



RESEARCH REQUEST FOR PROPOSAL (RRFP) #25-03

ARTIFICIAL INTELLIGENCE FOR PAVEMENT DISTRESS DETECTION AND MEASUREMENT USING SURFACE IMAGES

POSTED DATE: 5/8/2025; CLOSING DATE: 6/6/2025

PROJECT INFORMATION

Funds:	\$240,000
Estimated Contract Term:	24 months
Projected Start Date:	September 22, 2025
Deadline for Submitting Proposal:	4:30:00 PM (local time) 6/6/2025
Submit Proposal via Email to:	research@getipass.com

BACKGROUND

Accurate pavement condition evaluation is crucial for any toll road entity, as it directly impacts roadway safety, financial performance, and customer satisfaction. Reliable pavement condition data is especially critical for effective maintenance planning and its associated financial returns.

Over the past decade, transportation agencies have widely adopted 3D laser-based pavement imaging systems to automate pavement condition surveys. While these systems can capture precise measurements of surface distresses, current image processing techniques often fall short in accurately extracting pavement distress information. Most existing methods are not advanced enough to fully utilize the high-resolution 2D/3D pavement surface images and scans available.

To address this gap, the Illinois Tollway aims to develop more efficient pavement condition evaluation methods as part of its overall management strategy. Advances in artificial intelligence (AI), computer vision (CV), and machine learning (ML) offer a promising path for

creating innovative solutions that leverage updated capabilities to improve pavement assessment accuracy, repeatability, and objectivity.

OBJECTIVES

1. Establish a library of pavement 2D/3D images in a standard format (eg. AASHTO), representing varying combinations of pavement conditions, locations, and surface types of the Illinois Tollway pavement network. The 2D/3D images should be generated using systems similar, but not limited, to the Laser Crack Measurement System (LCMS).
2. Develop or enhance AI/ML models and tools for pavement condition assessment based on the 2D/3D image library. The AI/ML models will allow for measuring pavement condition metrics, such as individual distress types and aggregate scores, from 2D/3D images. Pavement condition assessment maybe based on existing ASTM standards, the Illinois DOT CRS methodology, or a newly developed metric (upon approval by the IL Tollway).
3. Test and validate the developed AI/ML models and tools on actual pavement imagery captured on the IL Tollway, representing varying pavement types, age groups, conditions, and locations.
4. Implement a functional and practical workflow where captured images can be gathered, organized, and processed through the developed AI/ML model to yield pavement condition metrics that can be used for pavement management and pavement maintenance planning by the Illinois Tollway.

RESEARCH TASKS AND REQUIRED DELIVERABLES

Several tasks are envisioned for completing this research project, as described below. Researchers are encouraged to propose additional tasks if it will produce better deliverables for this project.

- A. **Literature review:** Conduct thorough research review of published and unpublished material available related to the use of AI for pavement distress identification. Literature review should include interviews with relevant members of academia/research/industry communities working in the area of pavement distress evaluation and AI.
- B. **Development of a Research Work Plan:** Based on the findings from the literature review and the project objectives, the researcher will develop a detailed work plan outlining the tasks necessary to deliver an AI-based pavement condition identification tool that meets the research objectives. The research work plan must clearly identify the tasks required to gather data, develop and enhance AI/ML models, train and validate these models, and implement a process for the Illinois Tollway to determine pavement condition metrics from captured 2D/3D scans.

The proposal should include the researcher's current approach and methodology for achieving the project objectives. It must also address considerations and solutions for periodically updating and maintaining the AI/ML models over the five-year period following the project's conclusion. The Illinois Tollway is open to considering an ongoing maintenance and update agreement with the researcher to keep the final deliverables—models and software tools—updated for five years post-project. If the researcher has an existing AI/ML model that can be enhanced or modified for this project, the Illinois Tollway will consider a licensing agreement to retain access to the model, software tools, and update/maintenance support for five years after the project's conclusion. The Illinois Tollway will also consider Software-as-a-Service (SaaS) models as a deliverable.

