

**CIVIL WORKS
BROAD AGENCY ANNOUNCEMENT
W912HZ-23-BAA-02**

**U.S. Army Corps of Engineers (USACE)
Engineer Research and Development Center (ERDC)**

SECTION A: INTRODUCTION

The Engineer Research and Development Center (ERDC) is issuing this Civil Works Broad Agency Announcement (BAA) in accordance with FAR 35.016 as a means of soliciting proposals for basic and applied research. This announcement is being used to fulfill individual Civil Works Program requirements for scientific study and experimentation directed toward advancing state-of-the-art or increasing knowledge or understanding rather than focusing on a specific system or hardware solution. Proposals submitted under this announcement will be subject to scientific or peer review.

“Basic Research” is defined as research directed toward increasing knowledge in science with the primary aim being a fuller knowledge or understanding of the subject under study, rather than any practical application of that knowledge.

“Applied Research” is the effort that normally follows basic research, but may not be severable from the related basic research; attempts to determine and exploit the potential of scientific discoveries or improvements in technology, materials, processes, methods, devices, or techniques; and attempts to advance the state-of-the-art.

Each submission in response to this announcement will be considered a pre-proposal and shall be submitted in accordance with SECTION C. Should ERDC’s review of the pre-proposal indicate a need for a full proposal, one will be requested by the Contracting Officer. **Pre-proposals are due by close of business 26 June 2023.**

All offerors must be registered and active in the System for Award Management (SAM) at <https://sam.gov/content/home> prior to pre-proposal submission.

SECTION B: REQUIREMENTS

The USACE and its Civil Works mission areas of commercial navigation, flood and coastal storm risk management, and aquatic ecosystem restoration will play an essential role in energizing the US economy as we recover from recent crises and prepare for the future challenges facing our Nation. Investments in Civil Works are critical in generating near- and long-term benefits for securing our communities, supporting, and growing our economy, creating jobs, and enhancing broader societal impacts such as improved public health, National security, recreation, and tourism.

The ERDC intends to obtain pre-proposals and subsequent full proposals that respond to the following individual Civil Works Program Requirements:

CW-01: Non-Destructive Evaluation and Geophysics Research

The Corps of Engineers requires a robust understanding of existing conditions of built infrastructure to support optimized asset management approaches and maintenance prioritization. New and advanced inspection technologies are required to improve our ability to detect and quantify conditions in infrastructure projects. The technologies will require fundamental research to improve our understanding of mechanisms and their utility for infrastructure assessment. This effort focuses on fundamental research on advanced non-destructive evaluation (NDE) systems and geophysical characterization technologies for concrete, steel, and geotechnical infrastructure systems. The work will focus on NDE tools and related fundamental research that will advance the Corps' future infrastructure assessment methodologies. The following basic and applied research topics are of interest:

- 1) Study and method development for utilization of raw X,C,L, and S band synthetic aperture radar data, processing, and basic analysis for interferometric SAR (InSAR) applications in geotechnical and structural infrastructure assessment.
- 2) Identification, feasibility, and practicality of geophysical / seismic imaging technologies, models, and underlying mechanisms that enable characterization of subsurface geology and blanket thickness beneath a levee or other earthen structure.

CW-02: In-Situ Robotic Repair and Rehabilitation Technology

The advancement of mobile robotic systems that can integrate sensors and manufacturing technologies have tremendous potential to modernize the Corps' long-term approach to conduct repair and maintenance operation. This effort will focus on three lines of effort to develop and demonstrate robotic capabilities for critical infrastructure repairs: (1) ground and underwater highly portable robotic platforms, (2) nondestructive evaluation and sensing systems, (3) manufacturing approaches that allow for in-situ concrete, steel, and coating repairs. To enable these future technologies, fundamental research in multiple areas is required, to include the following priority areas for basic and applied research:

- 1) Robotics based concrete assessment and repair to include novel sensing technologies, models for damage characterization, and chemical / mechanical assessment to include cracks, scaling, delamination, corrosion, and other phenomenon.
- 2) Fundamental study of processes and methodology for underwater additive friction stir deposition for manufacturing and repair in-situ on infrastructure projects.
- 3) Repair of corrosion damage or pitted surfaces using additive manufacturing with limited surface preparation to study surface preparation procedures, materials and manufacturing sciences, and lifecycle durability factors of repairs.

