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George E. Brown, Jr. Network for Earthquake Engineering Simulation Research (NEESR) Planning Grants (NEESR Planning)

PROGRAM SOLICITATION
NSF 13-544

REPLACES DOCUMENT(S):
NSF 11-566

National Science Foundation

Directorate for Engineering
Division of Civil, Mechanical and Manufacturing Innovation

Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):

June 03, 2013

IMPORTANT INFORMATION AND REVISION NOTES

A revised version of the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), NSF 13-1, was issued on October 4, 2012 and is effective for proposals submitted, or due, on or after January 14, 2013. Please be advised that the guidelines contained in NSF 13-1 apply to proposals submitted in response to this funding opportunity. Proposers who opt to submit prior to January 14, 2013, must also follow the guidelines contained in NSF 13-1.

Please be aware that significant changes have been made to the PAPPG to implement revised merit review criteria based on the National Science Board (NSB) report, National Science Foundation's Merit Review Criteria: Review and Revisions. While the two merit review criteria remain unchanged (Intellectual Merit and Broader Impacts), guidance has been provided to clarify and improve the function of the criteria. Changes will affect the project summary and project description sections of proposals. Annual and final reports also will be affected.

A by-chapter summary of this and other significant changes is provided at the beginning of both the *Grant Proposal Guide* and the *Award & Administration Guide*.

Please note that this program solicitation may contain supplemental proposal preparation guidance and/or guidance that deviates from the guidelines established in the Grant Proposal Guide.

This solicitation is a major revision of NSF 11-566, George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES) Research (NEESR). National Science Foundation (NSF) support for operations of the current George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES), which includes the 14 NEES experimental facilities listed at http://nees.org/sites-mainpage, ends on September 30, 2014, when the five-year NSF cooperative agreement with Purdue University for NEES operations expires. Between October 1, 2013 and September 30, 2014, the 14 NEES facilities are either at capacity or, because of final year ramp-down under the Purdue award, will not have operating funds to support NEESR planning grant awards during this period. Therefore, proposals may not be submitted to conduct research that requires use of any of the 14 NEES facilities between October 1, 2013 and September 30, 2014.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

George E. Brown, Jr. Network for Earthquake Engineering Simulation Research (NEESR) Planning Grants (NEESR Planning)

Synopsis of Program:

National Science Foundation (NSF) support for operations of the current George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES) ends on September 30, 2014, when the five-year NSF cooperative agreement with Purdue University for NEES operations expires. Under the separate program solicitation NSF 13-537, entitled "George E. Brown, Jr. Network for Earthquake Engineering Simulation Operations FY 2015-FY2019 (NEES2 Ops)," NSF is soliciting proposals to configure and operate the "second generation" of NEES

infrastructure, hereinafter referred to in this solicitation as "NEES2." The competed infrastructure includes the management office, experimental facilities, cyberinfrastructure, and education and community outreach. As the outcome of that competition, the intent is to award one cooperative agreement to a lead institution for NEES2 operations with an award start date of October 1, 2014, and a duration of up to five years.

To provide continuity in earthquake engineering research during the NEES2 competition period, NSF's Division of Civil, Mechanical and Manufacturing Innovation (CMMI) in the Directorate for Engineering (ENG) solicits proposals through this program solicitation for planning grants for research that could eventually require the advanced experimental capabilities of NEES2 facilities for follow-on research. Information about the NEES2 infrastructure will not be available until NSF issues the award for NEES2 operations. As the design of experiments in the follow-on research would be dependent on the specific NEES2 experimental facility to be used, NSF's expectation is that all preliminary testing at other than NEES2 facilities and preliminary numerical studies for proof-of-concept would have been completed under the planning grant, and researchers thus would be "NEES2-ready" to submit proposals in early FY 2015 to design experiments to directly utilize NEES2. Planning grant awardees are required to archive all experimental data generated during the research in the NEES2 operations awardee's data repository.

