IOWA HIGHWAY RESEARCH BOARD (IHRB)

Minutes of March 30, 2018

Regular Board Members Present

A. Abu-Hawash
K. Jones
T. Nicholson
S. Okerlund
R. Knoche
P. Hanley
W. Weiss
P. Geilenfeldt III
J. Thorius
M. Parizek

Alternate Board Members Present

B. Billings
D. Harness

Members with No Representation

L. Bjerke
B. Skinner

Secretary – V. Goetz

Visitors

Tammy Bailey	Iowa Department of Transportation
Brian Worrel	Iowa Department of Transportation
Nicole Fox	Iowa Department of Transportation
Daniel Harness	Iowa Department of Transportation
Francis Todey	Iowa Department of Transportation
Danny Waid	Iowa County Engineers Association
Khyle Clute	InTrans/Iowa State University
Ashley Buss	InTrans/Iowa State University
David White	InTrans/Iowa State University
Sunghwan Kim	InTrans/Iowa State University
John Shaw	InTrans/Iowa State University
Halil Ceylan	InTrans/Iowa State University
Michael Perez	InTrans/Iowa State University
Yang Zhang	Iowa State University
Shuo Yang	Iowa State University
Junxing Zheng	Iowa State University
Gordon Smith	Concrete Pavement Technology Center
Steven Tritsch	Concrete Pavement Technology Center
Asghar Bhatti	University of Iowa
George Constantinescu	University of Iowa

Brian Moore	Wapello County
Andrew McGuire	Keokuk County
Greg Mulder	Iowa Concrete Paving Association
Katelyn Freeseman	Bridge Engineering Center
John Thomas	Hungry Canyons Alliance

The meeting was held at the Iowa Department of Transportation Ames Complex, Materials East/West Conference Room, on Friday, March 30, 2018. The meeting was called to order at 9:00 a.m. by Chair Wade Weiss with an initial number of 12 voting members/alternates at the table.

1. Agenda review/modification

Motion to Approve by R. Knoche; 2nd B. Billings
Motion carried with 12 Aye, 0 Nay, 0 Abstaining

2. Minutes Approval from the December 2017 and February 2018 Meetings

Motion to Approve December 2017 by M. Parizek; 2nd K. Jones
Motion carried with 12 Aye, 0 Nay, 0 Abstaining

Motion to Approve February 2018 by M. Parizek; 2nd R. Knoche
Motion carried with 12 Aye, 0 Nay, 0 Abstaining

3. Final Report – *TR-671, "Performance Monitoring of Boone County Expo Pavement Sections: Phase III"*, David White, Iowa State University, $10,968, (15 min).

Background

Subgrade soils in Iowa generally rate from fair to poor with the majority of soils classifying as A-4 to A-7-6. These soils can exhibit low bearing strength, high volumetric instability, and freeze/thaw durability problems. Stabilization offers opportunities to improve these soil conditions. One of the objectives of this study is to investigate the use of different stabilization methods in subgrade and subbase layers to optimize pavement foundation design by measuring in situ engineering properties over time with a special focus on freeze/thaw performance.

Objectives

The primary research objectives for the Phase I project were to:

- conduct full-scale field studies to assess pavement foundation compaction using intelligent compaction and high energy impact compaction technology,
- build full-scale field test sections consisting of geosynthetics, chemical stabilizers, and recycling of existing materials that will allow long-term performance monitoring,
- develop recommendations with respect to conducting the Phase II pavement studies to demonstrate various pavement technologies.

• develop local experience with stiffness based quality assurance (QA) and quality control (QC) measurement technologies to assist with near-term implementation; and
• increase the range of stabilization technologies to be considered for future pavement foundation design to optimize the pavement system;

The primary research objectives for the Phase III monitoring project were to monitor:

- Seasonal changes (within a year and over time) in foundation layer support conditions,
- Seasonal changes (within a year and over time) in subbase layer permeability,
- Seasonal temperature changes in foundation layers (document number of F/T cycles),
- Seasonal changes in in-ground stresses under loading,
- Surface layer distresses over time (crack mapping and elevation changes),
- Moisture changes in subbase and subgrade layers seasonally and over time,
- Micro-mechanical changes in stabilized subgrade over time,
- Seasonal water table changes
- Loss of support/erosion, and
- Weather information monitoring