CW-03: Sustainable Construction and Repair Materials

This initiative focuses on rapidly advancing materials and systems with significant potential for reducing the embodied energy of infrastructure. The effort will leverage development made in prior interagency projects focused on sustainable materials for next generation transportation infrastructure as well as many recent advancements in industry on alternative low GHG emitting cement chemistries, carbon-capture / carbon sequestration construction materials, and bio-based building products. Benefits of this effort will be a reduction in lifecycle carbon footprint of construction materials used in Civil Works megaprojects, particularly concrete. To support these activities, fundamental study is required in the following areas for basic and applied research:

- 1) Performance-based test methods and testing methodologies for concrete materials and mixtures including novel cement chemistries and alternative cementitious materials.
- 2) Multi-physics / chemo mechanical modeling of alkali-silica reaction, expansion, and damage in mass concrete to include constitutive modeling development.
- 3) Life cycle assessment modeling approaches of sustainable materials for mass concrete.
- 4) Fundamental studies of lower-embodied-energy cements and alternative cementitious materials.
- 5) Study of viability and engineering approaches of reinforced carbonated cement chemistries and concrete to ensure lifecycle durability.
- 6) Chemo-mechanical modeling of concrete for performance and durability.

CW-04: Mitigation of Overtopping Damage in Geotechnical Projects

Damage caused by overtopping of geotechnical structures, such as dams or levees, is a potential source of disastrous consequences for the U.S. public. There exist several potential technologies and methodologies that could be implemented by USACE to mitigate this damage and reduce losses due to flooding, such as novel soil treatments and coatings. Studies are needed to evaluate the full spectrum of available technologies and the associated knowledge gaps which would prevent implementation

into practice. Research is needed to fill these knowledge gaps and to test the usage of technologies at operational projects. A full understanding of the design and implementation of mitigation strategies will require advancements in modeling and prediction of the overtopping failure modes, necessitating R&D focused on the modeling and understanding of the underlying physics based on numerical and physical testing. Areas of interest for basic and applied research include:

- 1) Conceptual development, testing, and modeling / characterization of novel overtopping mitigation strategies and materials.
- 2) Fundamental study of soil aging and other environmental factors on soil erodibility and overtopping performance and development of design approaches.

CW-05: Coastal and Inland Compound Flooding

The USACE is the nation's leading flood risk management agency. USACE districts and research laboratories has been actively investigating and managing the threats to the nation's coastal areas from compound flooding (CF) events. The USACE, through active and robust collaboration with partner agencies, has made advancements in the simulation of inundation impacts of CF. Significant work is required to establish a cohesive framework to pro-actively manage the risk presented by CF events. At maturity this framework should provide an encompassing approach to all aspects of CF including technical guidance, long-term data collection-monitoring, enhanced numerical modeling and a robust statistical approach to the coincidence of events that create CF. Areas of interest for basic and applied research include:

- 1) Social and Economic Justice (SE&J): Priority areas include techniques and methods to help in the quantification S&EJ for flood risk management cost-benefits analysis.
- 2) Inland Hazards System: Assistance in the conceptual and operational development of a probabilistic Inland Hazards System that includes precipitation, and river flow while maintaining the possibility of expansion to other inland water hazards.

CW-06: Geophysical Computational Modeling

Coastal and estuarine environments are critical for local water resources and environmental quality and play a disproportionately large role in global carbon and nutrient cycling relative to their physical area. Coasts and estuaries are also undergoing rapid changes in response to sea level rise, sediment management, and pollution from anthropogenic nutrient and carbon additions, yet their rates and processes of biogeochemical cycling and susceptibility to long-term changes remain poorly characterized. Long-term monitoring of coastal and estuarine water quality is therefore needed to quantify baseline physical and biogeochemical properties, as well as identify changes over time in response to human impacts.

- 1) Numerical Model Formulation: Assistance in the formulation, employment, and future integration of numerical modeling technologies for groundwater and urban pipe networks for future modernization of USACE modeling tools.