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- Joy M. Pauschke, Program Director, George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES) Operations and Research, telephone: (703) 292-7024, fax: (703) 292-9053, email: jpauschk@nsf.gov
- Kishor Mehta, Program Director, Hazard Mitigation and Structural Engineering (HMSE), telephone: (703) 292-7081, email: kimehta@nsf.gov
- Richard J. Fragaszy, Program Director, Geotechnical Engineering (GTE), telephone: (703) 292-7011, email: rfragasz@nsf.gov
- Dennis E. Wenger, Program Director, Infrastructure Management and Extreme Events (IMEE), telephone: (703) 292-8606, email: dwenger@nsf.gov
- Konstantinos P. Triantis, Program Director, Civil Infrastructure Systems (CIS), telephone: (703) 292-7088, email: ktrianti@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.041 --- Engineering

Award Information

Anticipated Type of Award: Standard Grant

Estimated Number of Awards: 20

NSF anticipates funding up to 20 awards, subject to the availability of funds and quality of proposals. Awards for single institution proposals and collaborative proposals will not exceed $450,000 total for up to three years.

Anticipated Funding Amount: $8,000,000 for new awards, subject to availability of funds and quality of proposals.

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI: 1

An individual may appear as Principal Investigator (PI), co-PI, Senior Personnel, Other Personnel, Consultant, or elsewhere in the proposal budget in no more than one proposal submitted in response to the full proposal deadline. Applicants are responsible for ensuring that no individual is listed as PI, co-PI, Senior Personnel, Consultant or elsewhere in the proposal budget on more than one proposal. If an individual is included as PI, co-PI, Senior Personnel, Other Personnel, Consultant, or elsewhere in the proposal budget in two or more proposals submitted by the full proposal deadline, then the first proposal submitted, based on the system time stamp, will be deemed the one allowable submission. All subsequent proposals that include the individual as PI, co-PI, Senior Personnel, Other Personnel, Consultant, or elsewhere in the proposal budget will be returned without review. For collaborative proposals comprised of simultaneous proposal submissions, the FastLane time stamp for the first proposal submitted as part of that collaborative, whether or not the lead proposal, will be used to determine compliance with this eligibility requirement.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable
- **Preliminary Proposal Submission:** Not Applicable
- **Full Proposals:**
  - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.
  - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide)

B. Budgetary Information

- **Cost Sharing Requirements:** Inclusion of voluntary committed cost sharing is prohibited.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

  June 03, 2013

Proposal Review Information Criteria

Merit Review Criteria: National Science Board approved criteria apply.

Award Administration Information

Award Conditions: Additional award conditions apply. Please see the full text of this solicitation for further information.

Reporting Requirements: Additional reporting requirements apply. Please see the full text of this solicitation for further information.

TABLE OF CONTENTS

I. INTRODUCTION

National Science Foundation (NSF) support for operations of the current George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES) experimental facilities and cyberinfrastructure, described at http://www.nees.org, ends on September 30, 2014, when the five-year NSF cooperative agreement for NEES operations with Purdue University expires.

Under program solicitation NSF 13-537, entitled "George E. Brown, Jr. Network for Earthquake Engineering Simulation Operations FY 2015-FY2019 (NEES2 Ops)," http://www.nsf.gov/publications/pub_summ.jsp?WT.z_pims_id=503259&ods_key=nsf13537, NSF is soliciting proposals in a separate competition to configure and operate the "second generation" of NEES infrastructure, hereinafter referred to in this solicitation as "NEES2." Recompeted for NEES2 are the following components: (a) a network-wide NEES2 management office, (b) four to six experimental facilities, plus a post-earthquake, rapid response research (PERRR) facility, that can provide the most critical and technically advanced capabilities and data needed by the earthquake engineering research community for transformative hazard mitigation research, (c) community-driven, production-quality cyberinfrastructure, including a community NEES2 data repository, and (d) education and community outreach activities. NSF intends to award one cooperative agreement to a lead institution for NEES2 operations with an award start date of October 1, 2014, and a duration of up to five years.

