

National Concrete Pavement Technology Center

Under

Cooperative Agreement with the Federal Aviation Administration

Airport Concrete Pavement Technology Program

Request for Proposal (RFP) ACPTP-2021-3

Best Practices for Rapid Repair, Rehabilitation and Reconstruction of Concrete Airport Pavements

RESEARCH PROBLEM STATEMENT

In 2002 the Innovative Pavement Research Foundation (IPRF) developed a *Guide for Accelerated Airfield Concrete Pavement Rehabilitation and Reconstruction (Planning, Design, Execution)*. This guide was based on materials and processes that were available at that point in time. The guide contained case studies documenting approaches and practices for accelerated construction for various types of projects. The guide considered projects that had to be completed overnight as well as any project that had a compressed completion schedule as an accelerated project. In today's environment, any closure can have even more detrimental impacts on airport operations than in the past. Research is needed to develop guidance for design engineers and contractors for rapid rehabilitation practices using current technologies.

Current FAA pavement design guidance is contained in FAA Advisory Circular 150/5720-6(G) *Airport Pavement Design and Evaluation*. This guidance assumes standard pavement design coupled with standard construction practices will be used for a project. The design is supported by the FAA Rigid and Flexible Iterative Elastic Layer Design (FAARFIELD) computer software to assist with pavement design. Currently the design guidance does not consider factors that should be considered when a significant schedule reduction is needed. When engineers determine the need for rapid construction for an airport project, the airport sponsor and the FAA both have concerns because there are no standards to support the design decisions or fast-track construction processes. This lack of guidance often leads to the engineer filing a modification to standards (MOS) to use a non-standard typical pavement section or non-standard materials to aid in expediting construction. Documenting the need and filing an MOS can be complicated and time consuming. Oftentimes, a MOS fails to consider impacts to the construction specifications or construction processes. This potential lack of vetting all aspects of the construction through the MOS during the design phase of a project can raise difficulties for both the engineer and the contractor during construction. So, the need exists to develop guidance that considers both the design and construction of reduced schedule projects such that airport sponsor, the FAA, and the engineer of record have design and construction standards to support processes that they can reference with confidence.

OBJECTIVES

The aim of the work in this RFP is to build upon the accelerated construction guide and case studies developed under the IPRF program to develop the guidance and standards for rapid construction projects such that the engineer, airport sponsor and FAA have guidance they can rely on to provide quality concrete pavements under rapid construction practices. Topics to address include, but are not limited to

- Develop tools and/or standards that will allow for the fast-track pavement design and construction without the need for a MOS.
- Develop language to provide guidance to be included in AC 150/5320-6 such that if an engineer determines that fast-track construction is necessary to meet a rehabilitation or reconstruction project requirements, they have design guidance to support fast-track construction methods.
- Develop language to provide guidance on FAA requirements for benefit-cost analyses (BCA) to be completed in the project planning phase to support the justification for using rapid construction for all capacity projects that require more than \$10 million in federal AIP discretionary funds.
- Discuss the factors to be evaluated when considering project fast-tracking including criteria for justifying rapid construction as opposed to traditional approaches.
- Determine if changes to the standard parameters required in the FAA pavement design software, FAARFIELD, are needed so that when a fast-track project is selected, a standard pavement design can be accomplished.
- Determine if modifications to P-501 are necessary to make it consistent with fast-track construction. Examples may include additional “Notes to the Engineer” in P-501 on how to modify the specifications to be consistent with fast-track paving processes, material acceptance, etc.
- Review and determine if changes to other specifications may be recommended to accommodate fast-track processes.
- Consideration should be given to all pavement layers from the subgrade to base selection.
- Include information / research into concrete pavement strength gain such that guidance can be determined on opening pavement to construction traffic.
- Review and recommend timing of ancillary item installation such as drilling and inserting dowel bars, grooving, installing pavement markings, installing electrical items and installing in-pavement light cans.
- Consider cost differences between performing regular and expedited construction.