CW-07: Computational Fluid Dynamics/Fluid Structure Interaction (CFD/FSI) Modeling

USACE has several flood risk management projects that require the capabilities of efficient and robust three-dimensional modeling software utilizing computational fluid dynamics (CFD) and capturing fluid structure interaction (FSI) effects. This effort supports USACE priorities of Mitigate and Adapt to Climate Change, Modernize our Nations Infrastructure, and Support Resilient Communities. USACE priorities of these projects include but are not limited to gated control structures, spillways, stilling basins, pump stations, dredge head design, breakwaters, seawalls, levees, etc. Basic and applied research proposals are sought in the following area:

- 1) Computational Fluid Dynamics: Formulation of user-friendly tools for employment of USACE CFD codes such as OpenFoam and Proteus. Fundamental research may lead to development of a user friendly interface that integrates with the USACE Surface Modeling System (SMS).

SECTION C: PRE-PROPOSAL SUBMISSION AND REVIEW

Offerors shall prepare pre-proposals in accordance with the following instructions to avoid delays in the review.

- 1) Pre-proposals shall be submitted electronically at <https://www.erdcerx.org/civil-works-rd-collider/>.
- 2) Pre-proposals shall not exceed five (5) pages and shall reference the requirement number for the specific research area (e.g., CW-01) under which the pre-proposal is being submitted.
- 3) Pre-proposals may only be submitted under one specific research area.
- 4) Pre-proposals shall not contain any sensitive data or proprietary information.
- 5) Pre-proposals should contain the following:
 - a. Objective(s) or goal(s) of the working hypothesis to be proved or disproved, if appropriate.
 - b. Technical approach to be taken in the course of the research. If experimental, it should include a description of the scope of the testing program. If analytical, it should include key assumptions to be made, the scientific basis for the analysis, and the numerical procedures to be used.

- c. Describe the potential military and/or civil payoffs that might ultimately derive from the proposed research to the Corps of Engineers.
 - d. A one-page curriculum vitae of the principal investigator.
 - e. If a cooperative agreement or grant is contemplated by the offeror, include a description of how the principal purpose of the research effort supports or stimulates a public purpose and, if applicable, the substantial involvement by the government.
- 6) A review will be conducted on all pre-proposals submitted in response to this announcement and will undergo a technical review using the following factors/criteria:
- a. The overall scientific and/or technical merits of the proposal, including how the proposal meets the FAR requirements for scientific study and experimentation directed toward advancing the state-of-the-art or increasing knowledge or understanding, rather than focusing on a specific system or hardware solution.
 - b. The potential contributions of the effort to the ERDC mission.
 - c. Available funding.
- 7) Pre-proposals will be responded to within 60 days of receipt. If a pre-proposal is accepted and funding is available, the offeror will receive a request for full proposal (RFP) by the Contracting Officer. If a pre-proposal is accepted but funding is not available, the offeror may be requested to have the pre-proposal placed in the 'electronic library' for up to three years, pending funding. Pre-proposals that do not have sufficient scientific merit or relevance to the Army's needs, or those in areas for which funds are not expected to be available, may not be declined.
- 8) Issuance of an RFP does not guarantee award. The full proposal shall be submitted and evaluated in accordance with SECTION D.

SECTION D: FULL PROPOSAL SUBMISSION AND EVALUATION

Offerors shall prepare full proposals in accordance with the following instructions to avoid delays in the evaluation.

- 1) Full proposals shall be submitted via email directly to the Contracting Officer.
- 2) TECHNICAL: Full proposals should contain the following technical information:
 - a. Discuss the background and objectives of the proposed work, the approaches to be considered, the proposed level of effort, and the anticipated results/products, to include the proposed reports and deliverables to be furnished.

- b. A recommended Quality Assurance Surveillance Plan, which includes proposed methods for the Government to evaluate performance and determine that the deliverables (results/products/reports, etc.) are properly executed.
 - c. The names, brief biographical information, experience, and a list of recent publications of the offeror's key personnel who will be involved in the research.
 - d. If a cooperative agreement or grant is contemplated by the offeror, a data management plan that describes which data generated through the course of the proposed research will be shared and preserved, how it will be done, or explains why data sharing or preservation is not possible or scientifically appropriate, or why the costs of sharing or preservation are incommensurate with the value of doing so. It must include the following considerations:
 - The types of data, software, and other materials to be produced
 - How the data will be acquired
 - Time and location of data acquisition, if scientifically pertinent
 - How the data will be processed
 - The file formats and the naming conventions that will be used
 - A description of the quality assurance and quality control measures during collection, analysis, and processing
 - A description of dataset origin when existing data resources are used
 - A description of the standards to be used for data and metadata format and content
 - Appropriate timeframe for preservation.
 - The plan may consider the balance between the relative value of data preservation and other factors such as the associated cost and administrative burden. The plan will provide a justification for such decisions
 - A statement that the data cannot be made available to the public when there is national security or controlled unclassified information concerns (e.g., "This data cannot be cleared for public release in accordance with the requirements in DoD Directive 5230.09.")
- 3) COST: Full proposals should contain the following cost information:
- a. A complete detail of direct labor to include, by discipline, hours or percentage of time and salary.
 - b. Fringe benefits rate and base.
 - c. An itemized list of equipment showing cost of each item.
 - d. Description and cost of expendable supplies.
 - e. Complete detail of travel to include reason/need for travel, destination, airfare, per diem, rental car, etc.
 - f. Complete detail of any subcontracts.
 - g. Other direct costs (reproduction, computer, etc.).