Benefits

In this study, pavement and foundation temperatures were recorded at three locations in central Iowa. Air and surface temperatures were used to estimate the seasonal frost penetrations in accordance with three simplified empirical models and the modified Berggren equations applied in PCASE. The estimated results were compared to in situ measurements to evaluate the accuracy of these models. Based on the study findings, the following conclusions have been drawn:

• From field measurements, the maximum frost penetration at central Iowa reached 145 cm. However, during the same winter, locations showed differences between maximum frost penetrations despite the close distance between tested sites. Different pavement types and foundation conditions influenced the measured frost penetration depths;
• Frost penetration depth estimates with the three simplified empirical equations did not match well the measured frost penetration depths;
• The modified Berggren equation used in PCASE can predict frost penetration in multi-layer pavements based on freezing index and soil properties. Using default values for soil properties in PCASE resulted in about 20% underestimation of the frost penetration depths;
• When using tested values for moisture contents and dry unit weights, calculations with the modified Berggren equation in PCASE provided more accurate results of predicted frost penetrations than using default soil properties values. However, the n-factor was found to have a significant influence on the accuracy of estimations, although it is difficult to determine the precise value of n at every specific location. Empirical values of n-factor may not be broadly applicable to each site;
• Stabilization and drainage systems utilized in foundation layers may have affected the frost penetration estimations. The possible causes may be that stabilization and drainage led to changes in soil densities, pore conditions, and water contents.

Motion to Approve by K. Jones; 2nd S. Okerlund
Motion carried with 12 Aye, 0 Nay, 0 Abstaining

Discussion
Q. Who is going to put information together for implementation, would this be something we would ask the researcher to do for the proposal?
A. Depends what we are doing for implementation. If it is more piloting the technology with more field demonstrations, that is a different discussion.

Q. Have we seen anything that came out of this project that we would implement or in our specifications or not?
A. This is such a massive project with so many different technologies that you could spend a whole day. Maybe the best way is to look at a workshop where we spend a whole day talking about the technology we would use with different consultants. When you see the final report and tech briefs that have been published, there is one for each technology with sixteen different test sections. There are two or three years' worth of data so the workshop would be one way to get the word out rather than letting people decide by themselves what they want to implement and try.

Q. If the AID funding came through, could some of the testing be done on this site?
A. The AID funding is for testing in construction projects.

Q. If there was interest in doing a workshop, how would we get a workshop started?
A. The best way to get a workshop started would be to target locals and we would partner with LTAP to put this together. Getting a representative group to talk about it what would be the best way. If we host it here, we could go to the Boone site. V. Goetz can get this started if this is what the board would like.

Q. Did the project in Hamilton County come out of this project?
A. No. The Hamilton County project was a demonstration project of the first phase literature review of technology to use for improvement of granular surface roads.

J. Thorius stated that we should consider phase four of the Boone County Expo project with how it performed under traffic loading. It has performed well, but it's not the real world in terms of traffic experiences where you know how it's going to perform and last with these improvements. This might need ironed out as we start to disseminate this technology because it looks good but we're unsure if it will hold up to the traffic loading.

V. Goetz stated that there is not a good way to say the performance can show that it works for the cost. Some of these treatments are expensive to put down initially.

A. Abu-Hawash stated that we did this for a reason, trying to learn types of different treatments and associated cost. There should be some value that will come out of this.

V. Goetz stated that this will be a good question for DOT's pavement section as well. Part of the intent for this project was learn how the performance of sub-material changes the pavement design. This relates to MEPDG.D. White touched on part of our STIC implementation project we are trying the automatic plate load testing (APLT) in several projects to look at the foundation and value the APLT so we can start getting better values to use on our MEPDG type of design. Currently on FHWA's desk we have our one-million-dollar AID grant request to do more of a state-wide look at automated plate load

testing and validated intelligent compaction. These projects are related to the technology that we used in Boone County. Maybe phase four makes sense to move forward as another way to get the word out about the technology and results we have so far and let the practitioners make the decision of what product they are willing to try and what opportunities there are to gather more data on actual projects besides the expo site.

