



## REQUEST FOR PROPOSAL #22-02

### *Impact of Commercial Electric Vehicles on Flexible Pavement Performance*

**POSTED DATE:** 4/1/2022

**CLOSE DATE:** 4/30/2022 at 11:59 p.m. CST

Submit Proposals to: [ICTProjectManagement@illinois.edu](mailto:ICTProjectManagement@illinois.edu)

#### **PROJECT INFORMATION**

<b>Funds:</b>	\$400,000 total (includes a required 25% cost share of \$100,000 from proposing agency)
<b>Estimated Contract Term:</b>	30 months
<b>Projected Start Date:</b>	8/16/2022

#### **BACKGROUND**

As electric fleet trucks become more common, the vehicles' additional torque is expected to cause higher distress levels at intersections and certain roadway segments. As the vehicles' acceleration will be greater than conventional trucks, more frequent highway maintenance and safety hazards may occur. The study will identify the weight distribution of the increased load on various axles as well as the increased pavement damage and associated costs caused by electric truck operations.

#### **OBJECTIVE**

The objective of this study is to assess the impact of electric trucks on the life-cycle cost of flexible pavements and recommend modifications to pavement design and maintenance. The outcome of the study should include remediation strategies to account for expected increased shoving, shear tears, and other distresses at intersections. This may include recommending

modifications to asphalt mixes, pavement structures, and maintenance procedures. The outcome will be used by the Illinois Department of Transportation to develop guidelines for designing hot-mix asphalt and selecting the optimum pavement type to withstand influences from additional torque and increased axle loads.

## **RESEARCH TASKS AND REQUIRED DELIVERABLES**

The proposed research will address the following tasks.

Task 1 — Review the current state of knowledge to synthesize best practices, challenges, synergistic criteria, and strategies being employed to develop guidelines for designing HMA and selecting the optimum pavement type to withstand influences from additional torque and increased axle loads.

Task 2 — Quantify the increase of tire force induced by increased torque and weight of commercial electric trucks and how they impact flexible pavement performance in Illinois.

Task 3 — Assess current IDOT mix designs for withstanding electric trucks. To recognize the relationships between mixture components and performance under electric trucks, small- and large-scale laboratory tests may be conducted. In addition, numerical analysis should be conducted to evaluate the effects of increased torque on flexible pavements, especially potential shoving, delamination and bonding, friction, and rutting of asphalt mixtures.

Task 4 — Develop guidelines for designing HMA and selecting optimum pavement type to withstand influences from additional torque and load of electric trucks.

Task 5 — Assess impacts on life-cycle costs and recommend modifications to pavement management, design, and maintenance due to increased loads, as well as remediation strategies to account for increased shoving at intersections.

Task 6 — Prepare a final report detailing the study's process, findings, and recommendations.

## **INSTRUCTIONS FOR SUBMITTING A PROPOSAL**

The proposal shall be prepared in accordance with the guidelines presented in Appendix A.

By submitting a proposal, potential principal investigators are acknowledging they have read and understand the IDOT/ICT [PI responsibilities and Guidebook](#) and terms and requirements under the current [IDOT/ICT Intergovernmental Agreement \(IGA\)](#)\*.

Technical questions regarding the research project or RFP procedures should be submitted to the ICT Project Management team via email at [ICTProjectManagement@illinois.edu](mailto:ICTProjectManagement@illinois.edu) within 14 days of the posting date. Technical questions and answers will be posted on ICT's website as they are received.

\* A new IGA will be effective July 1, 2022. Terms and conditions, excluding the F&A rate, are not anticipated to change.

## **SPECIAL CONDITIONS FOR REVIEWING PROPOSALS AND AWARDING ICT FUNDS**

Please note that the following conditions will be applied when reviewing all received proposals and in awarding ICT funds:

- 1) Preference will be given to Illinois universities (both public and private) when multiple proposals from this solicitation are reviewed and have identical scores.
- 2) The award of this project is contingent upon the availability of funds at the time of award.

## **APPENDIX A: Guidelines for Preparing Proposals for the Illinois Center for Transportation**

Please use the following format when submitting Illinois Center for Transportation proposals for consideration. Proposals should be a maximum of 15 pages (excluding the cover page, itemized budget, budget justification and optional appendices) with a minimum 11pt font, standard margins, and in Adobe PDF file format.

### **1. Cover Page**

Use the cover page found [here](#).