To provide continuity in earthquake engineering research during the NEES2 recompetition period, NSF's Division of Civil, Mechanical and Manufacturing Innovation (CMMI) in the Directorate for Engineering (ENG) solicits proposals through this program solicitation for planning grants for preliminary research investigations that could eventually require the experimental capabilities of NEES2 facilities for follow-on research. Information about the NEES2 awardee and infrastructure will not be available until after NSF issues the cooperative agreement award for NEES2 operations. As the experimental design in the follow-on research would be dependent on the specific NEES2 experimental facility to be used, NSF's expectation is that all preliminary testing and preliminary numerical studies for proof-of-concept would have been completed under the planning grant, and researchers thus would be "NEES2-ready" to submit proposals in FY 2015 to directly utilize NEES2. Proposers submitting to this solicitation should review the NSF 13-537 NEES2 Ops program solicitation to help them understand the requirements envisioned for the NEES2 infrastructure (experimental facilities and cyberinfrastructure) during FY 2015-FY 2019.

The planning grants should be comprehensive and complete all preliminary experimental and numerical work that then would be used, under a follow-on grant for continued hazard mitigation research, to design experiments to use a specific NEES2 facility. After an award is made for NEES2 operations under NSF 13-537. NSF anticipates providing funding opportunities for follow-on proposals to utilize the NEES2 experimental facilities. If a planning grant award had anticipated the use of advanced experimental capabilities that are not part of NEES2, then follow-on research proposals may be submitted to an appropriate research program within CMMI during an unsolicited proposal submission window described at http://www.nsf.gov/div/index.jsp?div=CMMI.

Awards made under this solicitation will be required, in follow-on proposals submitted to NSF to use NEES2 facilities, to report on the results of the planning grant research and to describe the experimental data generated under the planning grant. NEESR planning grant awards made under this program solicitation are considered by NSF to be part of the user group of NEES2 facilities. All experimental data generated under NEESR planning grant awards are required to be archived and curated in the NEES2 operations awardee's data repository.

II. PROGRAM DESCRIPTION

The NEESR planning grant program seeks to support fundamental research to

- advance discovery of potentially transformative solutions for mitigating the impacts of earthquakes and, as applicable, other natural hazards, on the natural and built environment;
- explore new concepts for sustainable materials, components, technologies and systems for earthquake hazard mitigation, for both new construction and rehabilitation of existing civil infrastructure; and
- accelerate innovations in experimental techniques that can potentially reduce future reliance on the need for large-scale earthquake engineering experimental facilities or can provide the dual capabilities to address earthquake and other natural hazard mitigation.

Planning grants, for example, may involve investigation of new sustainable materials, components, and technologies through small-scale testing; development of preliminary plans for system-level testing; the conduct of needed site characterizations; and numerical studies for a system-level proof-of-concept.

Potential Research Topics

NEES is authorized under the National Earthquake Hazards Reduction Program (NEHRP) (http://www.nehrp.gov), and awards supported under this program solicitation contribute to NSF's participation in NEHRP. NEHRP provides links to reports describing earthquake hazard mitigation research needs developed by workshops, code committees, and other sources on its website at http://www.nehrp.gov/library/researchneeds.htm. This website is not meant to be an exhaustive list of reports but rather provides a resource for potential research topics.

NEHRP Strategic Priorities

The Strategic Plan for the National Earthquake Hazards Reduction Program (NEHRP) Fiscal Years 2009-2013 identifies nine cross-cutting strategic priorities for earthquake hazard mitigation. Proposals are especially sought that conduct fundamental research to address these priorities.

Integration of Smart Materials and Structural Systems

Research on civil infrastructure materials and foundation/structural systems has traditionally been conducted independently without integrative research between these two areas. New research paradigms are needed to accelerate engineering innovations for sustainable life-cycle infrastructure performance through the integration of smart, sustainable materials and technologies for civil infrastructure and new and rehabilitated sustainable foundation/structural systems for earthquake, and potentially multi-hazard, mitigation.

Advancing Earthquake Engineering Experimental Capabilities

Proposals may be submitted to accelerate innovation in experimental simulation techniques and instrumentation for earthquake engineering experimentation that can potentially reduce reliance on the need for large-scale experimental facilities or can support research for mitigation of other hazards as well earthquakes. These techniques may require, for example, the development of advanced sensors, measurement devices, control algorithms, or robotic tools. Such innovations should be designed to be independent of a specific, existing experimental facility so that they may be readily implemented at other facilities. Hybrid testing

techniques, in particular, are expected to progress well beyond their current limitations, and research should lead to new capabilities not currently feasible. Proposals are especially encouraged for research that advances experimental capabilities for multi-facility hybrid simulation. Proposals are encouraged to include workshop(s) to obtain community requirements, identify potential users, and share implementation strategies.

