Request for Statements of Interest
Funding Opportunity Announcement

Federal Awarding Agency:
U.S. Army Corps of Engineers,
Engineer Research and Development Center
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

Funding Opportunity No: W81EWF-20-SOI-0036
CFDA No: 12.630
Statutory Authority: 10 USC 2358
Program Title: Implementing lifecycle characterization of embedded dam gate anchorage using non-destructive testing and structural health monitoring
Announcement Type: Initial announcement
Issue Date: 10 July 2020
Statement of Interest/Qualifications Due Date: 09 August 2020, 1400 hours, CST
Full Application Package Due Date, if Invited: 31 August 2020, 1400 hours, CST
Estimated Award Ceiling: $1.3M
Expected Number of Awards: 1
Expected Period of Performance: 3 Years

Section I: Funding Opportunity Description

Background:

U.S. federal and state government agencies manage and operate an inventory of dams that protect property, environment, and lives from floods, facilitate navigation along the U.S. river systems, provide water supply, create opportunities for hydropower generation, and create lakes for recreation use. Dam spillway gates are important components of a dam. They allow control of pool elevation along rivers and allow control of water during a flood event. Many spillway gates use post-tensioned anchor rods embedded into concrete during construction. After many years, the safety and reliability of these anchor rods is in question, as their deterioration may result in failure of the dam to serve its intended purpose, possibly leading to loss of life or major economic impacts. Unfortunately, these rods are mostly inaccessible for inspection, being embedded in concrete.

Recently, several non-destructive testing (NDT) methods have been developed for finding cracks or flaws on an embedded gate rod or determining the tension in existing ungrouted rods. However, it is not clear how these variables impact dam reliability nor how/when to remediate rods to increase reliability where appropriate. Information is even less clear for grouted type rods. There is a need to understand the lifecycle of embedded anchor rods such that efficient, effective, and proactive maintenance and repair strategies can be programmed and implemented to increase the national safety and reliability of the dam inventory. Recent research has been conducted which laid out a plan to finalize trunnion rod lifecycle characterization methods and provide an implementable NDT and assessment technique. Preliminary work was conducted along that play, but the full effort is still needed.

Brief Description of Anticipated Work:

The purpose of this research is to characterize the lifecycle of embedded dam gate anchorage such that risk can be assessed and managed efficiently and effectively by dam owners and to finalize an implementable technique for dam owners. Specifically, the objectives include:

Objective 1: Characterize dam gate anchorage lifecycles, specifically ungrouted trunnion rod anchorage commonly found on river and reservoir dam spillway gates for the purposes of assessing risk and reliability. The lifecycle should consider all relevant geometric, material, operational, and environmental variables in its definition. The lifecycle should describe clearly a measure of reliability of anchor rods, or groups of anchor rods if more appropriate, as a function of time given current conditions/knowledge. Uncertainty of all variables should be included and appropriately propagated through the lifecycle description to the outputs of reliability. The lifecycle should be able to be used by dam owners to assess degradation rates and plan maintenance and remediation strategies proactively. Physical and numerical modeling may be required for this and other objectives as may field measurements at U.S. dam sites.

Objective 2: Identify information and observations about the current conditions that can be procured to reduce uncertainty in the lifecycle. These may be from structural health monitoring technologies or testing, whether destructive or nondestructive (NDT), such as guided waves, ultrasonic methods, pull-off tests, or others. Develop a methodology for updating a lifecycle with this new information and a “value of information” process by which a dam owner can decide whether to “purchase” this new information. Provide information about frequency of updating information if deemed appropriate.

Objective 3: Identify remediation or repair strategies that can have a positive effect on the lifecycle and demonstrate through examples how an engineer or dam owner would use the lifecycle to decide on a best course of action. These strategies could be to isolate certain environmental effects, reduce anchor tension, replace anchors, etc.

Objective 4: Investigate the applicability of existing NDT methods to grouted trunnion rod anchors as well as how a grouted rod lifecycle may differ from that of an ungrouted rod.