The researcher must include plans to collaborate with the Illinois Tollway's IT department to identify requirements for software implementation. The proposal should reflect the researcher's current thinking on the development and deployment of the software tool.

- C. **Interim Report:** Prepare an interim report detailing findings of the literature review conducted by the research team as well as a thorough description of the Research Work Plan. The Interim Report must be submitted to the Illinois Tollway and approved prior to the Researcher moving advancing to the next task.
- D. **Execution of Research Work Plan:** Complete tasks and actions to execute the Research Work Plan identified in the Interim Report and approved by the Tollway.
- E. **Final Report:** Prepare a Final Report detailing all aspects of the project including methodology, results, recommendations, and deliverables.
- F. **Implementation Plan:** Prepare an Implementation Plan that the Tollway can use to implement the findings and deliverables of the project. The Implementation Plan must include a written documentation as well as training.

Deliverables that will be required throughout this project will include:

- Quarterly progress reports, in electronic format, containing a summary of effort performed during the quarter and expected progress for the following quarter including percent of remaining schedule and budget.
- Final report, in electronic format, summarizing the results and recommendations developed as a result of this research effort as contained in the Tasks A-F documents described above. A draft final report shall be submitted 45 days prior to the end date of the research contract. The Tollway will review and provide comments and feedback within 15 days of receipt of the draft final report. Then, the researcher shall have 30 days to address the comments and questions, make revisions, and resubmit the final report.
- An electronic copy (pdf) of all reports shall be submitted.

- All models, databases, and software tools developed as part of this project and needed to implement the research findings/results.
- An Implementation Plan that includes a “how to” manual as well as a training plan/program.

INSTRUCTIONS FOR SUBMITTING A PROPOSAL

The proposal shall be prepared in accordance with the guidelines presented in Appendix A. The contact name/email and due date are presented on the first page. All potential Principal Investigators (PIs) should read and understand the responsibilities of Illinois Tollway Principal Investigators, which are presented in Appendix B.

Technical questions regarding the research project or questions regarding the RFP procedures should be submitted to research@getipass.com by 2:00:00 p.m. (local time) on 5/22/2025. Technical questions that are received by 2:00:00 p.m. (local time) on 5/22/2025 will have the question and answers posted on the Tollway's website at least 3 days before the proposal due date.

SPECIAL CONDITIONS FOR REVIEWING PROPOSALS AND AWARDING ILLINOIS TOLLWAY FUNDS

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

- 1) The award of this project is contingent upon the availability of funds at the time of award.
- 2) Tollway research projects are entered into through an Intergovernmental Agreement. Therefore, the lead institution in a successful proposal is required to meet the definition of a "public agency" pursuant to Illinois' Intergovernmental Cooperation Act (5 Ill. Comp. Stat. 220) in order to enter into an Intergovernmental Agreement to complete the project. Prior to notification of a successful proposal, the Tollway may request the lead institution's W-9 form to verify compliance with this requirement.
- 3) The lead institution must perform at least 35% of the work (budgeted costs).

APPENDIX A: GUIDELINES FOR PREPARING A PROPOSAL FOR THE ILLINOIS TOLLWAY

Please use the following format for submitting a Tollway proposal for consideration. Please limit your total proposal to 5 pages in length (not including the Cover/Summary Page or optional Appendices), ensure file size is less than 5 MB, and use a font size no smaller than 10. We suggest Arial font with 1.5 spacing between lines.

1. Cover/Summary Page

Use the cover page included in Appendix C.

2. Research Plan

The research plan should describe in a specific and straightforward manner the proposed approach for solving the problem described in the problem statement. The research plan should be subdivided into the following sections:

(a) Introduction, including Research Idea Statement

Provide an introduction to the proposal and 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 the details of how the investigator will carry out the project and accomplish the project objectives. Itemize the tasks to be completed, explaining each in sufficient detail so the reviewers understand what will be done for each task and what will be produced or completed with each task.