J. Thorius stated the workshop was something to talk about and get people interested in. There are things he is willing to try not knowing how long it's going to last and things that he would not want to try unless he had an idea that it was going to last given their cost. Do we get the information out there, yes, and at the same time start phase four of testing to see if will last through traffic and loading? This might draw interest with other Counties.

K. Jones stated that the workshop may be of more interest. People have different interests and opinions on which ones are worth their time. The workshop could be in conjunction of the APLT testing.

V. Goetz stated if we go the route of a phase four and researchers are at the Boone Expo site testing, there would be something to go see for the people attending the workshop.

V. Goetz stated that she will contact Boone County to see how willing they are to participate in phase four with follow up testing and have a discussion with LTAP on the best way to go about promoting potential workshops.

4. **Final Report – *TR-683, "Use of Ultra-High-Performance Concrete for Bridge Deck Overlays",*** Sri Sritharam, Iowa State University, $10,968, (15 min)

Background

The most common bridge deterioration begins with cracking in the deck followed by water and chloride infiltration into the concrete core and corrosion damage to the reinforcement of the deck. Further damage to the bridge deck occurs due to freeze-thaw cycles, exposure to deicing salts, and dynamic loads from vehicular traffic and plow trucks. Cracking on bridge decks is common and bridge deck deterioration is a leading cause of structurally obsolete or deficient inspection ratings.

One innovative and conceptually simple solution developed at Iowa State University to combat this problem involves overlaying a thin layer of highly durable ultra-high-performance concrete (UHPC) integrally at the top of the normal concrete (NC) deck.

Objectives

- Evaluate a new UHPC mix design that will allow bridge deck overlays to be completed with appropriate crowning
- Demonstrate the applicability of the new UHPC mix by performing a deck overlay on an existing bridge
- Evaluate the performance of the UHPC overlay
- Evaluate the benefits of using UHPC overlays through experimental testing
- Conduct workshops on new UHPC overlay technology

Benefits
The new UHPC mix developed by LafargeHolcim was found to be suitable for use in bridge deck overlay projects and was found to be appropriate for crowning and for placement on sloping deck surfaces. No concerns have been identified for the top surface nor the interface bond between the old concrete deck and the UHPC overlay, suggesting that the surface preparation adopted for Mud Creek Bridge was satisfactory.

Due to its high tensile strength and low permeability, a UHPC overlay can improve the performance of a bridge deck by providing resistance against moisture penetration and chloride ingress. With the developed overlay technology, UHPC can be applied as a thin layer on top of a concrete deck with a roughened surface, making it an attractive solution for bridge rehabilitation and new bridge construction.

Motion to Approve by M. Parizek; 2nd R. Knoche
Motion carried with 12 Aye, 0 Nay, 0 Abstaining

5. **Final Report-*TR-687, "Effect of Wind Induced Unsteady Vortex Shedding, Diurnal Temperature Changes, and Transit Conditions on Truss Structures Supporting Large Highway Signs"*,** George Constantinescu, University of Iowa, $206,333, (15 min)

Background
Overhead truss structures are typically employed to support dynamic message sign (DMS) cabinets allowing a wide display over more lanes. DMS cabinets are much heavier than typical highway signs. The current American Association of State Highway and Transportation Officials *LRFD Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals* (AASHTO 2015), which is the main document used for design of sign support structures by state DOTs in the US, does not give clear guidance for estimating wind loads in these situations. This increases the uncertainty in estimating stresses induced in the members of the truss structure supporting the DMS cabinet. Having a detailed understanding of stresses caused during the service life of the trusses supporting DMS cabinets is crucial for their safe and economical design. In recent years, there is increasing evidence that the truss structures supporting a variety of large and heavy signs are subjected to much more complex loadings than those typically accounted for in the codified design procedures. Consequently, some of these structures have required frequent inspections, retrofitting, and even premature replacement. To reliably predict the behavior of these structures, and to design them properly, detailed knowledge of the wind forces acting on the signs and the truss members is obviously necessary. Besides wind loading, the highway sign structures may be subjected to fatigue induced by stresses caused during the transport of trusses to the site and those caused by large diurnal temperature variations.