- h. Indirect cost rates and bases with an indication whether rates are fixed or provisional and the time frame to which they are applied.
 - i. Proposed fee, if any. If a cooperative agreement or grant is contemplated by the offeror, fee or profit is an unallowable cost.
 - j. Any documentation which supports the above.
 - k. Offerors will furnish the name and telephone number of their Defense Contract Audit Agency (DCAA) office, if known.
- 4) Proposals submitted under this announcement should clearly identify within the proposal any research that is expected to be fundamental in nature as defined in National Security Defense Directive 189. Fundamental research means basic and applied research in science and engineering, the results of which ordinarily are published and shared broadly within the scientific community, as distinguished from proprietary research and from industrial development, design, production, and product utilization, the results of which ordinarily are restricted for proprietary or national security reasons.
- 5) No funds available to the Department of Defense may be provided to any institution of higher education that either has a policy of denying or that effectively prevents the Secretary of Defense from obtaining, for military recruiting purposes, entry to campuses or access to students on campuses or access to directory information pertaining to students.

6) SUBCONTRACTING PLAN (Large Business ONLY):

NOTE: Small businesses are exempt from this requirement to submit a Subcontracting Plan and do not apply to assistance instruments (cooperative agreements and grants).

- a. For proposed contract awards exceeding \$750,000, large businesses and non-profits (including educational institutions) shall provide a Subcontracting Plan that contains all elements required by FAR 19.704 and DFARS 219.704.
- b. Subcontracting Plans will be reviewed for adequacy, ensuring that the required information, goals, and assurances are included. FAR 19.702(a)(1) requires an apparent successful offeror to submit an acceptable Plan. If the apparent successful offeror fails to negotiate a Plan acceptable to the contracting officer within the time limit prescribed by the contracting officer, the offeror will be ineligible for award.
- c. Subcontracting plans are determined to be acceptable or unacceptable based on the criteria established at FAR 19.705-4, DFARS 219.705-4, and AFARS 5119.705-4. Goals are established on an individual contract basis and should result in realistic, challenging, and attainable goals that, to the greatest extent possible, maximize small business participation in subcontracting for Small Business, Small Disadvantaged Business (SDB), Woman-Owned Small Business (WOSB), Service-Disabled Veteran- Owned Small Business (SDVOSB), Veteran-Owned Small Business (VOSB), and Historically Underutilized Business Zone (HUBZone) Small Business.
- d. Subcontracting goals should result in efficient contract performance in terms of cost, schedule, and performance and should not result in increased costs to the Government or undue administrative burden to the prime contractor.

7) ADDITIONAL PROPOSAL REQUIREMENTS FOR GRANTS AND COOPERATIVE AGREEMENTS

- a. SF 424 Research and Related (R&R) – Application for Federal Assistance
- b. Research & Related Senior/Key Person Profile, including:
 - i. Biographical Sketch
 - ii. Disclosure of Current and Pending Support:
 - A list of all current projects the individual is working on, in addition to any future support the individual has applied to receive, regardless of the source.
 - Title and objectives of the other research projects.
 - The percentage per year to be devoted to the other projects.
 - The total amount of support the individual is receiving in connection to each of the other research projects or will receive if other applications

are awarded.

