This would result in the ability to use thinner lifts and provide cost savings.

- Phase II proposes to validate the modeling described in Phase I by using structural condition data from falling weight deflectometer (FWD) studies and bearing tests using dynamic cone penetrometer (DCP) readings, both from in-service pavements.

- The Phase II objectives are:
  1. Evaluate the structural condition of existing rubblized concrete pavements across Iowa through FWD, DCP, soil sampling and soil classification tests, and visual pavement distress surveys for validating Phase I study findings.
  2. Examine design, construction and performance records of existing overlaid fractured PCC pavements to estimate the effects of subgrade, fractured slab thickness and structural value, and overlay thickness on performance.

- Dr. Ceylan also described the timetable and budgets. The project is estimated to take 12 months and total cost is $43,221.

- It was noted that funding and oversight for these projects is provided by the Iowa Highway Research Board, not just the Iowa DOT. Dr. Ceylan agreed to make the correction.

- John Adam moved to approve the proposal. Ed Jaselskis seconded. Carried with 13 yes, 0 no, and 0 abstaining.

Final Report for TR-427, "Evaluation of High-Slump Concrete for Bridge Deck Overlays"

- Ed Engle from the Iowa DOT reviewed the background; the project objectives; the construction processes and materials; and the results for the Buchanan county project. He also described more recent uses of high-slump concrete for bridge deck overlays at the county and state levels.

- This method of overlaying bridge decks should provide a very cost effective alternative to local agencies. The state is also using a modified version of the method, which lends confidence to other agencies that might want to try it.

- Ed will be implementing the research by sharing the report with county engineers, informally, at the annual meeting in December and publicizing with the ICEA Service Bureau.

- Charles Marker moved to approve the proposal. Lyle Brehm seconded. Carried with 13 yes, 0 no, and 0 abstaining.

Final Report for TR-511, "Design and Construction Procedures for Concrete Overlay and Widening of Existing Pavements"

- Dr. James Cable, ISU/CTRE, reviewed the project objectives; results and conclusions of the research. He listed an extensive number of people who helped out with the program.

- Some of the objectives of the research were:
  1. To look at the structural behavior when widening units are placed with an ultrathin PCC overlay, specifically if the widening unit acts to restrain the overlay from lateral movement;
  2. To create design procedures and construction guidelines;
  3. To validate the designs (this was not accomplished in the current research).

- Results:
  1. Planning guidelines: This overlay and widening process is not appropriate for every composite pavement scenario. The engineer has to look at existing materials, reinforcement and joint status, drainage, traffic (1,500 to 2,000 vpd in the current projects).
  2. Design: The design procedure uses results from a falling weight deflectometer or other deflection device to provide information to design an overlay using the so-called "Colorado Procedure". There are several procedures available, Dr. Cable thinks this one is the best for the information we have available. Generally on Iowa pavements that are appropriate for this approach there is a satisfactory amount of structure and the overlay thickness will be in the 3 ½ to 4 ½ -inch range. Unless there is a weak sub-grade. It will be important to look at the sub-grade strength, because it won't do any good to overlay something without adequate structure underneath.
  3. Use of fibers – If the overlay thickness is below 4 inches, the use of polypropylene fibers is recommended. It won't be needed for strength, but to hold things together if there is any unexpected cracking.
  4. Construction survey is important. Getting an accurate measure of high and low points in the existing pavement is very beneficial. It's helpful to set up milling based on the survey that will match the finished grade and just take of high points. That way, when the concrete is placed it will fill in any ruts and provide the appropriate transverse slopes.
  5. Construction concerns. Is it better to pave one lane at a time or both? Future work will address these concerns.
  6. Underlying asphalt temperatures are important. If the pavement is hot, it is worthwhile to use a small amount of water to cool it off to under 100 ºF.
  7. Joint saw – use the narrow (1/8 inch) width and don't seal.

- Future Work Recommendations
  1. Validation project. Dr. Cable is discussing a project, working with District 3 near Sioux City. The plan is to build 15 miles of this type of overlay, from US 71 west to Ida Grove. Construction would entail building one lane at a time with a pilot car (24 hours a day). Work would cover five miles in one week. Then sections would cure over the weekend and return on the other lane the second week.
  2. Discussions are also underway with District 2 about a project in the Charles City area.