International Collaboration Research Topics

NSF encourages collaboration with foreign researchers. Proposals including international collaboration should (a) identify the names and affiliations of the international collaborators, (b) describe the nature and goals of collaborative activities, (c) highlight the synergies and benefits to be gained from the collaboration, and (d) describe the international collaborators' current or anticipated resources that will be available to the project. International collaborators cannot be funded under this solicitation and must provide their own support. General NSF policies and procedures regarding collaboration with foreign researchers on NSF-supported projects can be obtained from the NSF Office of International Science and Engineering (http://www.nsf.gov/div/index.jsp?div=OISE).

Two international collaborations with NEES that have been identified through recent workshops are the following:

1. *International Collaboration with Researchers using Japan's E-Defense Shake Table Facility:* The 3-D Full-Scale Earthquake Testing Shake Table Facility, known as E-Defense, (http://www.bosai.go.jp/hyogo/ehyogo/), built by the Japanese National Research Institute for Earth Science and Disaster Prevention (NIED), opened for research in 2005. Proposals may be submitted to this solicitation that eventually plan to use both NEES2 experimental facilities and the E-Defense shake table in the conduct of the research; such proposals are encouraged to include collaborators from Japan. Proposals must include letters of support verifying the Japanese collaboration and, if appropriate in the planning grant phase, the availability of the E-Defense facility. Research topics of mutual interest to researchers in Japan and the United States have been identified and are under refinement through ongoing workshops and meetings (see http://www.nees.org).
2. *International Collaboration with Academic Researchers Supported by the National Natural Science Foundation of China (NSFC):* Recent NSFC/NSF sponsored workshops have identified priority research topics for joint collaboration (see http://www.nees.org). U.S. researchers may be supported for this collaboration as follows: (1) as new planning grant awards made under this solicitation, and (2) as supplements to existing NEESR awards made under prior NEESR solicitations (i.e., NSF 09-524, NSF 11-512, and NSF 11-566). Proposals that wish to collaborate in this manner must provide letters of support from the Chinese counterparts verifying the collaboration.

Software Development

Proposals may include software development to support the research activities, for example, for new tools for hybrid simulation and for augmentation of existing software through the creation of a new element or module. This solicitation requires open source software development regardless of the intended use or application. Proposals with a software development component must include:

- A description of the value of the work in the context of a missing analytical capability required for earthquake engineering research.
- Specific examples and use cases of how use of the software will have an impact on earthquake engineering research.
- Preliminary user requirements.
- Summary of the software development process, including user manual and documentation.
- Plan for maintenance of the software beyond the NSF award period.
- Expected annual user base.
- Identification of the open source license to be used.

Common Requirements for all NEESR Planning Grants Proposals

- "NEES2 Conceptual Project," included in the Project Description, which outlines the vision and goals for the planning grant research and potential follow-on research and describes potential NEES2 experiments to support that research.
- The NSF-required Data Management Plan, to include the plan for archiving all experimental data generated as part of the research in the NEES2 operations awardee's data repository, in accordance with the data archiving and curation policies to be announced and implemented by the NEES2 operations awardee. Data in this context refers to all measurements, calibrations, observations, analyses, images, commentary, reports, logs, notes, and electronic notebook entries that relate directly to the proposed experiments. Any data (as described above) that are recorded in hardcopy of any form must be transcribed or converted, without loss of information, into an appropriate searchable format onto electronic media. Hybrid simulation involving experimental and computational components must also include computational data recorded as output of the experiments conducted, and models and software codes used. In addition, this information must be properly characterized with appropriate metadata descriptors and then subsequently stored into one of the NEES2 operations awardee's accepted digital formats to facilitate archiving. For purposes of establishing a level of effort required for data archiving and curation, proposers may base their plan on the current NEES operations awardee's Data Sharing and Archiving Policies and Guidelines available at http://nees.org/resources/2812/download/Data_Archiving_and_Sharing-Sep10.pdf and the Data Sharing and Archiving Procedures available at http://nees.org/resources/3029/download/Data_Sharing_and_Archiving_Procedures.pdf.