Objectives
The first objective of this study is to accurately estimate unsteady wind loads acting on the DMS cabinets and other traffic signs and on the members of the truss structures supporting these signs. The cyclic oscillations of the total wind load associated with vortex shedding behind traffic signs may be a main contributor to premature fatigue failure. This is because these cyclic oscillations, that occur even

under steady incoming wind conditions, can create a resonance condition. The second objective is to investigate possible fatigue failure due to vibrations during transportation from fabricator to the site where the truss and DMS cabinet will be deployed. The third objective is to investigate diurnal temperature effects on the fatigue life of structures.

Benefits

A significant finding of this study is that AASHTO 2015 underestimates the wind drag coefficient for signs by as much as 25%. At the same time, the CFD results show that the *Minimum Design Loads for Buildings and Other Structures* recommendations for the design of aluminum sign structures is too conservative. The other main contribution of Part I is to propose a relatively simple procedure to estimate drag forces on the members of the support structure (e.g., truss). The current procedures to estimate wind loads on the members of the supporting structures are based on many simplifying assumptions and are not straightforward to apply for practical cases, various AASHTO and ASCE specifications, and design manuals used by state DOTs. The proposed procedure is much simpler and less confusing than current procedures used by the Iowa DOT.

A main finding of the fatigue analysis conducted for the truss structure is that transportation over a few hours can cause fatigue damage similar to months of in-service loading. Based on both the experimental and the numerical studies, it was found that the diurnal temperature variations do not have a major effect on the truss structures used to support highway signs in Iowa.

Discussion

Q. Have changes been made because of this project?
A. There have not been changes yet, though the AASHTO Committee on Support Structures is interested in these results. Changes to AASHTO are mainly the result of research sponsored by NCHRP. A new project has been submitted to NCHRP and is being prepared for advertisement. Once complete, AASHTO will consider making changes to the specifications.

Q. Are we are using steel instead of aluminum in Iowa?
A. Yes, we are now using steel instead of aluminum.

Q. How many structures are there like this?
A. There are over one hundred structures and several in reconstruction projects.

A. Abu-Hawash stated anytime there are changes needed, we save them until we are getting ready to update the Iowa DOT standards.

Motion to Approve by A. Abu-Hawash; 2nd T. Nicholson
Motion carried with 12 Aye, 0 Nay, 0 Abstaining

6. **Proposal: *"Impact of Curling and Warping on Concrete Pavement Systems Phase II"*,** Halil Ceylan, Iowa State University, $370,000, (15 min)

Background

Curling and warping of PCC pavements can result in upward (concave) or downward (convex) deformation from changes in environmental conditions. Among these conditions, temperature and moisture are the two most significant environmental factors that can influence volumetric changes in PCC. The non-uniform temperature gradient induced deformation is referred to as curling while the non-uniform moisture gradient induced deformation is referred to as warping. Usually, when the top of a PCC slab has a higher temperature or moisture content than the bottom, a positive gradient will be induced, and the top part of the PCC slab will experience more expansion than the bottom, thus resulting in downward slab curling or warping. Conversely, if the bottom of a PCC slab has a higher temperature or moisture content than the top, a negative gradient will occur, and the bottom part of the slab will experience more expansion than the top, resulting in upward curling or warping of the slab. Furthermore, a positive temperature gradient usually occurs during the daytime, while a negative temperature gradient usually occurs during the nighttime. On the contrary, a positive moisture gradient usually occurs during the nighttime and a negative moisture gradient usually occurs during the daytime.

Typically, the curling effect from temperature reversals on slab deflection is diurnal, whereas the warping effect from moisture on slab deflection is more seasonal, and the diurnal variation (curling) is generally larger than the seasonal variation (warping). Furthermore, the diurnal temperature effect has a maximum impact during the nighttime and morning the following day. However, it should be pointed out that diurnal ambient temperature changes only affect the temperature profile of the top half portion of a PCC slab, whereas seasonal ambient temperature changes can affect the full-depth temperature profile of a PCC slab. The temperature difference between mid-depth and the bottom of a slab is almost negligible from diurnal effects.