- Questions
  1. Dr. Cable was asked about the required depth of cover over tie bars for the widening sections. In the sections in this research the tie bars were stapled down to the underlying asphalt. Then they had at least 3 ½ inches of cover.
  2. How thick does the overlay have to be for tie bars to be necessary? The more important issue is what the widening unit is going to do. If you can leave it in place and there is no

evidence of the joint already moving, then you can forego the tying. But if there has been movement in the joint and if you've had to fill the joint more than once, then you'll need to bridge the joint with a bar.

3. Is there any issue with the width of the widening unit? A minimum of 2 feet and even 3 feet would provide the benefit that the widening is intended to provide. What the widening does is provide a strong surface for the trucks or farm equipment to land on that won't rut like granular shoulder can. Nor will it be as likely to blow out the side as a heavy load riding right on the edge will tend to do.
4. Is there a significant difference between joint spacings? Joint spacing is important. In part because it's sometimes difficult (with unusual joint spacings) for Maintenance to figure out where to put the centerline striping. Also, it can be important if there is still significant movement in the underying PCC joints.
5. What types of fiber did you use? There were three types of fiber used, all polypropylene: monofilament, fibrillated, and structural.

- Roger Schletzbaum moved to approve the proposal. Clark Schloz seconded. Carried with 13 yes, 0 no, and 0 abstaining.

Final Report for TR-483, "Evaluation of Hot Mix Asphalt Moisture Sensitivity Using the Nottingham Asphalt Test Equipment"

- Sunghwan Kim, Iowa State University/CTRE reviewed the project objectives; the equipment evaluated and results of the testing.

- Moisture sensitivity of Hot Mix Asphalt mixtures has been recognized as a major form of distress in asphalt concrete pavements since their inception. The evaluation of moisture sensitivity has been divided into two categories: visual inspection testing and mechanical testing. This research was conducted to develop a new test protocol which can overcome the problems of the current procedures and to evaluate the possibility of using the Nottingham Asphalt Tester (NAT) in the protocol.

- The proposed testing protocol was intended to correspond with the Superpave mix design process for sample preparation and to perform mechanical tests that simulate repeated traffic loading on a wet pavement typical of the field.

- Standard PG 58-28 asphalt binder and three types of aggregate were selected to verify the proposed test. Samples were prepared under Superpave volumetric mix procedures. Samples were divided into wet and dry groups and tested with the NAT.

- Results indicated that the failure of a specimen derives from a cohesive failure in the binder, not binder stripping failure of a specimen. Even though there was statistical difference between the dry and the different wet mixtures, there was no statistical difference within different saturation level mixtures due to samples being damaged through the vacuum pressure saturation before loading tests.

- Questions/Comments
    1. There were two types of coarse aggregate used, crushed limestone and gravel. What was the composition of the gravel; was it quartz? The gravel was made up of mixed silicates.
    2. It would have been helpful to provide a description of the gravel and photographs in the report.

- Rob Ettema moved to approve the proposal. Charles Marker seconded. Carried with 13 yes, 0 no, and 0 abstaining.

Presentation of Certificate of Appreciation – Lowell Greimann

- The IHRB presented a certificate of appreciation to Lowel Greimann for 12 years of dedicated service to the board ending with his retirement from the ISU faculty this last summer.

- Dr. Greimann served as an alternate for two years followed by 10 years as a full board member. His time on the board will be fondly remembered and his expertise sorely missed. The board wished him well on his future endeavors.

Review/Finalize RFPs for Second Solicitation for FY 2005-2006

Conduct a Synthesis of Past IHRB Projects

- It was decided that this could be accomplished with current staff and resources at the Iowa DOT, including the available web sites and libraries rather than funding a project through the board.

Examination of Curing Criteria for Cold-in-Place Recycling

- Mark Dunn, Iowa DOT, explained the background of this RFP. Cold-in-place recycling involves milling up the old hot mix asphalt (HMA) paving material, rejuvenating it with an emulsion and placing it back down as a base for future HMA overlay.