### **2. Research Plan**

Clearly and concisely address the proposed approach for solving the issue described in the problem statement. The research plan should be subdivided into the following sections:

#### **(a) Introduction, Including Research Objective**

Introduce the proposal and provide a concise overview of the research approach. Outline the objectives of the research project and explain the questions that will be answered by the research.

#### **(b) Research Approach/Work Plan**

Include details of the research project and strategies to accomplish the project objectives. Itemize the tasks and provide clear explanation of the research approach, deliverables, and identify the research team lead for each task.

#### **(c) Anticipated Research Results**

State the anticipated research results and deliverables.

#### **(d) Expected Implementable Outcome(s)**

All IDOT/ICT research is expected to be implementable. Describe what implementable outcomes (e.g., specification, test, recommendations, etc.) are anticipated that will facilitate implementation of the research results.

### **3. Qualifications and Accomplishments of the Research Team**

Identify who will perform the research and provide a brief explanation of each researcher's qualifications and related research efforts.

### **4. Other Commitments of the Research Team**

Outline the other commitments of the research team to demonstrate the ability to fulfill the commitments of the proposal.

**5. Facilities and Equipment**

Describe the facilities and equipment available to conduct the research.

**6. Timeline Requirements**

Include a timeline of the research project’s tasks in this section. Describe the required time to complete the research, including final report preparation, ICT’s editing process, review of the report by the Technical Review Panel, and publication of the report. Please note the final report must be submitted in Section 508 compliant format at least three months before the project’s end date. Below is an example of a project timeline.

Project Milestones (assuming an August 16 Start Date, and a 24 month project)	2022				2023								2024												
	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8
1 Kickoff Meeting	█																								
2 PI conducts Research	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
3 PI writes DRAFT report																									
4 PI Submits Final DRAFT report to ICT for editing																									
5 ICT Preliminary editing phase																									
6 PI/TRP editing phase																									
7 Final editing phase																									
8 Report published																									
(Quarterly Progress Reports Due)		█			█			█			█			█			█			█			█		
(TRP Meetings)		█			█			█			█			█			█			█			█		

**7. Itemized Budget**

Provide an itemized project budget including the cost of personnel, consultants, subcontracts, equipment, materials, travel, indirect costs, and cost share.

A minimum 25% of the total project budget must be cost share from the proposing agency. Under the IGA effective July 1, 2022, the indirect cost rate used for institutions with a federally negotiated F&A rate cannot exceed 37.7% of the modified total direct costs. If the proposing agency does not have a federally negotiated rate, a 10% de minimus rate must be used.

Subaward costs from outside the proposing agency cannot exceed 50% of the total project budget without prior approval.

A part of the cost share requirement may be fulfilled using unrecovered indirect costs. Any proposal submitted by an agency outside of the University of Illinois system that plans to use unrecovered indirect cost as cost share must submit a request for approval to IDOT/Federal Highway Administration. More information on this letter will be provided if a proposal is selected for funding.

Please utilize ICT’s budget templates when submitting a proposal: [UIUC Budget Template](#) and [Subawardee Budget Template](#).

## 8. Budget Justification

Include a budget justification that explains the itemized budget in narrative form. The budget justification shall provide sufficient detail so there is a clear understanding of how the project costs were calculated and why they are necessary. The narrative discussion of the project cost categories and related line items should be presented in the same order as they appear in the itemized budget. If the project requires the purchase of equipment, out-of-state travel, or out-of- or in-state conference registration/attendance expense, please list and explain here.

*Under the terms of our IGA, equipment is defined as any tangible or intangible product, having a useful life of **two years or more**, an acquisition cost of at least \$500, and solely purchased for use in the IDOT-ICT project. Equipment purchased on IDOT-ICT projects is to be returned to IDOT at the conclusion of the project, unless otherwise agreed upon. Equipment purchases on IDOT-ICT projects must have a **signed** pre-approval.*

*Travel expenses should include, but are not limited to, travel to TRP meetings, travel for testing / sampling, etc. Any out-of-state travel expenses and **any** conference expenses charged to the project must have a **signed** pre-approval.*

***Inclusion of equipment and travel expenses in the project budget and workplan does not meet the requirement for pre-approval. Signed, pre-approval request forms must be submitted prior to purchase of any equipment or travel meeting the above criteria to be considered allowable expenses on the project. Expenses not meeting this requirement may not be reimbursed.***

## 9. Cooperative Features (if appropriate)

If assistance or cooperation is required from other agencies, public or private, to complete this proposed research, describe the plans for securing this assistance.

## 10. Appendices (if appropriate)

References or any additional materials deemed necessary may be provided here.