

IOWA HIGHWAY RESEARCH BOARD (IHRB)

Minutes of July 31, 2020

Regular Board Members Present

| | |
|--------------------|------------|
| A. Bradley | R. Knoche |
| D. Sanders | W. Weiss |
| T. Nicholson | W. Dotzler |
| P. Geilenfeldt III | J. Fantz |
| J. DeVries | |
| R. Koester | |
| B. Wilkinson | |
| T. Kinney | |

Members with Representation

A. Abu-Hawash
B. Skinner

Members with No Representation

S. Struble

Executive Secretary – V. Goetz

The meeting was held online via Microsoft Teams on July 31, 2020 at 9:00 a.m. by Chair Ron Knoche with an initial number of 13 voting members/alternates.

1. Agenda review/modification

Number four needs to be changed to Problem Statement.

Motion to Approve by W. Dotzler; W. Weiss
Motion carried with 13 Aye, 0 Nay, 0 Abstaining

2. Minutes Approval form the June 26, 2020 meeting

Motion to Approve by W. Dotzler; 2nd T. Nicholson
Motion carried with 13 Aye, 0 Nay, 0 Abstaining

*****Member Joined*****

- 3. Final Report: TR-737, “Development of a Life-Cycle Cost Analysis Tool for Improved Maintenance and Management of Bridges”,** Alice Alipour, Iowa State University, \$90,000, (15 min).

<http://publications.iowa.gov/id/eprint/33246>

Motion to Approve by W. Dotzler; 2nd T. Nicholson
Motion carried with 14 Aye, 0 Nay, 0 Abstaining

- 4. Matching Funds Problem Statement: “Prototyping a novel aerodynamic solution to mitigate large vibrations in traffic signal structure”,** Alice Alipour, Iowa State University, \$100,000, (15 min).

Background

As part of the National Cooperative Highway Research Program (NCHRP), the NCHRP Highway Innovations Deserving of Exploratory Analysis (IDEA) Program has sponsored projects on innovative concepts, which if proven feasible, have the potential to significantly advance the state of the art and practice of the nation’s highway systems. The program is guided by an oversight panel of experts from state departments of transportation (DOTs), academia, and the private sector who volunteer their time and effort. The Highway program within NCHRP IDEA has two types of projects. Type 1 projects are concept explorations that demonstrate the validity of unproven concepts, and Type 2 projects develop and test prototypes of proven concepts. Only those who have received and completed a Type 1 project would qualify for a Type 2 project, which also requires a matching fund. While the NCHRP IDEA program is one of the most competitive federal programs, the research team at Iowa State University (ISU) was able to secure the funding for a Type 1 project on the development of a novel aerodynamic solution to mitigate large vibrations in traffic signal structures. With the successful completion of this project, which led to a promising solution to substantially decreasing the vibration of traffic signal structures through the modification of the shape of the signal light itself, the ISU team has been encouraged by the NCHRP IDEA panel to pursue a Type 2 project with the ultimate goal of prototyping the new design, monitoring the performance in real-life conditions, and preparing a guide for future implementation.

Objective

Innovation synopsis: Outcomes of Type 1 project In the NCHRP IDEA Type 1 project that was completed by the ISU team (2018–2020), an innovative concept was developed to address the vibration-induced fatigue of traffic signal structures by changing the aerodynamic shape of the signal light installed on them. The implementation of the proposed modification in the design of signal lights and traffic signal structures is deemed an excellent opportunity to address the longstanding issues associated with the fatigue-related damage to this safety-critical structures. The economic advantages of this solution are also notable, considering that millions of these structures are maintained by state DOTs and cities. The implementation of the proposed solution will ensure longer service life for these structures, without increasing the fabrication cost and/or requiring any supplementary damping devices. The developed solution is expected to introduce an even broader positive impact, as it can be extended to other traffic structures, such as luminaires and structural sign supports.

Proposal for Type 2 project and match Promising results from the extensive wind tunnel tests and numerical simulations performed by the ISU team under the NCHRP IDEA Type 1 project, as well as the strong interest expressed by the NCHRP IDEA panel, has motivated the ISU team to take the next step to move the developed solution to the prototyping and implementation phase, i.e., Type 2 project, which also requires a matching fund.

Benefits

The main outcome of the proposed NCHRP IDEA Type 2 project will be modified traffic signal lights that will utilize for the very first time the concept of using aerodynamic damping, which is essentially mitigating wind-induced vibrations using wind itself. The core solution will be further tested, refined, and finalized by the end of the NCHRP IDEA Type 2 project. This will include prototyping and implementation phases, which will help address the long-standing issue of having to employ unnecessarily large structures/connections for traffic signal structures, which currently cost in the order of \$10K-\$30K each to fabricate (depending on the size). Solving the issue of wind-induced vibrations is expected to result in smaller size structures, consequently leading to smaller size connections and more economical foundation. This Innovative solution can also be used in the existing traffic signal structures with fatigue-related issues, eliminating the need to replace them earlier than their expected service life. This will not only help state DOTs and cities save in time, labor, and budget, but also greatly enhance the public safety.

The NCHRP IDEA Type 2 project will provide a funding of \$100,000. Given the immediate benefits of the developed solution to high-wind regions, similar to Iowa, a one-to-one matching fund is requested to enable the ISU team to (i) perform the outdoor and laboratory experiments planned for this project with a focus on the wind characteristics specific to the state, and (ii) tailor the final product consistent with the state's current practice and future needs as they relate to traffic signal structures.

