

IOWA HIGHWAY RESEARCH BOARD

Minutes of February 25, 2000

Regular Board Members Present

J. George L. Greimann
R. Krauel T. Myers
C. Narotam D. Osipowicz
L. Smithson T. Stoner
W. Weiss J. Witt

Alternate Board Members Present

B. Belzer for M. Gardner W. Nixon for J. Odgaard
S. Andrie C. Marker
B. Younie J. Weber

With No Representation

D. Little

Visitors

Ed Engle Iowa Department of Transportation
Dave Heer Iowa Department of Transportation
Ian MacGillivray Iowa Department of Transportation
Norm McDonald Iowa Department of Transportation
Steve Gent Iowa Department of Transportation
Bob Stanley Iowa Department of Transportation
Saleem Baig Iowa Department of Transportation
Dave Claman Iowa Department of Transportation
LaDon Jones Iowa State University
F. Wayne Klaiber Iowa State University
David White Iowa State University
Terry Wipf Iowa State University
Ken Bergeson Iowa State University
Chuck Jahren Iowa State University
Doug Wood Iowa State University
Mahmoud Haljouy Iowa State University - CTRE
Omar Smadi Iowa State University - CTRE
Gordon Smith Iowa Concrete Paving Association
Brian Keierleber Buchanan County
Leo Donnelly Buchanan County
Lyle Brehm Tama County

The meeting was held at the large Materials Conference Room at the Iowa Department of Transportation, Ames, Iowa. The meeting was called to order at 10:00 A.M. by T. Myers.

Approval of the Minutes

T. Stoner made a motion to accept the minutes and L. Smithson seconded the motion. It was approved by the Board with 12 yes, 0 no and 0 abstaining.

Problem Statement

LaDon Jones of Iowa State University presented a problem statement entitled, "A Computer Program for the Hydraulic Design of Culverts." The available FHWA and commercial software is inadequate for culvert hydraulic design in Iowa. None of the available software incorporates Iowa methods for estimating the design discharge, a primary factor affecting culvert sizing. In addition, no software is available that includes Iowa DOT standard sizes for pipe and box culverts, Iowa DOT design methods for tapered and drop inlet, or Iowa DOT allowable headwater design criteria.

A computer program is needed that combines the data, methods and tasks required for Iowa DOT culvert design into a single, integrated, user-friendly, software package that contains the information and tools needed for hydraulic culvert design from start to finish. Such a program will be developed for the Iowa DOT Preliminary Bridge Section, under the direction of

Mr. Dave Claman, with input from county, city and consulting engineers.

The culvert program will be utilized by city and county engineers, the Iowa DOT staff and consultants for the design of culverts along the State's primary and secondary road system. The program will be a valuable tool for city and county engineers, the Iowa DOT and consulting engineers in Iowa.

The proposed funding is 50% Primary, 40% Secondary and 10% Street.

C. Narotam - Will you have any provision for the maintenance of the software or standard changes?

LaDon - Right now it is not in this budget, but it surely is something I would want to continue to do as part of the project, is adding new ideas to update the software.

T. Myers - Will this compliment or will this take some of the information Dr. Cable has put in his manual that is available?

LaDon - Which manual is that?

T. Myers - On storm water runoff and IDNR reference manual.

LaDon - I'm not familiar with that, but I can find out. I hadn't thought about that, but that is certainly something that could be implemented. I could talk to Jim Cable about that.

W. Nixon - You note at the end in implementation that this will be used by city and county engineers, Iowa DOT staff and consultants. Will you be providing the software free of charge to whoever wants it by the Internet?

LaDon - I believe so, the software will belong to the funding agency. I believe that is what would happen right now, anyone could download it for free.

D. Claman - That is correct. I think we would distribute it through CTRE and it would basically be available to anyone.

W. Nixon - Are there any liability concerns if somebody uses that and something goes wrong? If so, where does that end up.