In support of their scientific inquiry, proposers may wish to use data that are available in the NEEShub Project Warehouse at http://nees.org/warehouse. Proposers planning to use such data should include the URL of the data location in the NEES Project Warehouse in the proposal.

This solicitation will not support the following research:

- Proposals may not be submitted to conduct research during the period from October 1, 2013 to September 30, 2014 that requires use of any of the experimental capabilities or other resources at the 14 NEES facilities supported during that period by NSF under the current NEES operations award to Purdue University and listed at http://nees.org/sites-mainpage.
- Proposals intending to investigate fire effects will not be supported.

Proposals to conduct such research will be returned without review.

III. AWARD INFORMATION

NSF anticipates funding up to 20 awards, subject to the availability of funds and quality of proposals. Awards for single institution proposals and collaborative proposals will not exceed $450,000 total for up to three years.

IV. ELIGIBILITY INFORMATION

Organization Limit:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI: 1

An individual may appear as Principal Investigator (PI), co-PI, Senior Personnel, Other Personnel, Consultant, or elsewhere in the proposal budget in no more than one proposal submitted in response to the full proposal deadline. Applicants are responsible for ensuring that no individual is listed as PI, co-PI, Senior Personnel, Consultant or elsewhere in the proposal budget on more than one proposal. If an individual is included as PI, co-PI, Senior Personnel, Other Personnel, Consultant, or elsewhere in the proposal budget in two or more proposals submitted by the full proposal deadline, then the first proposal submitted, based on the system time stamp, will be deemed the one allowable submission. All subsequent proposals that include the individual as PI, co-PI, Senior Personnel, Other Personnel, Consultant, or elsewhere in the proposal budget will be returned without review. For collaborative proposals comprised of simultaneous proposal submissions, the FastLane time stamp for the first proposal submitted as part of that collaborative, whether or not the lead proposal, will be used to determine compliance with this eligibility requirement.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.4 of the Grant Proposal Guide provides additional information on collaborative proposals.

Important Proposal Preparation Information: FastLane will check for required sections of the proposal, in accordance with *Grant Proposal Guide* (GPG) instructions described in Chapter II.C.2. The GPG requires submission of: Project Summary; Project Description; References Cited; Biographical Sketch(es); Budget; Budget Justification; Current and Pending Support; Facilities, Equipment & Other Resources; Data Management Plan; and Postdoctoral Mentoring Plan, if applicable. If a required section is missing, **FastLane will not accept the proposal.**

Please note that the proposal preparation instructions provided in this program solicitation may deviate from the GPG instructions. If the solicitation instructions do not require a GPG-required section to be included in the proposal, insert text or upload a document in that section of the proposal that states, "Not Applicable for this Program Solicitation." Doing so will enable FastLane to accept your proposal.

Field Work: Proposals to conduct field work that might have an environmental impact should provide sufficient information to assist

NSF in assessing the environmental consequences of supporting the project. This would include field work that affects the natural environment, or involves drilling of the earth or excavation, use of explosives, or other techniques that may alter a local environment.

Proposals must include the items listed below, as well as those specified in the GPG or NSF Grants.gov Application Guide. Proposals missing one or more of these items will **not be accepted** or will be **returned without review.**

Cover Sheet

Under "Program Announcement/Solicitation No," identify this Solicitation Number. The "Title of the Proposed Project" entry must begin with the phrase "NEESR Planning."

Project Description

The first two sections of the Project Description must be the following:

Project Team Table. The first page of the Project Description must start with the Project Team Table, which provides information about each project team member in the project description, i.e., **every individual** named in the proposal who has a role in the proposal, must be included in this table, regardless of the role in the project and whether or not that role is financially supported. Include international collaborators. Include for each project team member the following: name, title, affiliation, expertise, and a brief description of team member's role and full-time equivalent person-months effort during each year of the project. This table will be used by NSF to check for conflicts of interest in assembling the reviewer community. Note: Proposals must not include the names of external advisory board/group/committee members. Proposals that include the names of external advisory board/group/committee members will be **returned without review**.

