



REQUEST FOR PROPOSAL #24-01

Estimation of the Load Rating of Existing Highway Bridges Based on Bridge Weigh-In-Motion Data

POSTED DATE: 4/1/2024

CLOSE DATE: 4/30/2024 at 11:59 p.m. CST

Submit Proposals to: ICTProjectManagement@illinois.edu

PROJECT INFORMATION

Funds:	\$500,000 total (includes a required 25% cost share of \$125,000 from proposing agency)
Estimated Contract Term:	36 months
Projected Start Date:	8/16/2024

BACKGROUND

As a state that receives a large amount of truck traffic, Illinois Department of Transportation's bridges help carry large amounts of truck traffic, both in number of trucks as well as tonnage. To facilitate this process, the Bureau of Bridges and Structures employs a wide variety of measures to make sure that trucks cross the state's bridges and structures in the safest manner with the fewest deviations from their planned routes.

To ensure safety and uninterrupted functionality, IDOT evaluates bridges for their reserve capacity for live loads per AASHTO load and resistance factor rating (LRFR) bridge specifications and Illinois statutes, which inform important maintenance decisions by IDOT (e.g., rehabilitation, load posting, or closure). As a result, load rating estimation is an essential management tool for IDOT. Previous works have shown that conventional analytical load ratings without bridge-specific information can often result in overly conservative load ratings. Live load factors specified by AASHTO LRFR are calibrated based on a broad collection of historical and conservative truck loads that do not necessarily reflect the actual traffic conditions of each bridge for which they are used.

OBJECTIVE

The objective of this research is to utilize the data from bridge weigh-in-motion (BWIM) systems for load ratings. This objective can be achieved by 1) using BWIM load data to determine LRFR load factors specific to the bridge, 2) extracting BWIM strains to determine live load distribution factors, and 3) using speed data to determine site-specific dynamic load allowance.

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 BWIM programs.

Task 2 — Develop proposed practices, policies, and methods to establish a BWIM program for IDOT.

Task 3 — Instrument IDOT structures with BWIM equipment for collection of real-time data, including axle weight, axle spacing, and gross vehicle weight as well as speed and strain. Develop a process for extraction and post-processing of data for use in load rating calculations.

Task 4 — Develop a BWIM system procedure including protocols for installation of BWIM instrumentation; collection of real-time data including axle weight, axle spacing, and gross vehicle weight speed, and strain; and extraction and post-processing of BWIM data for use in load rating calculations.

Task 5 — Develop a procedure for calculating load ratings using BWIM data: determine LRFR live load factors based on BWIM load data, determine live load distribution factors based on BWIM strain data, determine dynamic load allowance based on BWIM speed data, and develop criteria for how often BWIM-based load ratings should be re-evaluated based on changes to load patterns in the future.

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 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 (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.