(c) Anticipated Research Results

Specifically state the anticipated research results and deliverables.

(d) Applicability of Results to Illinois Tollway Practice

Describe how the anticipated research results can be used to improve Tollway practices.

3. Qualifications and Accomplishments of the Research Team

Identify who will perform the research and provide a brief explanation of each researcher's qualifications to perform the research. Please provide examples of similar research that the proposed individuals have performed.

4. Other Commitments of the Research Team

Briefly outline the other commitments of the proposed principal and co-principal investigators to demonstrate that both will be able to fulfill the commitments of the proposal.

5. Equipment and Facilities

Describe the facilities and equipment available to undertake the research proposal.

6. Time Requirements

Describe the time that will be required to complete the research proposal, including final report preparation, Tollway editing, review of the report by the Technical Review Panel (TRP), and final review/publishing of the report. Include a timeline for each task.

7. Itemized Budget

Provide an itemized budget for each of the Phases of the project and for the entire project, including the cost of personnel, consultants, subcontracts, equipment, materials, travel, overhead/indirect costs and cost share (match). The Illinois Tollway believes that an overhead/indirect rate of 20% is reasonable and competitive. Justification shall be provided if an indirect cost rate in excess of 20% is used. Please itemize equipment and travel requests, especially any requested out-of- state travel or planned attendance at conferences.

8. Cooperative Features (if appropriate)

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

9. Appendices (if appropriate)

You may include such things as statements regarding previous work on the problem or related problems, abstracts of related projects, a bibliography or list of references, or materials describing the submitting organization.

APPENDIX B: RESPONSIBILITIES OF ILLINOIS TOLLWAY PRINCIPAL INVESTIGATORS

1. Prepare and submit a project work plan and multi-year line-item budget, consistent with the Tollway RFP for the newly-approved research project.
2. Meet with the Technical Review Panel (TRP) and revise the project work plan and multi-year budget, as agreed with the TRP.
3. Assist the TRP chair in preparing an Implementation Planning Worksheet and work throughout the project to identify the expected benefits of the research, e.g., construction savings, operation and maintenance savings, increased lifecycle, safety, etc.
4. Carry out the project as agreed with the TRP, or notify the TRP if any problem develops regarding the project.
5. Provide online quarterly progress reports to the TRP chair for review and approval.
6. Attend TRP meetings to provide project updates and answer TRP members' questions about the project.
7. Provide the TRP a synopsis of the project's implementation potential as well as implementation strategies. In conjunction with the TRP, develop Implementation activities/ tools such as draft specifications, policy guidelines, software, and training on new test/ practice/ equipment/ software and develop an implementation cost estimate, if applicable.
8. Near the completion of the research project, draft a final research report in accordance with the Tollway report format. (The timeline for the work plan must allow adequate time to prepare the report, typically three months.)
9. At least 45 days before the end date for the project, submit the draft final report to the Tollway for review and work with the TRP chair to finalize the content of the report.
10. Re-submit the final report to the Tollway for publication. The Tollway will post the final report to the Tollway website.
11. The publication or release of all work products, any information that is deemed confidential by the Tollway, or information which includes patentable results may not be published/ released without the Tollway's approval.

12. Include the Illinois Tollway acknowledgement statement and disclaimer statement (available on the Tollway website) in all publications and presentations regarding research sponsored partially or fully by the Tollway.



**APPENDIX C:
PROPOSAL COVER SHEET FOR
SOLICITATION #25-03**

**ARTIFICIAL INTELLIGENCE FOR PAVEMENT DISTRESS
DETECTION AND MEASUREMENT USING SURFACE IMAGES**

DUE: 6/6/2025
TO: research@getipass.com

Submitted by: (Include Name and Address of Organization)	
Proposed Investigator(s):	
Corresponding Investigator Name:	
Corresponding Investigator Phone:	
Corresponding Investigator Fax:	
Corresponding Investigator Email:	
Submission Date:	