LaDon - That is a good question. I don't know.

D. Claman - We put a disclaimer, "User Be Aware Always, Use at Your Discretion," whatever.

W. Nixon - How many people do you expect to use this in a given year? What is the market for this?

LaDon - I think it is hundreds of people, but I don't have a firm idea.

J. Witt - I'm pretty sure we would use it. The old FHWA/HY8 is a terrible program to use now. I can see in our applications that we would use this.

J. George made a motion to recommend the problem statement. J. Witt seconded the motion and it carried with 12 yes, 0 no and 0 abstaining.

Update on Research Proposal

I. MacGillivray gave an update on the research proposal entitled, "Development of an Automated Crack Measurement System for Iowa's Cities and Counties" by Dr. Lee of the University of Iowa. I understand there was some questions about how the Department handled the submission of a proposal that came from Dr. Lee of the U of I. I have to apologize to you for some of it. The less than 100 percent proper handling of it is my responsibility in doing.

First, I would like to give you some background on some activity that has gone on. What this amounts to is that work that Dr. Lee has proposed is work that has already been done and explored by the Department and by several other people. I have tried to get in touch with Dr. Lee this week and have left a phone message for him to get in touch with us to have further discussion. Let me tell you a little about what has been done.

First of all, the Texas DOT and the Iowa DOT, a number of years ago, began experimenting with the same type of technology, in fact, we did use high definition television and video capture with our so called videolog system to look at pavement

images and distress measurement, along with the Texas DOT which has been doing the same thing. Texas has been attempting to automate the translation of the images, that is the crack measurement, into an index system. About two years ago Texas DOT abandoned that effort in favor of something else. In addition, here are some copies of work being done in Minnesota at the Minnesota DOT of the same vehicle and same technology. It has been in operation a couple of years. In addition, several of you are aware of the fact that we currently contract for pavement condition, automated data collection for pavement management system, so a lot of counties and some cities are using. We do it through a company that provides us that inventory back. That company also has the capability of providing pretty much the same type of image and image translation. Perhaps the most important reason is after having initially looked into this technology several years ago and abandoning the video image approach, the Department for the last couple of years has been pursuing the use of an alternative technology which is laser based, instead of video, for the automated capture of this type of data. The information I'm circulating is two things, primarily what is attached to the cover memorandum which is the proposal was first given to us and then executed in 1998. In fact, we are only a few weeks from having the report for this work done by Phoenix Technology looking at using defense conversion technology called Close Surface Sensing Laser Technology being applied for the purpose of measuring cracks and patches on the road for the purpose of integrating it into pavement conditioning and distress measurement. With all of that in mind, our assessment was that there was nothing new or different or nothing that was a priority that we felt would advance any effort. None of this was reflected in the proposal to us which, unfortunately, had not been discussed or reviewed with our staff in advance to coming to the board. Frankly, that is probably my mistake for not catching that in the stage where the proposal first comes into us and we scan it and could have provided this type of information back to Dr. Lee. Instead, the proposal came to the board and it does have some inherent attraction because that is exactly what led us into this work in the first place. At this point, from the Department viewpoint, we have no interest until the rest of the work that has been under way is reported back and can be judged before we start pursuing alternative technologies that have already been investigated once.

T. Stoner - Based from input I have got from the east side of the state, I think Dr. Lee was pretty frustrated at the process. I don't know if it is so much the specific detail we are talking about in this program here or whether just the process itself.

I. MacGillivray - You are absolutely right Tom. We did not do the job that we should have on the follow up. It got off to a bad start because of me and my being absent at the time it got started. That is something I apologize for.

T. Stoner - It probably isn't fair to ask questions without Dr. Lee being here, but part of the problem statement usually at least involves a cursory review of existing research out and about. Are we saying that Dr. Lee just missed the Texas and Minnesota DOT research?