The intention of this project is that the primary deliverable will be a research report that suggests changes or additions to FAA Advisory Circular 150/5320-6 or Advisory Circular 150/5370-10; Item P-501 or other pertinent P-specification items to develop standards for fast-track construction such that modifications of current standards are unnecessary. Additionally, the researcher should investigate the possibility for updates to FAA AC 5370-16 *Rapid Construction of Rigid PCC Airfield Pavements* and FAA AC 5300-9 *Predesign, Prebid, and Preconstruction Conferences for Airport Grant Projects*. The research may potentially lead to development of a separate advisory circular and guide specification that can be referenced by the engineer of record for specific guidance when fast-track construction must be used.

TASKS

The Principal Investigator (PI) will be responsible for developing a series of sub-tasks that when completed will result in completion of the objectives of this study within the time and budget available. The proposal does not necessarily need to reflect the exact budget or the performance period indicated in the RFP; however, any deviation must be justified and clearly explained.

Task 1 - Literature Review

The literature review should include at a minimum:

- Publications, reports, and papers addressing rapid repair, rehabilitation, and reconstruction of concrete pavement – with a focus on airfield applications.
- How concrete mixtures, paving activities, and ancillary work should be adjusted for rapid construction without compromising pavement serviceability and performance
- Specifications used by pavement owner / agencies to facilitate rapid construction
- Records of performance of airfields built / rehabilitated using rapid construction methodologies
- Research on rapid airfield pavement repair and small pavement rehabilitation strategies currently being conducted under other funding sources.

IMPORTANT: The PI is encouraged to use a means other than a survey to identify the sources of information. A survey is defined as the random distribution of a standard list of questions that seek trends for forecasting information.

Task 2 – Work Plan

The PI will develop a work plan to describe the activities planned to address the objectives of this project. The plan will include time for reviewing a draft final report and completed final report. The Project Technical Panel (PTP) will meet in-person with key members of the research team to discuss the final work plan. The PI shall not proceed with Task 3 until the PTP has reviewed and approved the work plan.

Task 3 – Project Implementation

After approval of the work plan, the PI may proceed with the project that should include:

- Data collection and analysis
- Development of any protocols, provisions, or recommendations that should be included in airfield pavement design guidance and fast-track construction specifications
- Development of an implementation and education plan
- Final report

Task 4 – Draft and Final Report

A draft final report will be submitted to the ACPTP project director three months prior to the end of the contract. The PI and the PTP will meet to discuss the work conducted and the outcomes of the project. The one-day meeting will be held at a mutually agreed upon location for 1-2 key members of the research team; a virtual meeting may be substituted at the discretion of the PTP and ACPTP project director. The PI will have 1 month to submit a final 508 compliant report.

Depending on the outcome of this work, a second phase that includes field demonstrations may be considered by the PTP.

REPORTS

The following reports will be required

- Literature review and work plan for PTP review and approval
- Quarterly progress reports detailing work conducted and data collected
- Draft final report for PTP review and approval
- Final; 508 compliant, report

FUNDS AVAILABLE: Not to exceed \$750,000

CONTRACT TIME: Not to exceed 39 months;
Literature review 6 months
Work plan 30 months
Draft/Final reports 3 months

ACPTP PROJECT DIRECTOR: Dr. Peter Taylor, ptaylor@iastate.edu; 515-294-9333

QUESTIONS ON RFP: E-mail to ACPTP@iastate.edu prior to October 15, 2021. Answers will be posted at <https://cptechcenter.org/airport-pavements/acptp/>

PROPOSAL PREPARATION INSTRUCTIONS: <https://cptechcenter.org/airport-pavements/acptp/>

ESTIMATED NOTICE TO PROCEED DATE: January 1, 2022

PROPOSAL DUE DATE: October 29, 2021 not later than 4:00 P.M. (Central Time)

PROPOSAL SUBMIT TO: ACPTP@iastate.edu (PDF proposal plus Excel spreadsheet, see proposal instructions)