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-0029

CFDA No: 12.630

Statutory Authority: 10 USC 2358

Project Title: Levee Monitoring with Distributed Strain Sensing, Black Hawk, LA

Announcement Type: Initial announcement

Issue Date: 4 June 2020

Statement of Interest/Qualifications Due Date: 17 July 2020, 1PM CDT

Full Application Package Due Date, if Invited: 14 August 2020, 1PM CDT

Estimated Award Ceiling: $90,000

Estimated Total Program Funding: $180,000 (base plus optional year)

Expected Number of Awards: The government may issue more than 1 award from this announcement.

Section I: Funding Opportunity Description

Background:

In 2017, during a high-water event, a sand boil was discovered in a borrow pit located on the outside of the levee on the west bank of the Mississippi River in Black Hawk, LA, south of Vidalia, LA (Figure 1), and remediated by the USACE Vicksburg District, which involved covering the boil with a layer of crushed rock (Figure 2). In addition, relief wells were drilled to relieve excess subsurface hydrostatic pressures for underseepage control. This area has been selected as a proof-of-concept in using fiber optics as an option for persistent monitoring.

Figure 1. Black Hawk site south of Vidalia, LA.

The goal of this project is to determine the feasibility of using distributed fiber optic sensing to detect and monitor seepage and/or boil formation in levees. This project proposes to use two types of distributed fiber optic sensing: distributed strain sensing (DSS) and distributed acoustic sensing (DAS). Both are established techniques for measuring strain and seismic signals using optical fiber. The optical cable, which typically contains several strands of fiber, can be tens of kilometers in length, thus providing the opportunity to monitor large areas. For both systems, the spatial resolution is on the order of meters.

Figure 2. Remediated sand boil at the Black Hawk site. The gravel pad lies over the boil and extends into the borrow pit, surrounded on three sides by water.

Brief Description of Anticipated Work:

The emphasis in this Statement of Interest is in DSS. In this approach, an interrogator is connected to the fiber optic cable. The interrogator is a “black box” that contains a laser that injects laser pulses into the optical fiber. The interrogator receives light backscattered from imperfections in the fiber. Via a mechanism referred to as Brillouin scattering, the frequency of light backscattered from points in the fiber is shifted an amount proportional to the strain. These return signals are used to determine the strain at points all along the length of the fiber.

A distributed fiber optic test bed will be designed and installed at the Black Hawk, LA site (Figure 3). For the DSS installation, vertical sections of fiber are proposed so that the fiber optic cable can extend through the clay blanket and into the sand substratum, as shown in Figure 4. The purpose of this configuration is to measure vertical strain. The idea is that during a flood event, seepage will cause the pressure to increase within the sand substratum, pushing up on the clay top stratum, or blanket, thereby inducing strain in the vertically oriented fiber.

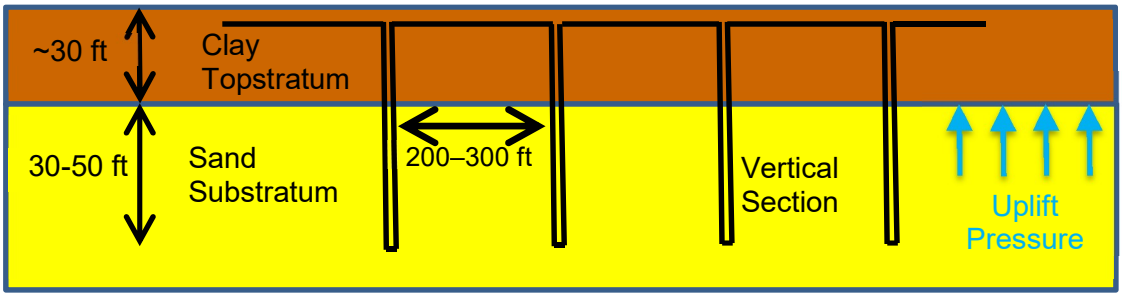
There are two areas of potential collaboration in applying DSS to the detection of seepage. One isto provide input in the design of the test bed. The second is in assisting to analyze and interpret data acquired with the DSS interrogator, to include developing algorithms to record, monitor, and display the signals over time.

To interpret DSS signals and associate them to detected events, the signals will be recorded, analyzed, and compared with data acquired from corroborating sensors (e.g., piezometers and resistivity probes) to aid in their interpretation. Algorithms will need to be developed to interpret these signals and associate them to detected events.
The objectives of the proposed effort include:

Objective 1: To provide input in the design of the test bed to be installed at the Black Hawk site. The collaborators will provide the DSS interrogator to be installed at the site to record measurements over the length of the project.

Objective 2: Aid in the analysis and interpretation of the data acquired using the DSS interrogator. This includesthe development of algorithms to record data, process data for continuous monitoring and display results.

Figure 3. Proposed configuration for the installation of fiber optics, Black Hawk, LA.



Public Benefit:

The goal of this research is to develop and evaluate technologies for monitoring the health and integrity of levees and earthen dams. This research will have an impact on public safety by providing evidence to stakeholders of potential problems so that they can be mitigated before failure, thus avoiding catastrophic events that could affect lives and property.

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 (ERDC) to investigate the use DSS to monitor levees for seepage. The estimated level of funding for FY20 is approximately $90,000. Additional funds of $90,000/year for 1 additional year may be available, providing the potential funding of $180,000 over 2 years to the successful Recipient/Awardee

Government Involvement:

The ERDC will design and install the instrumentation at the Black Hawk site. This will include fiber optic cables for DSS and DAS, as well as corroborating sensors. The ERDC will be responsible for acquiring data and making it available to project participants. In addition, they will develop algorithms for processing and analyzing data acquired by the DSS and DAS systems. They will also analyze the data acquired by the corroborating sensors for comparison with the DSS and DAS results.

Section III: Eligibility Information

1. Eligible Applicants – This opportunity is restricted to non-federal partners of the Californian 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: Chelsea.M.Whitten@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.

    The administrative point of contact is Chelsea Whitten, 601-634-4679; Chelsea.M.Whitten@usace.army.mil

2. Statement of Interest/Qualifications shall be submitted NO LATER THAN 17 July

2020, 1PM CDT.

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 Chelsea Whitten, 601-634-4679; Chelsea.M.Whitten@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. Application package shall be submitted NO LATER THAN 14 August 2020, 1PM CDT

4. Submission Instructions

Applications may be submitted by mail, e-mail, or Grants.gov. Choose ONE of the following submission methods:

a. E-mail:
Format all documents to print on Letter (8 ½ x 11") paper. E-mail proposal to Chelsea.M.Whitten@usace.army.mil

b. 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

Chelsea Whitten, Grants Officer
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Vicksburg, MS 39180-6199
Chelsea.M.Whitten@usace.army.mil

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