I. MacGillivray - That is what I would like to discuss with him, but based on review of the proposal, it appears to be a duplicate, particularly the Texas work even more than the Minnesota work and a duplicate of work we have done. Our work was not that documented. It was prototype experimental work with technologies. It was done probably about 1991, 1992 and finished in about 1994.

W. Nixon - That raises an interesting issue. You know one of the areas where there has been considerable advance over the last 10 years is in image process. It has been advancing, as a combination of advances in both computing power and also communications technology. To say we looked at something in 1994 and it didn't work and for that reason a proposal in 1999 or 2000 should be discarded, I find a little troubling because the technology is different today.

I. MacGillivray - What I was talking about was work we did in 1992. Texas abandoned that in favor of the laser technology last year. There are several states at work here. I believe Connecticut is also doing this. I guess I was a little troubled by the fact that there is a lot of practice in the field, none of which is included or summarized in the proposal.

W. Nixon - I'm not an expert in this area and I wouldn't claim to be, but my concern is that when you start a research project and you are following it down over a number of years, it is not always easy to bring in the most up-to-date technologies. I have played with lasers and they can be incredibly valuable in terms of monitoring, but there have also been substantial improvements in image analysis and image recording that I would hate to think we were judging a proposal on the basis of experience that is rooted five years ago, even two years ago, could be seriously out-of-date. You know if you have been in the market for a digital camera how the prices have come down and the capability has gone up. Those sorts of things may merit investigation. I can't speak for Dr. Lee, he is not here; he may have answers for these issues and I hope he will get an opportunity to discuss this and explain why he thinks his idea isn't old technology.

I. MacGillivray - We have invited him to come and visit with us about and also as I have indicated, we are very close to having our laser project finished and recorded. We would like to have that available to also assist in the evaluation. At this point, we were unwilling to support proceeding with what looked like the duplicate of past work and also from prior investigation looked like less productive than the laser based technology. That is a part of the type of review of proposals that I think we want to be making and is something that we have already invested substantial funds in. There is no way for Dr. Lee to know that without having had some prior communication with us and that is a part of where the process broke down. It would have been nice to have him come in here, but it would have been even better for us to close the loop with him.

J. George - I was under the impression that at least part of CTRE's methodology was using some video cameras to collect some data. Are you saying that this is strictly laser based collection?

I. MacGillivray - I'm not sure what you are referring to with CTRE. This is involving a company in Phoenix, Arizona.

J. George - CTRE, I guess, has supported it with work with the consultant. I came up and took a look at the consultant's equipment.

I. MacGillivray - You are talking about our pavement management data collection. That is not associated with this. That is another one of the technologies that is being applied and the vendor of that, I can't remember the name of the company, the vehicle is called the ARAN vehicle. That vehicle does have some of the same technology available to it. Right now it is not using Algorithm based translation of video images, it uses a professional, manual interpretation of video images, which I think is the most interesting part of Dr. Lee's proposal which is to automate the video interpretation. But no, that is not a part of what we are doing for the Iowa Pavement Management System. The work I'm talking about was not associated with that.

J. George - But that ARAN system is what is being run on the county roads.

I. MacGillivray - The ARAN system is what is being run on the county roads as well as DOT routes.

T. Myers - I think that is what the board was worried about last time Ian, is that we as the state government and city/county are using this same kind of technology at a higher expense where Dr. Lee's was the same type of technology that we are still using today, only a lot cheaper than even a county or city might incorporate in a program without hiring it out there. I think that was the concern of the board was competition between different state agencies, but the technology is there and the cost effectiveness of that technology I think was an issue that we discussed last time.

I. MacGillivray - I understand that perception. The Texas effort is one that has endeavored and to some extent has succeeded in automating the video interpretation of crack and patch, which is what the key component of Dr. Lee's approach is. This is the technology that they have abandoned in favor of going to the laser at this point and why we are waiting for that report to help us with that next level of evaluation, which we also expect to be even less expensive. You are absolutely right, the manual interpretation is a very time consuming and expensive alternative use of the technology. I am not suggesting to you that the door is closed, I'm suggesting to you that we don't have all the information that is necessary before making a decision to proceed with something that we think has been evaluated once and that we are pursuing alternatives to. They need to be concluded before proceeding.