Curling and warping of the PCC slab can cause stresses as well. Once the curling and warping induced concrete slab curvature is initiated, slab restraints will tend to exert tensile stresses in the slab that resist the differential strain response throughout the slab depth. The magnitudes of the critical tensile stresses are usually determined by sudden and drastic changes in ambient temperature (Nantung 2011). The most common PCC pavement restraints include self-weight of concrete, dowel bars, shoulder and adjacent slabs, aggregate interlock, and non-uniform friction between the PCC slab and the base. Furthermore, it should also be noted that the deflection is usually asymmetric for a PCC slab in the field, due to varying restraints along the slab.

Objectives

This proposed Phase II research is a follow-up investigation of the recently completed IHRB research project (TR-668) entitled "*Impact of Curling and Warping on Concrete Pavement.*" The primary objectives of the proposed Phase II research are listed below:

- To develop actionable recommendations for pavement design engineers and contractors to minimize the degree of curling and warping and correct the curling/warping-related performance issues.
- To evaluate and quantify curling and warping impacts on Iowa concrete pavement ride quality.
- To document the degree of curling and warping in Iowa county/city roads (which was not investigated in the Phase I study), in addition to Iowa highways, by selecting a larger number of PCC pavements.

- To determine the factors (through a sensitivity study) that have the most influence on curling and warping behavior of PCC pavements in Iowa highways and county/city roads.
- To evaluate the seasonal variation effects on curling and warping severity/magnitudes.
- To demonstrate the effectiveness, accuracy, and versatility of LiDAR for curling and warping inspection.
- To evaluate the use of a high speed inertial profiler for curling and warping inspection of concrete pavements in comparison to LiDAR units.

Benefits

The real impact of the curling and warping phenomena on concrete pavement performance continues to be a mystery. While some recent studies have pointed to a strong connection between the two, others have stated that these findings may not be as significant as first thought. At the same time, we continue to seek out more cost-effective ways of designing and constructing pavements without sacrificing performance. To do this, the curling and warping relationship must be better understood. This study will collect the field data necessary to demonstrate, one way or another, these connections. The expected, beneficial outcomes to the Iowa DOT and county and city engineers are listed below:

- Iowa concrete pavement design and construction practices will be improved by limiting curling and warping and learning ways to achieve these limits for building long-lasting concrete pavements.
- Effective smoothness QA test procedures/requirements will be established by considering curling and warping behaviors.
- Iowa concrete pavement surface correction practices (e.g., diamond grinding) will be improved by providing optimal time windows for correction operations to maximize benefits.
- Use of the high speed inertial profiler will allow for a more consistent program to quantify curling/warping at the network level.
- The same characterization procedure developed for the high speed inertial profiler can be used to quantify the curling/warping impact of newly constructed concrete pavements using a lightweight profiler.
- The procedures developed for LiDAR operation and analysis can be used for characterizing built-in curling and warping measurements during the early stages of pavement construction. The use of inertial profilers has remained limited during this stage owing to the potential distress that pavement can suffer from certain levels of loads caused by inertial profilers.
- A LiDAR system can minimize safety concerns and create less disturbance to passing vehicles, since on-site traffic control is not necessary when the stationary LiDAR system is located on the shoulder or on the sidewalk (for inspecting concrete pavements in a city).
- The developed procedure will utilize raw profiles acquired for IRI measurements to extract curling/warping impacts.
- The percentage of curling/warping contribution to IRI can be quantified.
- A set of stand-alone software tools will be developed as part of the implementation process for use by the Iowa DOT and county and city engineers by integrating the computational algorithms developed in this study.

Discussion

Q. Is purchase of a Profiler something needed for this project?

A. Yes. Based on discussions with the TAC, the use of profilers was added. The team received quotes for rental of units from two companies. Because of the large number of testing sites, the rental costs were significantly higher than the cost to purchase a profiler unit. The profiler will be the property of the Iowa DOT and once the project is complete, there will be discussions on what to do with the profiler.

Q. The time frame of diamond grinding. Is this talking about the time frame as far as in a years' time or talking about grinding at a certain part of the day?
A. There are pavements that are working well for more than ten years. These concrete pavements will not go through a significant amount of warping. For the first ten years you don't have to do anything but after the first ten years, you would need grinding. Other pavements can experience significant curling and warping in a very short amount of time and grinding would be needed sooner.