NEES2 Conceptual Project (up to five pages maximum). Immediately following the Project Team Table, the next section of the Project Description must include the section entitled "NEES2 Conceptual Project" that (a) outlines the vision and goals for the planning grant and potential follow-on research and (b) describes potential NEES2 experiments and experimental capabilities needed to conduct research to support that vision. The proposal must not identify any specific experimental facility planned to be used for the follow-on research. The NEES2 conceptual project forms the basis for the research plan discussed in the subsequent sections of the Project Description. Graphics should be used to illustrate conceptual NEES2 experiments.

Facilities, Equipment & Other Resources

Information in this section should include, but is not limited to, the following:

1. Description of all experimental facilities, other than Japan's E-Defense shake table, which will be used to conduct the planning grant research.
2. Under the category "Other," all contributions and resources that will be used to conduct the planning grant research and other activities. Contributions could include items such as donated personnel time; donated use of facilities, equipment, and instrumentation; and donated materials and test specimens. Such information must be provided in this section, in lieu of other parts of the proposal such as the project summary, project description, budget, or budget justification. The description must be narrative in nature and must not include quantifiable financial information or assign any equivalent costs for the contributions and resources within the proposal. Any individual named in this section must be included in the Project Team Table in the Project Description.

Special Information and Supplementary Documentation

Data Management Plan: Proposal must include a data and information management plan that describes how quality-controlled and fully-documented data and information, including all experimental metadata and raw and converted/processed data, will be archived and made publicly available in the NEES2 operations awardee's data repository. Refer to section II of this solicitation for additional information.

Additional Information: Proposals may include in the Special Information and Supplementary Documentation section only the additional information listed below. Proposals that include letters of support, endorsement, or participation from individuals or organizations not listed in the Project Team Table in the Project Description will be **returned without review.**

- For all project personnel who have been funded through awards made under prior NSF NEES research (NEESR)program solicitations (i.e., NSF 03-589, NSF 05-527, NSF 06-504, NSF 07-506, NSF 08-519, NSF 09-524, NSF 11-512, and NSF 11-566, a table showing the status of experimental data produced, curated, archived, and publicly available in the NEES Project Warehouse for these awards. For data that has completed curation, include the URL location in the NEEShub Project Warehouse.

- For E-Defense collaboration discussed in Section II, "Program Description," include: (a) One letter of endorsement from the counterpart Japanese collaborator verifying interest in collaboration and proposed or funded sources of research support, and (b) if appropriate at the planning grant stage, one letter of support from the Director of E-Defense verifying the availability, costs, and accommodation of that facility for coordinated research.

- For U.S./China collaboration as discussed in Section II, "Program Description," one letter of endorsement from the counterpart Chinese collaborator(s) verifying interest in collaboration and the collaborator(s)' current or anticipated support from the NSFC.

- Formal vendor quote(s), if needed, for specific equipment, specimen, or services beyond those available at the equipment sites. Note: A formal vendor quote states a specific price for equipment or specimen to be provided or for services to be rendered.

- Letters of commitment documenting collaborative arrangements of significance to the proposal from individuals or organizations that are explicitly listed in the Project Team Table in the project description but are not requesting support. The description of the arrangement must be narrative in nature and must not include quantifiable financial information or assign any equivalent costs for the contributions and resources within the letter. Letters of collaboration must not be submitted from any organization that requests financial support.

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited

Other Budgetary Limitations:

A collaborative proposal may be submitted to this solicitation in one of two methods: as a single proposal, in which a single award is being requested (with subawards administered by the lead organization) or by simultaneous submission of proposals from different organizations, with each organization requesting a separate award. For both types of collaborative proposal submissions, this solicitation considers the collaborative proposal to be a single unified project. Proposal budgets for single institution proposals and collaborative proposals may not exceed $450,000 total for the entire project. Single institution proposals and collaborative proposals submitted with total budget requests exceeding $450,000 will be returned without review.

Budget Preparation Instructions:

Proposals may request travel funds to attend a NEES annual meeting organized by the current NEES operations awardee (through FY 2014) and the NEES2 operations awardee (starting in FY 2015).