L. Greimann - I don't know all the technical merits of this, but I was uncomfortable about the exchange and the way it happened with Dr. Lee. For lots of reasons I suppose, he was not probably made aware of the process, maybe he didn't take the time to find out about the process, I'm not sure we, this group, were fair/kind, I just felt uncomfortable with that whole thing. The other thing, looking ahead, I don't know this person, but I had the sense

he probably knows something. There is probably a way we can take advantage of this, of his expertise, being in the state of Iowa in this area. Maybe it is more oriented toward county applications, but I hope we can somehow take advantage of this expertise in a positive sense.

I. MacGillivray - That is why I have invited him to come and meet with our staff. He can look at what we are doing as well as where we might be going.

T. Myers - The feeling that I received is that the board members are in favor of Dr. Lee having the opportunity to visit with the DOT and come back with a final summary of those activities so we can make a determination of what the board wants to pursue at that time. Is that agreeable to the board members?

T. Stoner - I sure want to see Dr. Lee back here again. I hope he is comfortable coming back here again. I would understand if he wouldn't be. I want to go back and correct the record, he presented a problem statement, not a proposal. I want to go along with what Lowell Greimann says, I think it does make a lot of sense, if he has this knowledge. He seemed extremely articulate when he was speaking to us; he knew exactly what he was talking about even when he was under attack. I think there may be some education on both sides. He may be able to walk in and enlighten your staff as to what may be out there that you don't know about. I thought this was a leaner/meaner pavement management logging system and now I guess I'm finding out that is not what we were looking at or maybe it was and a few of us were looking at, but I think we are all excited about the idea of going out to Best Buy and buying our camera and buying a \$1,000 of software and there we go. The alternative is an awful expensive alternative. Anyway, I hope Dr. Lee will visit with your staff and I hope he comes back to see us again. He is very welcome back here. I hope we can draw some information from him that we can use on down the road. We really want to see him back here.

I. MacGillivray - Perhaps with Dr. Nixon's assistance we can encourage him to come in and spend some time with us.

W. Nixon - He is very keen to work with the board and the DOT. It makes sense, he is in the area of transportation. He would be foolish not to. He is confused, I think, at the moment because of what has happened. He had a process explained to him and the first time he tried to follow it, the process changed in midstream. He, I'm sure, will need some reassurance in that regard as to whether the process really does work. I think having him come over and visit the DOT folks will be very fruitful and I hope that there are many opportunities, not just in this area, but in others for him to work with the DOT and with the board. We will try to draw a breath and start over.

W. Weiss - I guess I haven't reviewed the business plan, being new to this process. It seems to me as though I'm kind of getting from this that Ian has sole preapproval of the proposals and the agenda. I guess I don't understand. Last meeting I was told Dr. Lee's research proposal would be on the agenda this meeting; Dr. Lee would be back and that did not happen. It seems to me as though the DOT is going to approve what comes into

this board for approval and then we are just sitting here voting unanimously. That is somewhat concerning to me, maybe you can address that Ian and how that process works, if that is the business plan, I don't know if I need to attend here.

I. MacGillivray - That certainly is not the business plan. A part of what we think our responsibility is, is to do some preliminary screening and identify things such as is it genuinely new work and/or are there competing things like this being done. It is a part of what needs to be shared with the board. We don't want to be reinventing the wheel or be investing in the same thing the state of Missouri is investing in or anything else. As I said, while we had some information, we did a very poor job, my fault, I'm the guy that is responsible for that poor job being done in getting that type of screening done which should have happened at the first stage submission so that the first stage submission would have been revised. As we are talking here, if there is still a target that is not yet addressed and/or should have been recycled with the researcher, which we as researchers or administrators would also be telling him, "I'm sorry but it may be new to you, but we have a product out here that looks like it does do the job and you need to show us what is different about it before we can consider it." That type of screening does go on with an awful lot of projects. Now the majority of projects when we do that type of review, we find there is no evidence of work being done or anything else, but that type of staff work is done. That is expected to be done, mostly by researchers, but we have a little knowledge as well about a few things that go on.