- The moisture content of the recycled layer is critical to its performance, but not well understood. Current practice calls for a period of time (10 to 14 days) for drying or a maximum moisture content of 1.5 percent before a surface layer can be placed. These criteria are probably too conservative. Often the exposed layer is subjected to traffic and weather for many weeks before paving, which risks damage.

- The purpose of this project is to explore ways to identify minimum properties of the recycled layer that would allow the surface course to be applied in a timely manner. A maturity curve type of concept (similar to the one used in PCC paving) should be one of the options considered.

Questions/Comments

- The board noted that there are three different methods for doing cold-in-place recycling: emulsion, foamed asphalt, and engineered.

- Question: Are the types of emulsions going to be limited? Answer: There will be three emulsions tested.

- Mark Dunn agreed to clarify the language to account for those.

Performance Evaluation of Concrete Pavement Granular Subbase

- Recycled PCC pavement has been used for subbase material for many reconstructed pavement sections, primarily on the interstate and primary systems in Iowa.

- The Materials office at the Iowa DOT is currently doing research on the laboratory properties of recycled PCC and effects on gradation requirements.

- The purpose of this research would be to do a forensic analysis of the performance of projects in the field that use recycled PCC as a subbase. The analysis would also compare the performance of recycled PCC with virgin aggregate.

- Question: How is this different from the paper we heard earlier with the analysis of rubblized pavement? Ans: The rubblized pavement is broken up in-place and compacted before paving. Recycled PCC is brought to a paving site in the same way that virgin granular subbase material would be brought, and placed in the same manner.

- Question: Are you just going to be comparing to the PMIS data at the state level, or are you going to look at the local roads too? Answer: We're aiming for a cross-section of roads from interstate to the local level.

- We don't have a funding level or time frame for this project.

- Comment: The only criteria listed here is permeability. There are more issues that can affect pavement performance than just permeability. Response: We're also looking at how the pavement is performing, such as with deflection testing. Also, there have been questions about how the recycled PCC is performing over time – issues like plugging of drains. Is that problem getting worse or better?

- Mark said that we can add language about testing stability.

- Question: Is the intent to look at existing locations? Answer: Yes. Since we had a significant specification change in 1992, there is a large cross-section of roadways out there that use various types of material including recycled PCC.

- Recommended funding levels were discussed.

- Question: Is this going to look at different gradations of material? We've used two gradations, one of which worked well and the other not. Answer: Since these are historical projects, the detailed gradation records may not be available.

- An estimated funding level of $150,000 and a two year time period were discussed and settled on. That would cover both the record research and field work.

- Mark Dunn will add language covering stability and gradation.

Field Evaluation of Timber Preservation Treatments for Iowa Highway Applications

- The objective of this research will be to evaluate the performance of different wood preservatives in the field and review current specifications and testing procedures and determine if they are sufficient to provide the level of timber treatment required for acceptable performance.

- Comment: There have been reports that some preservation methods/products could make timbers brittle or otherwise adversely affect timber properties.

- Comment: The proposals need to include a literature search of existing research, products and methods.

- Question: Is there a cost component to this research? Is cost an issue? Answer: Once the researchers have established performance differences, then costs can be evaluated.

Restoration of Borrow Land to Maximum Agricultural Productivity

- This one does not have a write up, pending discussion with the board on the scope and objectives for the research.

- There are several things you can do to borrow areas to help them recover faster. The only thing the state requires of the counties is topsoil removal and replacement. But you can do aeration and soil treatments prior to replacing topsoil. That will make recovery in one to two years compared to five or six.

- Lyle Brehm had originally submitted this topic and provided a significant amount of documentation for preparation of the RFP. This included such important points to consider as slope issues.

- Question: Would this be a research or a best practices type of project? Answer: It would be very helpful for the counties to have a best practices manual. It might need research to get to that point though.

- Question: Would the NRCS be a potential research entity for this kind of project? Answer: It's not limited - the NRCS, the agricultural college at ISU, one of the engineering colleges would all be candidates.

- Question: Would this extend to the areas of soil treatment, seeding, types of seed, etc.? Answer: Yes it would include all of those things - culminating in an effort to get the land back into useable form.