The budget justification must include for each year and for each experimental facility to be used, an itemization of all associated user fee/recharge rate costs for which support is requested.

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

  June 03, 2013

D. FastLane / Grants.gov Requirements

- **For Proposals Submitted Via FastLane:**

  Detailed technical instructions regarding the technical aspects of preparation and submission via FastLane are available at: https://www.fastlane.nsf.gov/a1/newstan.htm. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

  Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane Website at: https://www.fastlane.nsf.gov/fastlane.jsp.

- **For Proposals Submitted Via Grants.gov:**

  Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: http://www07.grants.gov/applicants/app_help_reso.jsp. In addition, the NSF Grants.gov Application Guide provides additional technical guidance regarding preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

  Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in the GPG as Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: http://www.nsf.gov/bfa/dias/policy/meritreview/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Empowering the Nation Through Discovery and Innovation: NSF Strategic Plan for Fiscal Years (FY) 2011-2016*. These strategies

are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the core strategies in support of NSF's mission is to foster integration of research and education through the programs, projects and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students, and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the variety of learning perspectives.

Another core strategy in support of NSF's mission is broadening opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (GPG Chapter II.C.2.d.i. contains additional information for use by proposers in development of the Project Description section of the proposal.) Reviewers are strongly encouraged to review the criteria, including GPG Chapter II.C.2.d.i. . prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
    a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
    b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and

public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (GC-1); * or Research Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

Special Award Conditions:

Project Data

All experimental data and metadata generated under a NEESR planning grant award must be submitted electronically for data archiving and curation to the NEES2 operations awardee's data repository, which is anticipated to be operational by April 1, 2015, in accordance with the data archiving and curation policies to be announced and implemented by the NEES2 operations awardee.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer at least 90 days prior to the end of the current budget period. (Some programs or awards

require submission of more frequent project reports). Within 90 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report, will delay NSF review and processing of any future funding increments as well as any pending proposals for all identified PIs and co-PIs on a given award. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

More comprehensive information on NSF Reporting Requirements and other important information on the administration of NSF awards is contained in the NSF *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

Final Project Report

The final project report for all awards supported under this solicitation must include the following information:

- The website (URL) in the NEES2 operations awardee's data repository where all experimental metadata and data generated under the planning grant award is archived, curated, and complete.
- If the project included a software development component, the website (URL) where the open source software and supporting documentation may be found, and identification of the open source licensed used.

VIII. AGENCY CONTACTS

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- Joy M. Pauschke, Program Director, George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES) Operations and Research, telephone: (703) 292-7024, fax: (703) 292-9053, email: jpauschk@nsf.gov
- Kishor Mehta, Program Director, Hazard Mitigation and Structural Engineering (HMSE), telephone: (703) 292-7081, email: kimehta@nsf.gov
- Richard J. Fragaszy, Program Director, Geotechnical Engineering (GTE), telephone: (703) 292-7011, email: rfragasz@nsf.gov
- Dennis E. Wenger, Program Director, Infrastructure Management and Extreme Events (IMEE), telephone: (703) 292-8606, email: dwenger@nsf.gov
- Konstantinos P. Triantis, Program Director, Civil Infrastructure Systems (CIS), telephone: (703) 292-7088, email: ktrianti@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

IX. OTHER INFORMATION

The NSF Website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this Website by potential proposers is strongly encouraged. In addition, National Science Foundation Update is a free e-mail subscription service designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Regional Grants Conferences. Subscribers are informed through e-mail when new publications are issued that match their identified interests. Users can subscribe to this service by clicking the "Get NSF Updates by Email" link on the NSF web site.

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this new mechanism. Further information on Grants.gov may be obtained at http://www.grants.gov.

Sources for additional information:

Current NEES Operations Project Warehouse, http://nees.org/warehouse/welcome

National Earthquake Hazards Reduction Program (NEHRP), http://www.nehrp.gov

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at http://www.nsf.gov

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center)**:** (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**

  Send an e-mail to: nsfpubs@nsf.gov

  or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50. "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and NSF-51. "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Division of Administrative Services
National Science Foundation
Arlington, VA 22230

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