W. Weiss - Do I have that same opportunity? So if I would call Mark and say, "I'm not comfortable with this proposal, I do not want it included on the agenda," then it would not be included on the agenda?

I. MacGillivray - I can't answer that. I don't think Mark would do that. I think it would have to be discussed by the board.

W. Weiss - That is my whole point. Why aren't we discussing this? If you want to discuss it, if you have problems with it, it can be discussed here, true?

W. Weiss - You are saying it should be discussed with the DOT prior, not giving me a chance to adjust the agenda.

T. Myers - This was discussed at the last board meeting. Do the cities and the counties have the same authority as the DOT? Wade is just bringing that up.

W. Weiss - In the future though, future proposals, if I have questions with the merit or anything I can use my expertise on, am I afforded the same opportunity?

L. Greimann - It would be another mistake, that is my personal opinion.

W. Weiss - Ok. So we are continuing the mistake, I think having Dr. Lee come in and talk to the DOT and not talk to the board, you know, I don't know how that works, but...

I. MacGillivray - Wade, what we like to do with researchers who develop proposals is to work with them to help develop the best proposal to come to the board. We have the opportunity to do that with the majority who come and talk to us before they finalize proposals. That is what we were attempting to do. I don't think we went about it quite the right way. Part of that was my mistake in terms of timing, among other things. It just got too far going the wrong direction, missing information that should have been there and didn't get handled as well as it could have.

T. Stoner - Wade and I discussed this a little on the phone and I think I'm getting a better feel of what happen here. What I think our concern on this side of the table is, that the DOT or whatever member of the staff or whoever it might be seems to have exercised a veto authority over a unanimous board decision two months ago. I think what I understand now with the process that there was an error that it ever got that far in the first place. I have no problem with DOT staff and other experts in the DOT or wherever reviewing proposals and if they identify an absolute duplication of effort, then tell the researcher if we have been down this road either we had success or didn't, but need not proceed, but that somehow got short circuited. The discomfort that we have is that the board took some action, however flawed the action may have been, and now we have a problem statement that has been approved and somehow vetoed and that made us very uncomfortable. Like Wade said, if that is going to happen then we have other things to do, other places to be. Maybe it was just a miscommunication/misunderstanding. I hope that it doesn't happen again because Dr. Lee was caught in the middle of this one.

I. MacGillivray - The way you characterize what happened on the front side is correct. I would anticipate as we work with Dr. Lee we may or may not have something that would come back to the board. There would be a report back to you that we mutually concluded that there is nothing to bring back. Dr. Lee is not going to want to do that any more than anyone else or we are going to help him identify what it is that responds to the concerns that were raised that should have been raised before the first stage even made it here.

T. Stoner - We do have a problem statement that is approved. Where is it?

I. MacGillivray - It should come back to the board for either adoption or termination. That still needs to happen. We just messed up the process. I'm the guy that did it.

D. Osipowicz - Are you saying we will either approve or reject the problem statement again or the proposal?

I. MacGillivray - The final stage submission.

D. Osipowicz - So you are saying a proposal.

I. MacGillivray - Yes. Or if the conclusion is and shared with Dr. Lee, it may get withdrawn, I don't know. That is an outcome too. Frankly, he was handicapped by not having information that is not readily available because of how a lot of states operate. A lot of that stuff is not published and readily available until well after the work is

completed and/or abandoned. That is a part of what we have the opportunity and the job to contribute to some of this process as well. We messed up, no we didn't, Ian did.