- Name and address of the agencies and/or other parties supporting the other research projects.
- Period of performance for the other research projects.

c. SF-LLL Disclosure of Lobbying Activities (if proposed value exceeds \$100,000)

8) Each full proposal submitted will be evaluated using the following factors/criteria:

Scientific and technical merit is the most important; the other factors/criteria are of equal importance to one another. All evaluation factors/criteria other than cost, when combined, are significantly more important than cost or price. The evaluation factors/criteria are as follows:

- a. The overall scientific and/or technical merits of the proposal, including how the proposal meets the FAR requirements for scientific study and experimentation directed toward advancing the state-of-the-art or increasing knowledge or understanding, rather than focusing on a specific system or hardware solution.
- b. The potential contributions of the effort to the ERDC and DoD mission.
- c. The offeror's capabilities, related experience, facilities, techniques, or unique combinations of these, which are integral factors for achieving the proposal's objectives.
- d. The qualifications, capabilities, and experiences of the proposed principal investigator, team leader, and other key personnel who are critical to achievement of the proposal's objectives.
- e. The reasonableness and realism of proposed costs and fee, if any, and the availability of funds.
- f. Subcontracting Plan (when required)

SECTION E: AWARDS:

With the submittal of all required information as described herein and the favorable evaluation of the proposal, the Government may unilaterally make award; therefore, it is in the Contractor's best interest to review all requirements listed within. Note that contract clauses are self-deleting; therefore, there is neither a requirement nor need for a modification to the award if any clause is found not applicable. Performance after the receipt of an award signed by the Contracting Officer indicates your full acceptance of all terms and conditions within the award.

Awards will be made electronically on SF-33, SF-26, DD-1155, or another document as appropriate. Contract awards will consist of all applicable FAR/DFARS clauses and shall be in accordance with the Uniform Contract Format (UCF).

Award of a grant or cooperative agreement is subject to applicable terms and conditions of 2 CFR 200, 2 CFR 1104, DoD Grant and Agreement Regulations (DoDGARs), and DoD Research Terms and Conditions.

TYPES OF AWARDS:

Selection of the type of contract is based upon various factors, such as the type of research to be performed, the contractor's experience in maintaining cost records, and the ability to detail and allocate proposed costs and performance of the work. This announcement affords the offeror the option of submitting proposals for the award of a contract, grant, or cooperative agreement. However, the type of agreement may change based on the nature of the effort and as a result of negotiation. Applicants should familiarize themselves with these instruments and applicable regulations prior to submitting a full proposal.

The following are brief descriptions of the possible award instruments:

Procurement Contract: A legal instrument reflects a relationship between the Federal Government and a State, a local government, or other recipient when the principal purpose is to acquire property or services for the direct benefit or use of the Federal Government.

Contracts awarded by ERDC will contain, where appropriate, detailed special provisions concerning patent rights, rights in technical data and computer software, reporting requirements, equal employment opportunity, etc.

A type of contract commonly used because of its suitability in supporting research is a cost-reimbursable type contract. It permits some flexibility in the redirection of efforts due to recent research experiment results or changes in Army guidance.

Fixed-price contracts are used when the research projects costs can be estimated accurately, the services to be rendered are reasonably definite, and the amount of property, if any, is fixed. The negotiated price is not subject to any adjustment on the basis of the Contractor's cost experience in performing the contract.

Contracts are primarily governed by the following regulations:

- Federal Acquisition Regulations (FAR)
- Defense Federal Acquisition Regulations (DFARS)
- Army Federal Acquisition Regulation Supplement (AFARS)

Grant: A legal instrument that is used to enter into a relationship in which the principal purpose is to transfer a thing of value to the recipient to carry out a public purpose of support or stimulation authorized by a law or the United States, rather than to acquire property or services for the Department of Defense's direct benefit or use; Substantial involvement is not expected between the Department of Defense and the recipient when carrying out the activity contemplated by the grant, and: No fee or profit is allowed.

Cooperative Agreement: A legal instrument that is used to enter into a relationship in which the principal purpose is to transfer a thing of value to the recipient to carry out a public purpose of support or stimulation authorized by a law or the United States, rather than to acquire property or services for the Department of Defense's direct benefit or use; Substantial involvement is expected between the Department of Defense and the recipient when carrying out the activity contemplated by the cooperative agreement, and: No fee or profit is allowed.

Grants and cooperative agreements are primarily governed by the following:

- Federal statutes
- Federal regulations
- 2 CFR Part 200
- DoD Grant and Agreement Regulations
- DoD Research and Development General Terms and Conditions