Iowa DOT Research Request for Proposal (RFP)

It is the intent of Iowa DOT Research to enter into agreement with the responsible bidder whose submitted proposal is the most advantageous, cost and other factors considered. Other factors include but are not limited to meeting or exceeding mandatory requirements, proposed staffing, and meeting required time schedule.

- Original RFP is posted at https://iowadot.gov/research/Requests-for-Proposal
- Questions should be submitted to the project manager, identified below.
  - Questions are due no later than 14 calendar days prior to the proposal due date. Questions and responses will be posted on https://iowadot.gov/research/Requests-for-Proposal no later than 7 calendar days prior to the proposal due date.
- Responses must be submitted in pdf form to Proposal.Research@iowadot.us
  - Use the following naming convention for the PDF submission:
    - **ResearchRFPNumber_ProposingAgency_PrincipalInvestigatorLastName.pdf**
- Responses must comply with the proposal guidelines in "Required Format for Iowa DOT Research Proposals."
  - https://iowadot.gov/research/Research-Process/Proposal-Deliverable-Guidelines

RFP #: IHRB-4162
RFP Title: Monitor and Evaluate Proprietary Products E5 Liquid Fly Ash and E5 Internal Cure on New Bridge Decks
Idea Page: https://ideas.iowadot.gov/subdomain/ideas-main/end/node/4162?qmzn=iKFrYf

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RFP Posted: July 15, 2025
Proposals Due: On or Before September 1, 2025 at 12:00 Noon Central Standard Time.
Project Manager: Vanessa Goetz, vanessa.goetz@iowadot.us, (515)-239-1382

Budget

☒ Funding limitations have been established. Proposed budgets shall not exceed $400,000.

☐ Proposed budgets are not limited. They will be considered during the evaluation process.

Timeline

☒ Timing limitations have been established. Proposed timelines shall not extend beyond 12/31/2028.

☐ Proposed timelines are not limited. They will be considered during the evaluation process.

Literature Review

☐ A Literature Review has been performed as part of project development and should not be included as a task in the proposal. The Literature Review is available for download here:

☒ A Literature Review has not been performed and may be included as a task in the proposal.

Data Management Plan

☐ Include a task in the proposal to develop a data management plan (DMP); refer to Iowa DOT's DMP guidance.

☒ A DMP is not required for this project.

Problem Statement

Early age bridge deck cracking is a concern both nationally and regionally as it can lead to long term durability and early age maintenance issues for bridge decks. Indiana DOT and a handful of other State DOT's have begun incorporating E5 "Liquid Fly Ash" and E5 "Internal Cure" into their bridge deck concrete mixes with published results indicating a marked reduction in non-structural, bridge deck cracking, as well as constructability benefits including an easing of curing requirements, pumpability and placing and finishing benefits. Iowa DOT is researching if E5 admixtures would be compatible with and benefit Iowa DOT's various deck mixes by reducing early age, non-structural deck cracking.

Objectives

1. To evaluate if E5 will benefit Iowa DOT's concrete deck mixes by answering Iowa DOT questions surrounding the E5 admixtures:
    - What is the product? How is the product currently being used? What is the product supposed to do? And what does it really do? Are there any negative effects? What are the product's benefits/drawbacks for our deck mixes?
    - What will the E5 admixtures do to our current deck mixes? Will it make them better?
    - What would an optimized Iowa deck mix using E5 look like? Can our current deck mixes be made better using E5 and modifying the mix properties like other States have done?
    - How can the deck mixes be tested? Which tests should be used? Which properties should be evaluated to produce a better concrete deck mix? Are these particular tests and properties applicable in assessing other products' claiming to have the same properties as E5?
2. To optimize Iowa DOT's concrete deck mixes, HPC-D and C-4, through the reduction of overall cementitious content and the incorporation of E5 "Liquid Fly Ash" and E5 "Internal Cure" admixtures with the goal of minimizing early age, non-structural bridge deck cracking.
3. To evaluate and recommend an adjusted bridge deck curing process to be used with the E5 modified concrete deck mixes.

Minimum Project Tasks

1. Literature review focused on electronically compiling all known documentation and research to date pertaining to the use of E5 "Liquid Fly Ash" and E5 "Internal Cure" admixtures.
    a. As part of this literature search, provide an assessment on whether there is enough research and data documenting how the product works and whether it may be compatible with Iowa's deck mixes. This should include:
        i. Reporting the purported advantages and disadvantages of the product.
        ii. Summarizing and describing the mechanism(s) by which the product affects/alters the concrete performance.
        iii. Documenting the performance history of the product to date. Including a compare and contrast of usage between different types of cements like I/II, IS, IL, etc.
        iv. Reporting any existing peer reviewed research.
        v. Identify comparable products, if any.
2. Optimize Iowa DOT's existing concrete deck mixes through the optimization (reduction) of the cementitious content of the mixes in conjunction with the incorporation of the E5 admixtures. The goal is to reduced early age cracking and shrinkage potential while maintaining minimum strength, permeability, durability, and workability characteristics similar to or better than the baseline IA DOT deck mixes.
    a. It is expected that a baseline of properties (i.e. permeability, strength, strength curve, shrinkage characteristics) for existing Iowa DOT deck mixes will be established to compare the research and the

optimized mix with. This is foreseen to include sampling of representative mixes from at least 3 of Iowa's 6 Districts.

b. The optimized deck mixes are expected to be compared to the baseline properties established in Item 2.a.The optimized mix will provide equivalent or better overall performance when compared to baseline IA DOT deck mixes.
    i. As part of the report, include expected cost savings for equivalent performance based on:
    ii. Reduced cement content.
        1. Reduction of need for other chemical/mineral admixtures.
        2. Relaxed water to cement ratio.
        3. Relaxed curing protocols.
        4. Relaxation of other relevant specification parameters.