Problem Statement

F. Wayne Klaiber of Iowa State University presented a problem statement entitled, "Demonstration Project Using Railroad Flat Cars for Low Volume Road Bridges." The primary objective of this research is to design and construct two bridges (one long span and one short span) using railroad flat cars. The bridges will be instrumented and field load tested after construction is complete, and they will be inspected and load tested periodically. The bridge design and construction will be documented (photographs, videotape, etc.) So that other interested counties can obtain information on their use.

The research team for this proposal recognizes the importance of developing ways to assist county engineers in efficiently utilizing their limited resources to deal with bridge problems. The results of this proposed research has the potential to provide guidelines on the use of railroad flat cars for replacing deficient bridges in a cost effective manner.

Proposed funding is 100% Secondary.

J. George - I will be real interested in what you come up with for what should be required for the guardrails that you put on.

B. Belzer - Were you looking at a possible wood deck on one of these and would it be the longer one or the shorter one?

F. Klaiber - I think we have to run some numbers. The one we tested in Tama County for Bob Gumbert if I remember correctly was approaching 40 ft. and it had timber and we were getting great lateral load distribution. We did tie them together with steel plates. We had it all ready to go so we could do it very quickly. It essentially made no difference.

B. Belzer - I notice when we get up around 50-60 ft. with wood decks, we start having a lot of maintenance problems.

F. Klaiber - Due to the flexing?

B. Belzer - Yes.

W. Nixon - Do you have an idea how many bridges in Iowa might be suitable for this?

F. Klaiber - It would be a guess on my part, but I would say in the low hundreds.

W. Nixon - If you put in one of these as opposed to a "standard" type of bridge, how much would you expect to save on installation as a percentage of the cost you might pay?

F. Klaiber - I think it is considerably less than half price.

W. Nixon - On a typical installation, how many dollars does that come to?

F. Klaiber - The railroad cars are about \$9,000 for a reputable one. So if you want three wide you have about \$27,000.

W. Nixon - So you might be saving \$30,000 to \$50,000 on a typical installation?

F. Klaiber - I would say \$50,000 on up.

C. Marker - What is the availability of railroad cars?

F. Klaiber - It varies, but you place your order at the company in Kansas City, Missouri and they will guarantee it within a couple months time.

D. Osipowicz made a motion to recommend the problem statement.. T. Stoner seconded the motion and it carried with 12 yes, 0 no and 0 abstaining.

Problem Statement

Terry Wipf of Iowa State University presented a problem statement entitled, "Development of Bridge Load Testing Program for Bridge Load Rating." The objective of this proposed study is to investigate and develop a load testing system for rating bridges on the highway system in Iowa. This proposed study is an initial phase in the development of the system, which will develop the long-term capabilities for establishing bridge ratings by load testing.

The primary value of the proposed research is the development of a load test program for rating bridges. Bridge rating by load testing has been proven to be a valuable tool for accurately determining safe load capacity for bridges. This tool can also be used where required to help with super load permitting and other situations.

Proposed funding is 65% Primary, 30% Secondary and 5% Street.

T. Stoner - What type of bridge do you envision using for this study?

T. Wipf - Slab bridge, steel girder bridge, concrete girder bridge.

T. Stoner - What I fear here is you are going to have a lot of data or information on a particular configuration and then if I say can I translate that to a different type, you are going to say no, I gotta come back to the Research Board for a steel beam rather than a slab, rather than a girder or whatever. Is that probably accurate?

T. Wipf - Yes. I can't test a steel girder bridge and get a data base of 5 or 6 of those and extrapolate and tell you anything about a slab bridge. I think with building up a data base of testing of a common bridge type, I think that we will be more comfortable being able to translate what we learn here in this group of bridges to a similar type of bridge. No, I can't test slab bridges and tell you what a truss is going to do for sure.