Motion to Approve by J. Thorius; 2nd K. Jones
Motion carried with 12 Aye, 0 Nay, 0 Abstaining

7. **Matched Proposal:** ***"Comparing the Design and Use of Different Types of Grade Control at Culverts",*** John Thomas, Hungry Canyons Alliance, $125,000, (15 min)

Background
The Hungry Canyons Alliance (HCA) was formed locally to research and implement solutions to widespread stream channel incision and erosion in a 19-county area of the deep loess soils region of western Iowa. Since 1992, the HCA has provided state and federal cost share to build grade control structures to protect county infrastructure. Over that time, the HCA has cost-shared on at least 135 culvert grade control structures. While weir structures have been the primary method of stream channel grade control on larger drainage basins, generally those associated with roadway bridge crossings, the method of grade control appropriate for smaller drainage basins, generally associated with roadway culvert crossings, is less clear. It is apparent that county road departments often use the same types of culvert grade control, becoming experts at one or two types of culvert grade control, probably because they have become comfortable with those types of practice, but also because time, staffing, and budgetary restrictions deny them the ability to research other cost-effective methods. Regardless, roadway managers have found significant benefits to both the roadway and adjacent lands when stream channel grade control is incorporated in roadway culvert crossings, and the practice has been gaining in popularity over the last ten years. A review of current culvert design manuals shows a wealth of information on how to properly design a culvert after choosing what type of grade control will be used, however there are no simplified preliminary design aids available to help engineers easily compare different types of grade control for small drainage basins. The USDANRCS has a simplified chart of the most economical grade control structure for small drainage basins as a function of grade controlled and discharge. Having a similar simplified chart or decision-making tool would help engineers select a cost-effective type(s) of culvert grade control in the preliminary design stage. This could be especially useful for engineers who are unfamiliar with all the options available.

Recommending a specific type of culvert grade control based on discharge (drainage area) and grade controlled alone is not feasible because there are many other factors that should

be considered when deciding which method to choose, including but not limited to: roadway type and ADT, replacement vs. add on to existing, material costs, site conditions, total project costs, constructability, anticipated structure life expectancy, and anticipated long-term maintenance. Although, it does beg the question if there are ways to assist engineers with type selection in the early decision-making process.

Objectives

1. Create a "state of the practice" report evaluating and summarizing current methods of grade control at culverts with photographic examples of each type of culvert grade control to be used as a reference.

2. Develop easy-to-use spreadsheet-based decision-matrix tool, along with any associated graphs/charts/other tools, to help engineers select the most cost-effective and constructible type of culvert grade control that also provides the longest-term performance with the least amount of ongoing maintenance.

Benefits

Besides the benefits listed above, this project should result in cost savings from reduced preliminary design time and from more cost-effective designs, advanced construction methods, and reduced maintenance costs.

This project will help a broad geographic range of transportation engineers become more familiar with different methods of culvert grade control and can compare project types to show tradeoffs between initial costs, constructability, and long-term maintenance costs.

Discussion

Q. If doing the Phase II RFP later, are we then only matching the twenty-five thousand?
A. The twenty-five thousand would be for phase one and then seventy-five thousand would be IHRB funding for phase two.

Q. Will the RFP go through the Hungry Canyons Alliance?
A. The RFP for Phase II would not be through the Hungry Canyons Alliance. It would go through the normal IHRB process if that is what makes sense at that time.

The board discussed moving forward with only Phase I of the project. Phase II part of this project will be re-evaluated once Phase I project is near completion.

Motion to Approve Phase I Project Matching $25,000 by B. Billings; 2nd T. Nicholson
Motion carried with 12 Aye, 0 Nay, 0 Abstaining

