



## REQUEST FOR PROPOSAL #24-07

### *Advancements in Profiler Certification*

**POSTED DATE:** 4/1/2024

**CLOSE DATE:** 4/30/2024 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> | 36 months   |
| <b>Projected Start Date:</b>    | 8/16/2024   |

#### **BACKGROUND**

Inertial profiler certification has been an ongoing research topic for decades. Many advancements have been made through Transportation Pooled Fund 5(063) and National Cooperative Highway Research Program projects. TPF-5(063) established critical profiler accuracy requirements in *Critical Profiler Accuracy Requirements* and has held many equipment roundups that have led to the current version of the AASHTO R 56 standard. Cross-correlation is the core methodology used in R 56 for profiler certification and was formalized in *Development of Cross Correlation for Objective Comparison of Profiles*. The latest available technology for inertial profilers allows stop-and-go operation, which is not fully addressed within the current version of AASHTO R 56. NCHRP 914 proposed updates to AASHTO R 56 to test these technological advancements. The recommended additions to AASHTO R 56 were tested in 2015 and documented in *2015 Evaluation of High-Speed Inertial Profilers* but have not been applied to current commercially available equipment nor have they been adopted by AASHTO.

One of the many goals of TPF-5(063) was to develop regional certification centers for these devices. A certification site requires a major investment from a state agency both in time and money. A study was completed under TPF-5(063), *Study for Establishing Regional Certification*

*Centers for Inertial Profilers*, to help guide the development and establishment of these centers. The need for guidance in certification programs and regional centers was further outlined in NCHRP Synthesis 526 *Inertial Profiler Certification for Evaluation of International Roughness Index*.

## **OBJECTIVE**

A regional/national profiler certification site at the Illinois Certification and Research Track (ICART) provides a venue for practical and research-level testing of profile-measurement accuracy and repeatability on a diverse set of surfaces. For practical purposes, comprehensive certification of profile-measurement technology using standardized procedures at ICART can provide partial certification of prequalification for interested agencies. ICART is three-quarters of a mile in length, allowing testing at a variety of speeds. ICART also provides a venue for addressing two current research needs: (1) development and demonstration of “start and stop” profiler certification procedures and (2) evaluation of potential profile-measurement reference devices.

This research/development project will support the set-up of test sections as well as testing and analysis procedures at ICART for profiler certification. The set-up, testing, and analysis procedures will be demonstrated and documented in the context of a reference profiler evaluation experiment and a pilot “start and stop” profiler certification experiment. In addition, the project will help establish operating procedures and protocols for ICART to operate as a regional certification center. This research project will establish certification procedures of “stop and go” or “zero-speed” profilers for the ICART facility. It will demonstrate protocols using pilot certification of production profilers owned by willing agencies and contractors. Then, the new certification procedures will be used to evaluate the latest reference devices and inertial profilers.

Illinois Department of Transportation made a large investment in ICART. This research will benefit IDOT by characterizing the capability of the existing fleet of commercial profilers, establishing ways to certify the latest available technology, and it will help establish ICART as a regional certification facility. ICART will be better positioned to host future research projects related to nondestructive testing equipment.

## **RESEARCH TASKS AND REQUIRED DELIVERABLES**

The proposed research will address the following tasks.

Task 1 — Review the literature of the current practices, advancements, and challenges with profiler certification.

Task 2 — Take initial measurements to determine the ideal location in each certification test section. The certification sections will then be laid out and marked for a device that can produce reference profiles with a cross-correlation repeatability with 0.99 or higher, and test equipment to follow. Take reference measurements for comparison to the equipment subjected to testing in the following tasks. Document all steps as best practices for other sites/agencies to use in set up of future facilities.

Task 3 — Set up inertial profilers, transverse pavement profilers, and novel profilers for testing. Propose testing and analysis protocols for executing regional certification testing of conventional inertial profilers, including high-speed profilers, lightweight profilers, or novel profiler designs meant for production measurement. Demonstrate the proposed methods through pilot certification testing.

Task 4 — Evaluate and modify AASHTO R 56-14 to support “start and stop” profilers. Propose modifications to AASHTO R 56-14 for verifying profiler accuracy and repeatability in urban and low-speed operation. Include low-speed, braking, and stop-and-go operation. Demonstrate the proposed methods through pilot testing of “start and stop” and conventional profilers.

Task 5 — Evaluate available reference devices. Test the repeatability and accuracy of profile measurements from production reference devices (i.e., devices in common use) and candidate references devices (i.e., novel designs). Establish accuracy through comparison to profile measurements from the benchmark device detailed in Task 2.

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, 2024. Terms and conditions 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<br>(assuming an August 16 Start Date, and a 24 month project) | 2024 |   |    |    |    | 2025 |   |   |   |   |   |   |   |   |    |    |    | 2026 |   |   |   |   |   |   |   |
|--|------|---|----|----|----|------|---|---|---|---|---|---|---|---|----|----|----|------|---|---|---|---|---|---|---|
|  | 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 new IGA effective July 1, 2024, the indirect cost rate used for institutions with a federally negotiated F&A rate cannot exceed 42.97% 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.