D. Osipowicz - You are basically going out and doing testing for a specific bridge to get a rating for that bridge only.

T. Wipf - That is the primary objective, but I want to get more information to study things a bit deeper. I want to look at some behavioral issues that may help down the road with extrapolating from one bridge to another bridge of a similar type. In general, that is what the system is great for, one bridge going out quickly and doing an evaluation on it.

T. Myers - The software purchase that you are looking at buying, is that going to be available to the counties and cities and other agencies.

T. Wipf - The whole system capability and so forth would be available. I don't know how much use you could make of it. I think this piece of software is best used by someone who has time to sit and learn to use and get comfortable with it.

B. Belzer - Some things I would be interested in would not only be the 100 ft. slab grades but the 100 ft. slabs that are 5 years old versus 25 years old. We see our decks deteriorating, what does that mean to it as well. Not only can we extrapolate between sizes but between years and age as well. County wise there are a lot of old Iowa State Standards H-15 bridges out there. A lot of these steel I-beams, 30 to 50 ft. long, have channels on the outside and so we end up posting them due to the channel with the insides encased in concrete, can we do something with that? The thing that I would be cautious about would be the dead load that is already in it that we don't know about and secondly, when finding when we are testing that we are getting some composite action which maybe we should not assume, that might take us into an area we shouldn't be.....

T. Wipf - That is a good observation. All your points are well taken. The last one though in the evaluation process you can measure the composite action if it exists. Then when you make your final decision about what I think is a safe load, you have to ask yourself do I count it. It is nice to know it is there and then you make the decision. That is what I was talking about developing some policies and so forth with this overall procedure.

L. Smithson made a motion to recommend the problem statement. C. Narotam seconded the motion and it carried with 12 yes, 0 no and 0 abstaining.

Problem Statement

The problem statement entitled, "Guidance on the Implementation of GASB 34 by Iowa Local Governments" was deleted from the agenda.

Research Proposal

K. Bergeson of Iowa State University presented a research proposal for TR-401, "Embankment Quality - Phase III." This research project has one primary objective and two secondary objectives.

The primary objective is to design and construct a project using the recommended design specifications and construction guidelines. The intent is to 1) field test and refine the proposed

soil classification system and construction specifications and 2) evaluate the feasibility of implementing a Contractor Quality Control (CQC) and an Iowa DOT Quality Assurance (QA) program in the future.

The two secondary objectives are as follows: The results from the test project will be evaluated to determine how the soil classification system and construction specification could be used by Iowa counties and cities for subgrade evaluation. Tentative local system guidelines will be proposed. The Resilient Modulus of project soils will be estimated from correlations with the DCP index test values during the construction phase of the project. This information will be compiled as a first step in the development of a Resilient Modulus data base of Iowa soils for future use in mechanistic pavement design.

The results of the research and pilot project design and construction feasibility evaluation will be used as a basis for developing proposed statewide specification changes.

The proposed research period is from February 1, 2000 to January 31, 2001. The project cost is estimated to be \$89,225. The proposed funding is 83% Primary, 10% Secondary and 7% Street.

T. Myers - Have you considered talking to the Corps. of Engineers? They use those correlations quite regularly.

K. Bergeson - Yes. In fact almost all the correlations have been developed from the Corps. of Engineers. We have all their reports from the core data.

R. Krauel - Do you expect this work to continue through to yield an operator certification training program?

K. Bergeson - Yes.

R. Krauel - Is the Iowa DOT pretty much bought into the fact that they may change the specification to incorporate the results of your work as opposed to what I think is roller walkout now?

K. Bergeson - Yes they have. That is the steering committee that has been heavily involved in this, Construction Office people, etc. The Iowa DOT is supportive of moving toward a Contractor Quality Control with a certification program. That program would be available to city and county people also. That is the materials we would be developing based on the results of this project.

