

PEER Request for Proposal (RFP): Solicitation TSRP-PEER 24-01

Introduction

The Pacific Earthquake Engineering Research (PEER) is a multi-campus center that has continuing funding from the State of California for the seismic performance of transportation and related systems. This funding supports the Transportation Systems Research Program (TSRP), the purpose of which is to lessen the impacts of earthquakes and other natural hazards on the transportation systems of California, including highways and bridges, port facilities, high-speed rail, airports, and other systems.

Funding from the TSRP supports transportation-related research that uses and extends PEER's Performance-Based Engineering (PBE) methodologies and integrates fundamental knowledge with enabling technologies. The program also aims to integrate seismological, geotechnical, structural, hydrodynamic, and socio-economical aspects of earthquake engineering, and involve theoretical, computational, experimental, and field investigations. The program encourages vigorous interactions between practitioners and researchers.

The PEER TSRP is coordinated by the PEER Research Committee (PEER-RC). Proposals will be reviewed by external reviewers, who will be determined by this committee, among experts who have not submitted proposals to this solicitation.

Requested Proposals

PEER core institutions¹ feature a wide array of experimental facilities as listed in PEER [Laboratories](#) website. The PEER-RC is soliciting proposals for **one-to-two-year**² projects related to the experimental investigation of components, structures, and systems exposed to seismic, tsunami, fire and other natural hazards. The proposed projects must use an experimental facility at a PEER core institution and should be aligned with the current TSRP experimental research priorities (Appendix A).

To encourage more experimental work, the seismic simulator lab at UC Berkeley has offered to contribute 2 weeks of complementary testing (an in-kind contribution valued at \$60,000) for any funded project from this RFP 24-01 that will use the shaking table at the Richmond Field Station. For example, a project requiring three weeks of shaking table usage will be given a discount for the first two weeks and will be charged only for the remaining one week only. To take advantage of this in-kind support, testing must be completed before June 30, 2026.

Regardless of the technical area, all proposals must meet the following requirements:

¹PEER combines resources of major research universities in Western USA (UC Berkeley, CALTECH, OSU, Stanford, UC Davis, UCI, UCLA, UCSD, UNR, USC, and UW) where earthquake hazards are the largest.

²Funding will be approved for only one year based on this solicitation. A successful two-year proposal will be tentatively funded for the second-year contingent upon availability of funding, submitting and accepting a progress report at the end of the first year, and formally requesting funding for the second year by the PI. Details will be provided when award is made.

1. Be led by investigators from the PEER core institutions. *PEER Business and Industry Partners (BIPs)* interested in this solicitation are strongly encouraged to collaborate with the researchers at PEER's core institutions and submit joint proposals.
2. Each investigator is limited to be the PI or co-PI on **one** proposal only.
3. Contribute substantially to the PBE of transportation systems and/or related systems.
4. Enable substantial progress for a reasonable investment (e.g., leverage past research findings based on previous PEER or non-PEER projects or utilize matching opportunities).
5. Have significant broader impacts and potential to be expanded as bigger center-wide projects.

Investigators must commit to:

1. Working as part of the overall TSRP team, sharing information, data, models, outcomes, and ideas needed for other projects;
2. Attending at least two meetings per each year of funding: the PEER Annual Meeting (usually held in Spring) and the PEER Researchers' Workshop (usually held in Summer);
3. Submitting a research highlights document at the beginning of the project for distribution to the PEER community; and
4. Writing a PEER report at the end of the project, documenting the project contributions.

Where possible, the projects should:

1. Leverage the investments of other programs within or outside PEER,
2. Engage the practitioner community,
3. Use OpenSees as the primary computational platform for pre- and post-test analyses and if applicable, contribute (or improve) and document new elements, material models, user interfaces, educational and training materials (e.g., examples), or numerical solution strategies and share any developed analytical models with the PEER community,
4. Organize blind prediction contests from the test outcomes, with in-kind support from the PEER headquarters staff and researchers.
5. Incorporate NHERI SimCenter computational tools as appropriate in the proposed research. These include many tools, e.g., uncertainty quantification with OpenSees and other finite element codes (e.g., model updating using test results), computational wind tools, PBE tools, and a large 1.8M building regional seismic risk workflow example that can be leveraged for multiple purposes. All SimCenter software is open source and ideally suited for research use and modification. They can run locally or on DesignSafe/TACC³. Details of SimCenter computational tools can be found at <https://simcenter.designsafe-ci.org/research-tools/overview/>, and
6. Leverage SCEC⁴ community models (e.g., Community Fault Model) for earthquake characterization.

³Texas Advanced Computing Center.

⁴Statewide California Earthquake Center, <https://www.scec.org/>, formerly known as Southern California Earthquake Center. PEER and SCEC are planning to work together at the strategic intersection of earthquake science and earthquake engineering that will be beneficial to researchers at both the Centers.