Previous work has established a technical development roadmap, which should inform the technical approach for this research. The existing technical development roadmap is:
Task 1: Review previous research conducted by USACE relevant to grouted and ungrouted trunnion rod assessment and NDT.
Task 2: Identify and describe potential failure modes specific to post-tensioned anchor rods, both grouted and ungrouted.
Task 3: Estimate likelihood of post-tensioned anchor rod brittle failure due to stress corrosion cracking, considering existing methods of identifying defects and performing necessary analytical modeling.
Task 4: Develop anchorage analysis methods under variable post-tensioned rod loads, utilizing finite element analyses calibrated as necessary.
Task 5: Conduct laboratory testing to validate numerical models.
Task 6: Develop a simplified method to estimate likelihood of rod failures.
Task 7: Characterize ungrouted trunnion rod anchorage lifecycles with respect to risk and reliability assessment.
Task 8: Identify information and observations about the current conditions that can be procured to reduce uncertainty in the lifecycle, considering structural health monitoring and NDT used update lifecycle models.
Task 9: Identify remediation or repair strategies and their expected impact on lifecycle performance.
Task 10: Investigate the applicability of existing NDT method to grouted trunnion rod anchors as well as how a grouted rod lifecycle may differ from that of an ungrouted rod.

Public Benefit:

This research will benefit the public through the quantification of dam gate anchorage reliability and the increased accuracy of risk assessment tools used by federal and state dam owners. Increased accuracy in risk assessment will enable more effective maintenance and asset management of the U.S. dam inventory which will result in a decrease in expected loss of life and property damage due to flood hazards and an increase in dam performance along navigable rivers.

Section II: Award Information

Responses to this Request for Statements of Interest will be used to identify potential investigators for studies to be sponsored by the Engineer Research and Development Center to provide a report characterizing the lifecycle of embedded dam gate anchorage such that risk can be assessed and managed efficiently and effectively by dam owners and to finalize an implementable technique for dam owners. The estimated level of total funding for this project is approximately $1.3M.

Government Involvement:

How will the government be substantially involved?

Section III: Eligibility Information

1. **Eligible Applicants – This opportunity is restricted to non-federal partners of the Southern Appalachian Mountains Cooperative Ecosystems Studies Unit (CESU).**

2. Cost Sharing – This action will be 100% funded by USACE.

Section IV: Application and Submission Information – Two Phase Process

Phase I: Submission of a Statement of Interest/Qualifications.

1. Materials Requested for Statement of Interest/Qualifications:
    a. Please provide the following via e-mail attachment to: stacy.d.thurman@usace.army.mil (Maximum length: 2 pages, single-spaced 12 pt. font).

1. Name, Organization and Contact Information

2. Brief Statement of Qualifications (including):
   - Biographical Sketch,
   - Relevant past projects and clients with brief descriptions of these projects,
   - Staff, faculty or students available to work on this project and their areas of expertise,
   - Any brief description of capabilities to successfully complete the project you may wish to add (e.g. equipment, laboratory facilities, greenhouse facilities, field facilities, etc.).

Note: A proposed budget is NOT requested at this time.

b. The administrative point of contact is Stacy Thurman; stacy.d.thurman@usace.army.mil

2. Statement of Interest/Qualifications shall be submitted NO LATER THAN 09 August 2020, 1400 hours, CST.

Based on a review of the Statements of Interest received, an investigator or investigators will be invited to move to Phase II which is to prepare a full study proposal. Statements will be evaluated based on the investigator's specific experience and capabilities in areas related to the study requirements.

Phase II: Submission of a complete application package to include a full technical proposal including budget, if invited.

1. Address to Request Application Package

The complete funding opportunity announcement, application forms, and instructions are available for download at Grants.gov.

The administrative point of contact is Stacy Thurman; stacy.d.thurman@usace.army.mil

2. Content and Form of Application Submission

All mandatory forms and any applicable optional forms must be completed in accordance with the instructions on the forms and the additional instructions below.