R. Krauel made a motion to recommend the research proposal. C. Narotam seconded the motion and it carried with 12 yes, 0 no and 0 abstaining.

Final Report

K. Bergeson of Iowa State University presented a final report on TR-425, "Reclaimed Fly Ash as Select Fill Under PCC Pavement." With the support of the Iowa Fly Ash Affiliates, research on reclaimed fly ash for use as a construction material has been ongoing since 1991. The material exhibits engineering properties similar to those of soft limestone or sandstone and a lightweight aggregate. It is unique in that it is rich in calcium, silica, and aluminum and exhibits pozzolanic properties (i.e., gains strength over time) when used untreated or when a calcium activator is added. Reclaimed Class C fly ashes have been successfully used as a base material on a variety of construction projects in southern and western Iowa. A pavement design guide has been developed with the support of the Iowa Fly Ash Affiliates.

Soils in Iowa generally rate fair to poor as subgrade soils for paving projects. This is especially true in the southern quarter of the state and for many areas of eastern and western Iowa. Many of the soil types encountered for highway projects are unsuitable soils under the current Iowa DOT specifications. The bulk of the remaining soils are Class 10 soils. Select soils for use directly under the pavement are often difficult to find on a project, and in many instances are economically unavailable. This was the case for a 4.43 mile grading and paving project in Wapello County. The project begins at the Alliant Utilities generating station in Chillicothe, Iowa and runs west to the Monroe-Wapello County line. This road carries a significant amount of truck traffic hauling coal from the generating station to the Cargill corn processing plant in Eddyville, Iowa. The proposed 1-inch Portland Cement Concrete (PCC) pavement was for construction directly on a Class 10 soil subgrade, which is not a desirable condition if other alternatives are available.

Construction of about three miles of the project was accomplished using 10 inches of reclaimed fly ash as a select fill beneath the PCC slab. The remaining mile was constructed according to the original design to be used as a control section for performance monitoring. This report represents the results of design considerations and laboratory and field testing results during construction. Recommendations for use of reclaimed fly ash as a select fill are also presented.

R. Krauel - Did you generate any cost data on the tradeoff between transporting this fly ash miles from a generating station to a site?

K. Bergeson - We did when we started out on the project. There was a significant amount of cost saving. The reason is the reclaimed ash is about \$3-4 a ton. This Class A road surfacing that we were putting down there I believe was \$12 a ton, something like that. Reducing that temporary surfacing thickness from 8" down to 3" saved a ton of money and reducing the shoulder surfacing stone saved a ton of money and reducing the thickness of the concrete. There was a significant amount of cost savings there. Practical haul distance from the power plant is about 40 miles. You get out over that, you can't compete usually, haul cost eats you up.

W. Weiss made a motion to accept the final report. R. Krauel seconded the motion and it carried by the board with 11 yes, 0 no and 0 abstaining.

Final Report

Final report TR-423, "A Commemorative History of the Iowa Highway Research Board (IHRB) was presented in draft form at the December board meeting. The board had no changes in the draft form. We will be making a major distribution of the book with publicity. It will probably be during May, maybe even target it for National Transportation Week. I haven't finalized the plans for it. We would like to see it recognized by the legislature, to some of the national publications. It is a real quality report with a good story. It is to honor the 50th anniversary of the IHRB and show what has been accomplished and what great things have been done here.

W. Nixon made a motion to accept the final report. R. Krauel seconded the motion and it carried with 10 yes, 0 no and 0 abstaining.

New Business

M. Dunn passed out information for next months business plan meeting. Next month we will start initial brainstorming on topics that we would like to see come into the board. I. MacGillivray offered to furnish a working lunch with the meeting if it was felt it was needed.

Date of Next Meeting

DATE OF THE NEXT MEETING WILL BE MARCH 31, 2000 AT 10:00 AM, IN THE LARGE MATERIALS CONFERENCE ROOM AT THE IOWA DOT.

Mark Dunn, Secretary