Proposals will be evaluated based on the primary criteria of technical merit and broader impact. Further, proposals that collaborate with other PEER projects, proposals with innovative research ideas, proposals with matching funding, proposals that explicitly aim at data/model sharing (not only results) upon project completion, proposals that use experimental facilities in multiple PEER institutions or have potential to initiate collaborations between these facilities, proposals from early career PIs (assistant or associate professors prior to being tenured), and proposals with PIs who have not received TSRP funding in the past four years will be viewed favorably. In addition to the above considerations, projects will be selected to result in a diversity of specializations that promote innovative research.

Proposals are expected to have an annual budget **not to exceed \$125,000**. The review process for the proposals will involve external reviewers selected by the PEER-RC. It is expected that **two (2) projects** of **about \$125,000 each per year** will be funded. All proposed research projects will be subjected to final approval by the PEER Director.

A list of the current and past TSRP projects is posted on the PEER website at: <https://peer.berkeley.edu/research/transportation-systems/projects>.

Proposal Submission Instructions

Format

Submit proposals online at <https://peer.berkeley.edu/research/transportation-systems/request-proposals>. Proposals should be submitted using the form in the above site. Uploaded attachment may be a Word document or PDF (*.doc, *.docx, or *.pdf) and shall include the following:

- a two-page project description,
- a two-page biographical sketch of the PI(s),
- a one-page summary of results & impact from past PEER projects (applicable only for PIs with completed or continuing PEER projects from PEER TSRP or PEER-Bridge funding), and
- a one-page draft budget.

Filename of the attachment should follow the format:

“<Topic>_<Last name>_RFP2024_<optional title less than 50 characters>”

For example,

“Topic3_Mosalam_RFP2024_Resilient bridge column testing hybrid simulation.pdf” or

“Topic1_Buckle_RFP2024.docx”

Budget

All proposed work should be completed within a period less than or equal to two years. Budgets for each year should be limited to:

1. one month of summer support (or its equivalent) for the PI,
2. one graduate student researcher,
3. experimental expenses,
4. computing expenses,
5. travel to two PEER coordination meetings (including the PEER annual meeting),
6. project-related supplies, and

7. other reasonable expenses, as approved by the PEER-RC.

It is expected that proposing institutions will waive indirect costs, as is the practice for University of California institutions. Final budgets with campus Sponsored Project Office (SPO) approval can be prepared after the initial selection of successful proposals, and any negotiated agreement on scope and budget.

To meet the needs of the TSRP program, PEER-RC through the PEER director may approach proposers to negotiate possible revisions to the scope and budget to fit the program goals.

Important Dates

The **key dates** for responding to Solicitation PEER 24-01 are:

8 November 2024: submitting questions to peer_center@berkeley.edu

15 November 2024: proposal submission deadline

16 December 2024: completion of the review process of all proposals

01 February 2025: project start date (tentative)

Appendix A: Research Topics for this Solicitation

Proposals are solicited for research on the topics (or a combination of them) listed in this appendix. Depending on the submissions, projects may not be awarded in all areas, and it is possible that multiple projects may be selected in some of the areas. In addition to the topics below, proposals focusing on cascading effects or multi-hazard, e.g., earthquake & fire following earthquake, earthquake & tsunami are welcome.

Topic 1. Geotechnical Engineering: Experimental verification of nonlinear constitutive models, centrifuge experiments, and field experiments that will add to the basic scientific knowledge or testing of innovative implementations to mitigate the effects of geohazards on the built environment. Potential testing categories include, but are not limited to, centrifuge testing, soil box and shaking table testing, and various field tests.

Topic 2. Structural Engineering: Experimental verification of nonlinear models, component testing, reduced-scale and full-scale structural testing that will add to the basic scientific knowledge or testing of innovative implementations to mitigate the effects of earthquakes on buildings, bridges, port facilities, airports, and transportation systems. Potential testing categories include, but are not limited to, monotonic or cyclic quasi-static testing, shaking table testing, hybrid simulations, and field testing.

Topic 3. Tsunami Engineering: Experimental evaluation of behavior of tsunamis, validation of current code guidelines, loading and impact on structures, testing of innovative solutions to mitigate the effects of tsunamis. Potential testing categories include, but are not limited to, wave tank and wave-flume testing, real-time hybrid simulation, and impact loading.

Topic 4. Fire Engineering: Experimental evaluation of material behavior subjected to fire, validation of current code guidelines, testing of innovative solutions and materials to mitigate the effects of fire on structures. Potential testing categories include, but are not limited to, furnace tests, burn hall testing, quasi-static loading, and hybrid simulation.

Topic 5. Sensors and Databases: Experimental or field testing performed for (a) verification of new sensor technologies, or non-contact measurement methods, including laser scanning, laser-based sensors, mobile sensing systems, drones, etc. and/or (b) database development, particularly for the purpose of training and validating Artificial Intelligence (AI) models.