a. SF 424 R&R - Application for Federal Assistance
b. Full Technical Proposal – Discussion of the nature and scope of the research and technical approach. Additional information on prior work in this area, descriptions of available equipment, data and facilities, and resumes of personnel who will be participating in this effort should also be included.
c. Cost Proposal/Budget – Clear, concise, and accurate cost proposals reflect the offeror's financial plan for accomplishing the effort contained in the technical proposal. As part of its cost proposal, the offeror shall submit cost element breakdowns in sufficient detail so that a reasonableness determination can be made. The SF 424 Research & Related Budget Form can be used as a guide. The cost breakdown should include the following, if applicable:
   1. Direct Labor: Direct labor should be detailed by level of effort (i.e. numbers of hours, etc.) of each labor category and the applicable labor rate. The source of labor rates shall be identified and verified. If rates are estimated, please provide the historical based used and clearly identify all escalation applied to derive the proposed rates.
   2. Fringe Benefit Rates: The source of fringe benefit rate shall be identified and verified.
   3. Travel: Travel costs must include a purpose and breakdown per trip to include

destination, number of travelers, and duration.

4. Materials/Equipment: List all material/equipment items by type and kind with associated costs and advise if the costs are based on vendor quotes and/or engineering estimates; provide copies of vendor quotes and/or catalog pricing data.
5. Subrecipient costs: Submit all subrecipient proposals and analyses. Provide the method of selection used to determine the subrecipient.
6. Tuition: Provide details and verification for any tuition amounts proposed.
7. Indirect Costs: Currently the negotiated indirect rate for awards through the CESU is 17.5%.
8. Any other proposed costs: The source should be identified and verified.

3. <u>Application package shall be submitted NO LATER THAN 31 August 2020, 1400 hours, CST.</u>

4. Submission Instructions

Applications may be submitted by e-mail. Format all documents to print on Letter (8 ½ x 11") paper. E-mail proposal to stacy.d.thurman@usace.army.mil

Or

Grants.gov: https://www.grants.gov/:
Applicants are not required to submit proposals through Grants.gov. However, if applications are submitted via the internet, applicants are responsible for ensuring that their Grants.gov proposal submission is received in its entirety.

All applicants choosing to use Grants.gov to submit proposals must be registered and have and account with Grants.gov. It may take up to three weeks to complete Grants.gov registration. For more information on registration, go to https://www.grants.gov/web/grants/applicants.html.

Section V: Application Review Information

1. **Peer or Scientific Review Criteria:** In accordance with DoDGARs 22.315(c), an impartial peer review will be conducted. Subject to funding availability, all proposals will be reviewed using the criteria listed below (technical and cost/price). All proposals will be evaluated under the following two criteria which are of descending importance.

   a. **Technical (items i. and ii. are of equal importance):**
      i. Technical merits of proposed R&D.
      ii. Potential relationship of proposed R&D to DoD missions.

   b. **Cost/Price:** Overall realism of the proposed costs will be evaluated.

2. **Review and Selection Process**

a. **Categories:** Based on the Peer or Scientific Review, proposals will be categorized as Selectable or Not Selectable (see definitions below). The selection of the source for award will be based on the Peer or Scientific Review, as well as importance to agency programs and funding availability.

i. **Selectable:** Proposals are recommended for acceptance if sufficient funding is available.

ii. **Not Selectable:** Even if sufficient funding existed, the proposal should not be funded.

Note: The Government reserves the right to award some, all, or none of proposals. When the Government elects to award only a part of a proposal, the selected part may be categorized as Selectable, though the proposal as a whole may not merit such a categorization.

b. No other criteria will be used.

c. Prior to award of a potentially successful offer, the Grants Officer will make a determination regarding price reasonableness.

Section VI: Award Administration Information

1. Award Notices
   Written notice of award will be given in conjunction with issuance of a cooperative agreement signed by a Grants Officer. The cooperative agreement will contain the effective date of the agreement, the period of performance, funding information, and all terms and conditions. The recipient is required to sign and return the document before work under the agreement commences. **Work described in this announcement SHALL NOT begin without prior authorization from a Grants Officer.**

2. Administrative Requirements
   The cooperative agreement issued as a result of this announcement is subject to the administrative requirements in 2 CFR Subtitle A; 2 CFR Subtitle B, Ch. XI, Part 1103; and 32 CFR Subchapter C, except Parts 32 and 33.

3. Reporting
   See 2 CFR Sections 200.327 for financial reporting requirements, 200.328 for performance reporting requirements, and 200.329 for real property reporting requirements.

Section VII: Agency Contact

Stacy Thurman, Grants Specialist
stacy.d.thurman@usace.army.mil