Discussion

Q. Are you working with an Ames Location?

A. Yes, we are working with Ames and Des Moines, the second phase with Ames. Ames is donating the traffic light.

Q. Will you modify traffic signal in the field, or will it be on a model?

A. We need to put it on the actual traffic signal in the field.

Q. When do you apply to the NCHRP idea and when would you hear your project is funded?

A. Our goal is September 1st, 2020, we need a letter stating this is matching for the approval process. A type one project usually takes four months.

Q. What type of action is required today?

A. We can vote to support the project and provide a letter of recommendation. We can also approve the funding pending getting the award from NCHRP, at that time the full proposal and budget would come back to the board.

Motion to Approve by A. Abu-Hawash; 2nd T. Nicholson

Motion carried with 14 Aye, 0 Nay, 0 Abstaining

5. Additional Funding Proposal: TR-726, “Modernization of Iowa Transportation Program Management System”, Danny Waid, Iowa County Engineers Association Service Bureau, \$40,155.79, (15 min).

Background

TPMS originally launched in 1999 and 2000, the system links local public agencies (cities, counties, etc.), with counterparts at the Iowa DOT (multiple offices), RPA/MPO planning agencies, consulting firms and the Iowa office of the FHWA, with the goal of enabling all participants to see the status of projects of interest in real time.

After 18 years of working with the original TPMS, a proposal to re-design and re-write TPMS 2020 was submitted and ultimately approved by the IHRB, with work on the project beginning in 2018. Since then the Service Bureau has deployed three of the five modules; the County Five Year Program, (CFYP), the County Budget, and the State-wide Transportation Improvement Program. Work is currently progressing on the TPMS Development Module, (TPDev 2020). The final Transit Module will follow to complete the entire application suite.

In order for the Program, Budget, and STIP modules to be deployed and used for this current fiscal year’s submittal, review, and approval activities, a hybrid system was created to combine legacy TPDev with the newly coded modules. This allowed seamless use of legacy project development to continue without interruption while the new modules were being used as the first-time beta trial version. Although successful, this added additional planning, coding, and configuration to implement.

Objective

While the TPMS 2020 main objectives identified in the original proposal have not changed, the processes and business rules of various organizations, review agencies, and application technologies have advanced and changed considerably. Since project initiation we have implemented the Federal Aid SWAP with primary funding, the Project Scheduling System is in the process of being rewritten as the new PPMS application, and review agencies, as part of the Technical Advisory Committee have discovered new ways to enhance their workflow. These important and valuable advancements have also allowed the Service Bureau to discover and design new ways to meet these challenges. These application solutions are requiring additional time and effort for incorporation into the TPMS 2020 renewal project. As progress continues to satisfy the original objectives, the scope has increased by TAC requested add-in features and some are included in the list below:

- **SWAP project process and tracking** incorporated into TPMS programming and budgeting, STIP, and TPDev modules.
- **Project enhanced features** in STIP and TPDev, including:
 - Funding breakdown

- Project Agreement management
- Utility clearances and notification
- Letting Date as higher order reference element
- Joint Corp and DNR Application Forms
- Construction Status
- Final project costs
- Project Turn-in checklists
- Concept Statement electronic submittal
- Project mapping capabilities
- **Shared/Tied/Bundled** Enhanced feature capabilities
- **Bid Item creation and transfer** in TPDev including APPIA materials reference information
- **Masterworks API data exchange Configuration**
 - Specification development
 - API creation
 - Real-time project information exchange configuration, rather than nightly file exchange

Further complicating these scope changes, is the need to run a parallel design schedule with PPMS. Considering the current project completion schedule of September 2020, we will need additional time to finish the project. The original cost estimate has been modified to include the additional scope change cost of \$40,155, to bring the total project estimated cost to \$445,520.

Benefits

The Iowa “Transportation Program Management System”, (TPMS), is a multi-function web-based system built to enable efficient submittal, review and approval of local public agency transportation project programming; tracking and facilitating the development and review of projects up to turn-in for bid letting. Designed to connect and serve the needs of cities, counties, state, FHWA, planning agencies and consultants it supports the programming of around 2500 county projects, in the County Five Year Program (CFYP), 3300 plus city/county/state Federal Aid projects, in the State Transportation Improvement Program (STIP), and at any given time orchestrate the development process of 1000 projects in TPDev. TPMS exchanges data electronically with the Iowa DOT to expedite program and project delivery. Changes and progress at the DOT make it desirable to enhance TPMS to be able to participate in paperless workflows in the future.

Motion to Approve by W. Weiss; 2nd T. Kinney
 Motion carried with 14 Aye, 0 Nay, 0 Abstaining

6. New Business

7. Regular Meeting Adjourn

8. New Platform Demonstration

The next regular meeting of the Iowa Highway Research Board is scheduled for Friday September 25, 2020 Online via Microsoft Teams Meeting. Please contact Vanessa.Goetz@iowadot.us by 4 p.m. Thursday September 24, 2020 if you would like to attend the meeting online.

A handwritten signature in blue ink, appearing to read 'Vanessa Goetz', with a stylized flourish at the end.

Vanessa Goetz, IHRB Executive Secretary