Board Member Left

8. Continuation Phase/Implementation Requests Update

		Continuation Phase Projects Requests		
	Previous Project	Project Title	Proposed Budget	IHRB Meeting Review
1	TR-664	Low-Cost Rural Surface Alternatives Demonstration Project Phase III	$150,000	Approved - Feb
2	TR-665	Validation of a proof-of-concept self-cleaning culvert design	$175,000	Approved - Feb
3	TR-660	Implementation of the Negative Moment Reinforcing Detail Recommendations	$160,000	Approved - Feb
4	TR-639	Development of Bio-Based Polymers for Use in Asphalt-Phase 2 Study	$175,000	Approved - Feb
5	TR-698	Optimized Joint Spacing for Concrete Overlays - field demonstration	$124,000	Approved - Mar
6	TR-664	Low Cost Rural Surface Alternatives Phase IV: Frost Depth Monitoring and Prediction	$300,000	Approved - Mar
7	TR-682	Load Rating of Short Span Box Beam Standards	15000	Approved - Sep
8	SPR/IHRB	Holding Strategy Treatments for Composite Pavements	100000	Approved - Sep
~~9~~	~~SPR~~	~~Predicting Future Major Equipment Repairs To Minimize Operating Costs~~	~~$100,000~~	No longer needed
10	TR-743	Field testing New Design detail for Short Span Box Beam Bridges	$ 100,000.00	Approved - Dec
11	TR-667	Vibrating Mix Design - N Design Phase II	$200,000	Approved - Dec
12	TR-676	Internal Curing in pavement field demonstration	$250,000	Approved - Feb
13	TR-668	Impact of Curling and Warping Phase II	$370,000	March
14	TR-626	Reducing uncertainties in snow fence design: Development of image based methods to estimate snow drifting and the snow relocation coefficient	$80,000	April
15	TR-661	Implementation of Wide Bridge Systems	$140,000	April
16	TR-704	Multimodal Transportation of Aggregates and Transloading Facilities Feasibility	$120,000	Hold until Phase I/Oct
17	TR-575	Development of Smart Sensing Technologies for Transportation Infrastructure Health Monitoring: Wireless	$350,000	Postpone
18	SPR	LRFD Calibration of Geotechnical Resistance Factors for Pile Bearing on Rock	$50,000	Postpone
19	SPR	Development of Drilled Shafts LRFD Resistance Factors	$200,000	Postpone
20	TR-663	GRS Abutment for Short Span Beam Bridges	TBD	Postpone

V. Goetz stated the Board has voted twice on these projects and rearranged the priorities. The list in green shows the projects already approved by the Board and are currently on-going.

Two projects are moving forward and will be scheduled for presentation either in April or May.

The Board should have seen an e-mail with the list of the new research topics that were submitted by the March 1st deadline. Within that list, there are projects related to a previous phase. These projects will be evaluated to see if they should move forward for consideration as a next phase of a previous

project or as an entirely new research topic. Depending on the number of projects, V. Goetz will make the determination if it makes sense do another priority ranking.

9. RFP

a. IHRB-18-04: "Evaluation of Penetrating Sealers for Concrete", $150,000

Motion to Approve by A. Abu-Hawash; 2nd M. Thorius
Motion carried with 11 Aye, 0 Nay, 0 Abstaining