3. Using laboratory testing and analysis to assess the product's stated improvements as they specifically relate to Iowa DOT's deck mixes, thus evaluating Iowa DOT's standard deck mixes (C mix and HPC-D mix) modified with E5, and an E5 modified "optimized" deck mix.
    a. This will include identifying the appropriate test methods to test the admixture modified deck mixtures with particular attention being paid to properties of the admixture and potential incompatibilities with the selected test methods that might occur. For example, we understand that certain permeability tests are affected by fibers and various admixtures, so selecting appropriate test methods will be critical.
    b. Compare the results of the optimized admixture modified mix against a sampling of concrete deck mixes from around the state.
    c. Anticipated properties to test include:
        i. Shrinkage, both short term and long term.
        ii. Permeability testing
        iii. Creep.
        iv. Elasticity
        v. Strength, strength gain and maturity profile
        vi. Short term / long term detrimental properties of product incorporation, if any.
        vii. Other variables deemed of potential relevance to cracking risk and durability risk
        viii. Assess for potential affects to pumpability, workability, finishability and general plastic performance characteristics, air entrainment ability and stability, etc.
4. Assess and recommend deck curing process(es) to be used with the optimized Iowa DOT E5 admixture deck mixes. This recommendation would be expected to guide deck curing policy for the optimized deck mix.
5. Implement the optimized deck mix on (2 to 3) bridge decks throughout the state with 24 months of monitoring.
    a. The Research Team will develop a monitoring plan in coordination with the TAC.
    b. At time of placement of the deck, include site observations documenting at a minimum:
        i. Weather conditions before, during and for a minimum of 14 days after.
        ii. Document all of the steps and times in the mixing / batching / placing / finishing / curing process.
        iii. Advantages/disadvantages to pumpability, workability, and finishability.
        iv. How does the modified mix compare to baseline IA DOT deck mixes.
        v. Monitor strains in the concrete.
        vi. Monitor and document finishing techniques and results.
    c. Evaluate the top and bottom of the deck for early age cracking, in-situ permeability, and other criteria as developed with the TAC at the following ages: 1 month, 2 months, 3 months, 6 months, 12 months, and 24 months.
    d. If other DOT deck inspection and evaluation including automated deck scanning, drone scanning, etc. is performed by the Iowa DOT, the results are expected to be included in the Interim and Final reports.
    e. An Interim report immediately following the 3rd month and 12th month of monitoring and review will be submitted to the TAC. The Interim Report will need to provide the Research Team's initial assessment of bridge deck early age cracking conditions and efficacy of the admixtures.
    f. After 24 months of monitoring, issue a final report within 4 months.
6. Quantify expected cost savings of optimized mix. Assess and document any cost to benefit ratio or return-on-investment ramifications of the optimized mix.

Products and Deliverables

1. Quarterly progress reports to the TAC
2. Literature review
3. #1 Interim Report documenting lab findings and lab optimized mix.
4. #2 Interim Report after 3 months of monitoring with a focus on bridge deck condition and presence or absence of early age cracking.
5. #3 Interim Report after 12 months of monitoring with a focus on bridge deck condition and presence or absence of early age cracking and any changes that may have occurred since the prior Interim report.
6. Draft Final Report
7. Final Report including, but not limited to:
    a. Comprehensive documentation of findings.
    b. Optimized Iowa DOT deck mixes modified with E5 admixtures.
    c. Curing requirement recommendations for optimized Iowa DOT Deck mix.
8. Technology Transfer Technical Brief
9. Implementation Plan – Implementing Research Form – See Proposal Guidelines Appendix A.

Note: All products and deliverables shall comply with accessibility and Section 508 requirements, regardless of funding source. Section 508 is an amendment to the federal Rehabilitation Act of 1973 mandating that all electronic and information technology developed, procured, maintained, or used by the federal government be accessible to people with disabilities. Refer to 29 U.S.C 794 (d) for additional information.

Additional Information

Upon completion of the literature search and confirmation of the ability to test the desired properties and confirmation that there are potential benefits to Iowa DOT's bridge deck mixes using the E5 admixtures, a bridge (or bridges) will be selected for the use of the to be developed optimized Iowa DOT E5 mixes with the monitoring of those bridges to follow construction.

- It is the goal of this research to incorporate and monitor the optimized mix on 2 to 3 bridge decks located in different Districts with the goal of testing utilization in different environments and with different Ready-mix producers in the state.

Non-Discrimination Statement

Iowa DOT ensures non-discrimination in all programs and activities in accordance with Title VI of the Civil Rights Act of 1964. Any person who believes that they are being denied participation in a project, being denied benefits of a program, or otherwise being discriminated against because of race, color, national origin, gender, age, or disability, low income and limited English proficiency, or needs more information or special assistance for persons with disabilities or limited English proficiency, please contact Iowa DOT Civil Rights at 515-239-7970 or by email at civil.rights@iowadot.us.