

July 17, 2023

NEx Request for Proposals Notice

NEx encourages you to submit proposals focused on the research topic described below:

Project ID: RD24.01.

Project Title: Conduct seismic study and develop guideline for GFRP bar reinforced concrete.

Background

The design and construction of seismic-resistant concrete members have always been a critical aspect of ensuring structural integrity and safety. As technology advances and sustainability becomes increasingly important, there is a growing interest in exploring alternative reinforcement materials that offer improved performance and environmental benefits. In recent years, significant research has been conducted to investigate the seismic behaviour of FRP-reinforced concrete members. However, there is still a need for comprehensive understanding and guidelines to effectively utilize FRP reinforcement in high seismic zones. The existing ACI 440.11 Code on GFRP bars, although providing guidance for general concrete structures, lacks specific provisions for seismic force-resisting systems for seismic design category (SDC) B and C. Consequently, there is a critical gap that needs to be addressed to ensure the safe and reliable implementation of FRP reinforcement in seismic-resistant concrete structures. This gap can be effectively resolved by investigating the GFRP bar performance by itself and/or by adopting a hybrid design approach and leveraging the advantages of both materials. This approach enables the creation of more sustainable seismic concrete members with enhanced strength and durability.

As this topic is one of the high priorities to ACI 440 Committee as well as Code and Building officials, NEx will prefer to receive proposals from experienced institutions to build on their expertise and achieve quick implementation and adoption of the codes.

Proposal Request

We invite research and development proposals from qualified/experienced researchers, engineering firms, and research institutions to undertake a comprehensive study on the seismic performance of FRP reinforced concrete and the rational design approaches required for the successful implementation of FRP reinforcement in high seismic zones. The objectives of this project are twofold:

1. **Seismic Performance of FRP Reinforced Concrete:** The proposal should outline an in-depth investigation of the seismic behaviour of FRP-reinforced concrete members. This study should include experimental and analytical research to build on current knowledge in the industry. The objective is to evaluate the performance, failure modes, and overall structural response under seismic loading conditions for FRP system including hybrid reinforcement that combines steel and FRP rebar. It should also explore the effects of different variables such as FRP reinforcement ratios, configurations, and installation techniques on seismic performance.
2. **Design guidelines** should focus on developing rational design approaches that enable the successful utilization of Glass Fiber Reinforced Polymer (GFRP) reinforcement in concrete structures located in moderate seismic zones. The study should encompass material selection, design methodologies, and construction considerations, considering the unique challenges associated with seismic design and the properties of GFRP reinforcement. The proposed guidelines should fill the gap left by the existing ACI 440.11 Code, providing a comprehensive framework for the hybrid design that combines steel and FRP rebar. PI is expected to

communicate frequently with ACI 440 committee with the project outcomes.

NEx Mission Statement

Collaborate globally to expand and accelerate the use of nonmetallics in the built environment to drive innovation, research, education, awareness, adoption, and deployment.

Research and Development within NEx are among its core missions, and it supports and facilitates the development of new nonmetallic technologies to address challenges with effective solutions.

Funding Policy

NEx will impose a limit of 15% on indirect costs (overhead) by research organizations for any research it funds. The organization must waive the remainder of the indirect costs.

Award Amount

NEx does not impose any limit on the overall funding request; however, the anticipated budget for this project is to be around \$100,000 to \$120,000. Proposals with higher budget estimate will be accepted with information on budget spending relevant to the value added to the project scope. Co-funding and co-sponsoring proposals with other organizations are welcomed.

Proposal Evaluation

NEx research proposals will be evaluated by the NEx Steering Committee. A winning proposal will be forwarded to the NEx Board of Directors with recommendations for funding.

Proposal evaluation criteria will include technical content, methodology, PI's relevant experience, potential impact/ industry adoption, budget and time, proposed deliverables, and outcome. NEx anticipates completion of this project within 24 months duration.

Awarded Proposals

- The awarded proposal is expected to commence within the first quarter of 2024.
- NEx will enter into a contract with the researching entity. As part of the contract, it is mandated that the overhead or indirect return be set at no more than 15% of the direct cost of the research funding requested from NEx. Any overhead over the maximum allowed 15% that is waived by the researching entity shall be considered as cost sharing and shall be indicated on the budget table as waived overhead, separate from other co-funding. Non-compliant proposals in this regard shall be returned without review.
- The schedule of payments contingent upon milestone deliverables will be contained in the contract and will include, at a minimum, a final report deliverable to NEx. Progress reports, if required, will be identified in the final contract.
- If principal investigators (PI) from two organizations are collaborating on the research, the award must be to a single organization, which will then subcontract with the second organization.
- NEx will only consider funding research that involves the use of proprietary products if the goal of the research is to advance knowledge in a particular area of study and not solely on a proprietary product.

- In case of any co-funding arrangement with other organization(s), commitment letter(s) from co-funding organization(s) is required before funds are dispersed from NEx.
- The results of NEx-funded research will be owned by NEx, and possibly by other co-founding organization(s). PI should obtain approval from NEx before publishing any results.

Where and How to Submit Proposals

Submitted proposals will be evaluated by the NEx Steering Committee and the NEx Staff. Anyone who evaluates a proposal is required to agree and abide by NEx policies on confidentiality and conflict of interest.

Please email the proposal and supporting information to info@nonmetallic.org, by end of the day, **September 5, 2023**. The email subject line and file name shall include project ID (see top of page 1) and the name of the proposing organization (For example: "RD24.xx University of xyz").

If you have any questions regarding the proposal requirements or process, please contact NEx Technical Director, Aparna Deshmukh (aparna.deshmukh@nonmetallic.org).

Required Proposal Content

Proposals submitted to the NEx shall be provided in one unprotected pdf file and shall contain:

1. Section 1: Executive summary (maximum 2 pages)

- 1.1. NEx RFP ID:
- 1.2. Proposal Title:
- 1.3. Principal Investigator (name, affiliation, address, phone, email):
- 1.4. Objective of the proposal (300 words or less)
- 1.5. Description of significance/impact of the project (300 words or less)

2. Section 2: Main body (maximum 5 pages)

- 2.1. Background
- 2.2. Project description (include enough detail to understand how the project will be performed)
- 2.3. Schedule (include matrix of tasks and schedule of completion, including quarterly progress and final reports, and semi-monthly teleconference updates)
- 2.4. List of deliverables/anticipated products, such as new material specifications, new documents, published papers, presentations, NEx/ACI University Webinar, or conference proceedings.
- 2.5. Budget (table of funding that includes all support such as):
 - Total budget
 - Any co-funding from organizations other than NEx (monetary, in-kind)
 - Net value of waived institution overhead or planned co-funding

3. Section 3: Supporting Documents (maximum 2 pages each)

- 3.1. Qualifications of the investigator, co-investigator(s), if any, and/or institutions.