b. IHRB-18-10: "Fiber-Reinforced Concrete in Bridge Decks", $100,000

Table this RFP until April

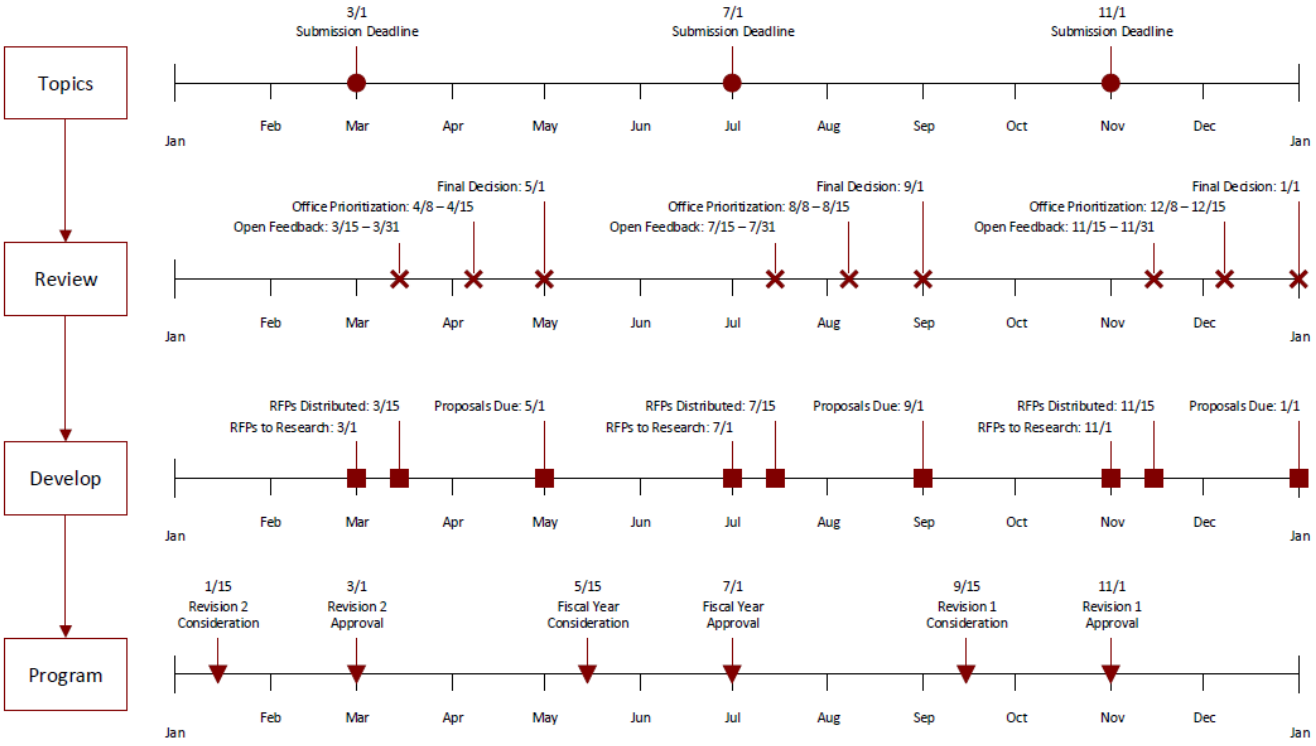
c. IHRB-18-14: "Design and Detailing Requirements for Columns Under Collision", $100,000

Motion to Approve by K. Jones; 2nd R. Knoche
Motion carried with 11 Aye, 0 Nay, 0 Abstaining

10. New Business

V. Goetz stated the Research office has been working on a new uniform process between our Federal funding with SPR and State funding, which includes IHRB. In the past, there would be a call for projects in the spring, then review and development for programming in July. New this year, the Research office will be accepting new projects year-round instead of only in March in a trimester fashion.

Research Cycle & Annual Calendar



Submit Ideas Online at https://www.cognitoforms.com/IowaDOTResearch/ResearchTopicFundingRequests

There will be three deadlines to submit new topic ideas: March 1st, July 1st and November 1st. All the projects collected between the different trimesters will undergo a review process. The review process involves initial research staff review for first round of cuts, then solicitation of open feedback with a survey monkey throughout the DOT and the Iowa Highway Research Board as well as local agencies. The Research section will do a second review of topics and submitted feedback. Topics moving forward will be organized and shared with different offices to review and give their priorities. Once offices submit their priorities, the Research section will do a third round of cuts as needed and give a final decision on approved projects to move forward for IHRB or SPR funding consideration. Each of our programs have their own final selection process. Those projects moving forward to IHRB will be ranked and voted by IHRB. Those projects moving forward to our SPR program will go through their review process.

The project given the green light and selected by each of our funding programs (SPR or IHRB) will go through a Project Development Process. This process will either have projects go out for RFP or straight to the proposal from a sole source. The Research section is also requiring that when a topic is approved, it will need a Project Champion. A champion will assist the research section with developing the project further and identifying who will be the targeted PI or agency for the project and work with

that PI to develop a scope and budget. Once a full proposal and scope is approved, the project will be programmed and funded and contracts will be negotiated.

The Research section is also implementing a trimester RFP cycle. RFPs will be released 3 times per year, and the calendar shows the deadline for the Research section to receive approved proposal outlines from project champions so they can be included in the next call for RFPs.

11. Adjourn

The next regular meeting of the Iowa Highway Research Board is scheduled for April 27, 2018 at 9:00 a.m. in the East/West Materials Conference Room at the Iowa DOT.

VG