- Question: The current specs require saving the topsoil and replacing it. Would it be possible to modify both the topsoil that will be replaced and the less productive underlying subsoil to be more amenable to growing? That would represent the research portion of this – what modifications can be done to the soil. Also, the applications are going to have to look at the widely differing soil types in Iowa.

- Comment: Compaction issues (from earth moving equipment) are an important part of the problem.

- Question: Is this a real problem or is it more of a perception issue? Answer: It's a real problem. When soil is removed from a field (subsoil removed, topsoil removed and replaced), the crops in that area tend to be stunted for the next several years.

- Question: Do we want to include evaluation of whether or not a borrow area is back to at least the quality it was before construction? Answer: Best practices should help with that issue.

- Comment: Ultimately, this project should lead to enhancement of the current specification.

- Question: Are there any existing performance measures so that a before and after quality check could be made? Answer: The problem we're facing is that 20 years ago there was no requirement for replacing that topsoil. That meant that borrow areas didn't produce for many years.

- Mark Dunn will work with Lyle Brehm and Jon Ites to come up with a draft RFP for the board to review at the next meeting.

Pervious Pavement

- This project was postponed at a previous meeting and placed into the rankings process at a later date, so there is not the usual write up. At the time the board chose to delay participation in the project.

- Currently, CTRE has been working with several other entities outside of just Iowa (Minnesota DOT, National RediMix Concrete Association, FHWA, and the National PCC center) to develop a concept statement that was submitted to Mark Dunn just a few days ago. Mark will distribute this draft document to all of the IHRB members following this meeting. Then the board can decide at a later meeting whether or not to go ahead with a partnership on this project.

- Questions: Didn't we have concerns with the scope of the original project – they were talking about paving a parking lot and we were concerned about how that would apply to roads? Answer: One of several things they are trying to address in this document is looking at actual paving systems instead of a parking lot. They were trying to design a paving system but test it in a parking lot, and perhaps that was not explained very well. Hopefully we can bring concerns like that into the evaluation of the concept statement, so that the board will be able to make informed decisions about participation.

Development of a Local Agency Pavement Marking Plan

- This has been somewhat developed already at the state level. This project would be looking more at lower volume roads in cities and counties. Perhaps not just low volume roads in cities, but different kinds of applications than would be seen on the primary roads.

- Dr. Smadi and Neil Hawkins with CTRE have worked on the project at the state level. The board may want to decide if they want to do this project as an RFP or ask that group to expand on work they've already done for the DOT.

- Question: Are there any comments on that or ideas about how that could be approached? Answer: The testing of materials is very viable both on the state and county level. However there are not too many counties who have their own application equipment. So, once we get specifications on the best type of material to use, then its simply a contractor applied specification. So that part might not need to be expanded.

- Question: Do cities do their own pavement marking? Answers: Painting they do, but not the tape. Taping is 100 percent contracted out.

- Question: Apparently there are two general types of materials, basic and high performance. The difference in cost is quite significant. On the county level with low traffic volumes is there going to be enough to justify use of the high performance materials? And if their use is not justified, is it worthwhile to bother testing those materials at the county level? Answer: Maybe not based on traffic count; but if you could show durability adequate to make a two year replacement cycle into a four year replacement cycle it would be cost effective.

- Comment: What the cities are concerned about is turning movements which wear out pavement markings faster than anything on the highway.

- Comment: What some of the local agencies have experienced in turning areas is loss of the pavement markings in months rather than years. Then that area goes a year or more without pavement markings within the normal cycle.

- Is there a better way of doing that at critical locations rather than across the entire system? Or could we use the more durable and expensive product in those high-wear areas?

- Comment: Counties have more of a problem with snowplow damage than with turning damage.

- Comment: It doesn't make a good research project to test the materials. That's been done, as far as how long materials last. I'm looking for more of a criteria of time-frame and one material versus another based on traffic. The RFP in front of us talks about putting down test strips. We have 35,000 miles of test strips out there already. We know what happens to the different materials. I just want to have an idea of what circumstances are going to make it necessary to go with the higher performance material.

- There was a discussion about durability as measured by the retroreflectivity of the markings. Some concern was expressed about the need to include retroreflectivity as part of this research because that's already been tested and is being tested regularly currently.

- Comment: There are a lot of new materials that the DOT is experimenting with currently that have the promise of being durable (lasting more than one season) and yet are at reasonable cost compared to tapes and epoxy. Some of these might not work on high traffic roads, such as the primary system. But they could have promise for the medium to low traffic roads on the local systems. So, the idea would be not to test materials that are known and established; but to test materials that are just now becoming available that show promise. These might extend the life of the marking more on a local road than on a primary highway.

- Comment: Ultimately, this research would give guidelines to what pavement marking materials and methods would provide better longevity under the local conditions at a reasonable cost.

- The Offices of Traffic and Safety and Maintenance are currently sponsoring the test program for the primary road system with CTRE. This project would fit in well with that program.

- The board discussed a couple of approaches to taking on this project: (1) Ask for a presentation from CTRE to show what's being done and allow the board to decide if they want to fund this as an add-on to the research currently underway or send out a standard RFP. (2) Send out the standard RFP and give CTRE the opportunity to show in their proposal that this dovetails with current work.

- There was some concern expressed about the amount of money in the funding, $175,000. That appeared high for the amount of testing described, especially if this is adding on to research that is already underway. On the opposite side of the discussion, this is a three year study; so that cost spread over three years is not inappropriate.

- It was suggested that option (1) be followed to allow the board to be able to determine better what funding level would be appropriate. CTRE will be requested to provide that information along with a problem statement for a possible research project at the next meeting.

Demonstration of Iowa DOT Operations Research Website

- Ed Engle, Iowa DOT, presented a demonstration of the website. This included the steps used to look up past research projects done in Iowa and searching the Transportation Research Information System (TRIS) for transportation related research done world wide.

- The reports from research done in Iowa are listed both chronologically and by topic. There is not currently a good search function on the site, but we hope to have that remedied soon.

- From about 2003 onward, staff has received reports in electronic form, per the business plan. Prior to that, all of the reports were received in paper form. So while all of the recent reports are available online, the earlier ones have to be scanned in. These are being scanned and uploaded as time permits. With over 500 such reports this effort will take a significant amount of time.

- Hank Zalatel will be manning a booth at the Iowa County Engineers Association annual meeting in December where he will be demonstrating these technologies.

- For the research board specifically there are several items of interest. The minutes of meetings going back several years are available. These are updated immediately after they are approved by the board. Also, board membership, meeting dates, announcements and agendas are provided.

- It was asked if the programs that had been written with some of the recent research, drainage programs, spreadsheets etc. were available. Yes, they are located with the reports.

- It was asked if the board should invest some funds into helping with the web design process. Is there anyway to make the site more accessible? Should we look to LTAP or the Service Bureau to provide better access? Answer: We don't want to have to rely on outside entities to keep things updated. We want to keep this as the one-stop place for all of those research items. That way we can be sure that things are updated in a timely manner. The question is how can we streamline what we have to make it more accessible to people looking for information.

- The Research and Technology Bureau is in the process of setting up a web page that will access all of the transportation related research being done in Iowa. This will include the current IHRB page as well as Traffic and Safety research, Maintenance, Materials, and all the research that we as an agency oversee.

- How much effort would it take to include the research that the universities and others are doing in this same site? Couldn't the board fund a project that would expand our site to include all of those programs? Answer: It simply isn't feasible with staffing and time constraints to expand our site to cover all of those areas. And it doesn't make sense to duplicate what the global sources such as TRIS are doing so well. What we could do is clarify better how a person searches through these other methods.

Review of Recent IHRB Research Implementation
• Due to lack of time, this item was postponed to a future meeting.

New Business
• None

Charles Marker moved to adjourn the meeting. Jeff Krist seconded. Carried with 13 yes, 0 no, and 0 abstaining.

Date of Next Meeting: THE NEXT MEETING WILL BE HELD Thursday, December 8, 2005 AT 1:00 P.M. (Please note the different day and time) IN THE EAST/WEST MATERIALS CONFERENCE ROOM AT THE IOWA DOT, CENTRAL COMPLEX, IN AMES, IOWA.

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Mark Dunn, IHRB Secretary