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

Program Solicitation

NSF 03-589



National Science Foundation
Directorate for Engineering
Division of Civil and Mechanical Systems

Letter of Intent Due Date(s) (*optional*):

December 08, 2003
and December 8 annually thereafter

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

January 22, 2004
and January 22 annually thereafter

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

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

Synopsis of Program:

The Division of Civil and Mechanical Systems (CMS) in the Directorate for Engineering of the National Science Foundation (NSF) invites proposals for earthquake engineering research that utilize the experimental resources of the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES). NEES is a national shared-use and geographically-distributed experimental laboratory for advancing understanding and improving the seismic design and performance of the Nation's constructed civil and mechanical infrastructure. When construction is completed on September 30, 2004, NEES will comprise a nationwide network of 15 earthquake engineering experimental equipment sites that includes shake tables, geotechnical centrifuges, a tsunami wave basin, unique large laboratory testing facilities, structural and geotechnical field-testing equipment, and mobile and permanently

installed field equipment. The NEES network, known as NEESgrid, will connect, via Internet2, the equipment sites, and will provide telepresence, a curated data repository, a simulation tools archive, and collaborative tools for facilitating on-line planning, execution, and post-processing of experiments. Access to NEES resources will be coordinated through the NEES Consortium, Inc. More information about NEES, the NEES Consortium, Inc., the NEES equipment sites (equipment, instrumentation, and capabilities), and NEESgrid resources is available at <http://www.eng.nsf.gov/nees>, <http://www.nees.org>, and <http://www.neesgrid.org>.

A proposal submitted under this solicitation must utilize the equipment resources at one or more of the NEES equipment sites operated by the NEES Consortium, Inc., in the proposed research project. NEESR projects will be supported at three levels of effort: Individual Investigator (II) awards will be made to individuals and small research teams; Small Group (SG) awards will be made to cross-disciplinary and, preferably, multi-organizational teams of researchers; Grand Challenge (GC) awards will support geographically-distributed, cross-disciplinary, and multi-organizational teams. The II awards are intended to focus on a specific problem in depth. The SG awards are larger in scope and most likely will require an investigating team. The GC awards are targeted to provide significant support for challenging problems that can be addressed only by a consortium of cross-disciplinary, multi-organizational investigators addressing research, education, and technology transfer.

NSF will hold an informational meeting after release of this program solicitation to inform the earthquake engineering community of this funding opportunity. NSF intends to issue a set of Frequently Asked Questions (FAQ) for this solicitation. Proposers should consult the following NSF web page for information about the informational meeting and the FAQ: <http://www.eng.nsf.gov/nees/neesresearch>.

Cognizant Program Officer(s):

- Steven McCabe, Program Director, Directorate for Engineering, Division of Civil & Mechanical Systems, 545 S, telephone: (703) 292-7003, email: smccabe@nsf.gov

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

- 47.041 --- Engineering

Eligibility Information

- **Organization Limit:**

U.S. universities and colleges and U.S. non-profit, non-academic organizations may submit NEESR proposals as the lead organization. NEESR proposals involving integrated partnerships (e.g., multi-organizational arrangements including other universities and colleges, minority-serving institutions, women's colleges, predominantly undergraduate institutions, national laboratories, private sector organizations, government agencies, and international collaborators) are encouraged. Note that the number of participating organizations and project participants is not necessarily a measure of quality. NEESR proposals must justify that all participating organizations and project participants are integral to achieving the goals and functions of the project.

NEESR proposals involving more than one organization must be submitted as a single administrative package from the lead academic institution or non-profit organization; collaborative proposals with multiple administrative packages will not be accepted.

- **PI Eligibility Limit:**

A Principal Investigator may submit only one NEESR proposal. However, a Principal Investigator for one proposal may be a co-Principal Investigator or project participant on other proposals submitted to this program solicitation.

- **Limit on Number of Proposals:** None Specified.

Award Information

- **Anticipated Type of Award:** Standard or Continuing Grant
- **Estimated Number of Awards:** 10 to 20 - total of GC, SG and II proposals
- **Anticipated Funding Amount:** \$9,000,000 maximum in 2004, pending availability of funds

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Submission of Letters of Intent is optional. Please see the full text of this solicitation for further information.
- **Full Proposal Preparation Instructions:** This solicitation contains information that deviates from the standard Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full text of this solicitation for further information.

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required.
- **Indirect Cost (F&A) Limitations:** Not Applicable.
- **Other Budgetary Limitations:** Not Applicable.

C. Due Dates

- **Letters of Intent (*optional*):**
December 08, 2003
and December 8 annually thereafter
- **Full Proposal Deadline Date(s)** (due by 5 p.m. proposer's local time):
January 22, 2004
and January 22 annually thereafter

Proposal Review Information

- **Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

Award Administration Information

- **Award Conditions:** Additional award conditions apply. Please see the full text of this solicitation for further information.
- **Reporting Requirements:** Standard NSF reporting requirements apply.

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I. INTRODUCTION

The Division of Civil and Mechanical Systems (CMS) in the Directorate for Engineering of the National Science Foundation (NSF) invites proposals for earthquake engineering research that require use of the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES) that is currently under construction. NEES is a national, shared-use experimental resource for advancing understanding and improving the design and performance of the Nation's constructed civil and mechanical infrastructure when subjected to earthquake excitation and tsunamis. NEES becomes operational for research and education activities on October 1, 2004, and will be operational through September 30, 2014. Once operational, NEES will comprise a nationwide network of 15 earthquake engineering experimental equipment sites, available for experimentation on-site or in the field and through telepresence. NEES equipment sites include shake tables, geotechnical centrifuges, a tsunami wave basin, unique large laboratory testing facilities, and mobile and permanently installed field equipment. The NEES network, known as NEESgrid, will connect, via Internet2, the equipment sites as well as provide telepresence, a curated data repository, a simulation tools archive, and collaborative tools for facilitating on-line planning, execution, and post-processing of experiments. NEES projects funded under this solicitation must utilize the equipment resources at one or more of the NEES equipment sites operated by the NEES Consortium, Inc., and the NEESgrid resources. More information about NEES, the NEES Consortium, Inc., the NEES experimental equipment sites (equipment, instrumentation, and capabilities), and NEESgrid resources is available at <http://www.eng.nsf.gov/nees>, <http://www.nees.org>, and <http://www.neesgrid.org>.

NEES provides the opportunity for the earthquake engineering community to participate in cutting edge research to extend theory, model-based simulation, computational and visualization tools, design practice and codes in earthquake engineering, experimental techniques, and sensor technology. As an integrated network, NEES offers new opportunities for earthquake engineering research to enable or enhance the investigation of problems at both the component and systems levels, in a more systematic way than previously possible through use of multiple, independent equipment sites. The NEES infrastructure also provides national resources for developing, coordinating, and sharing new educational programs and curricular materials to train the next generation engineering workforce.

A panel organized by the National Research Council of the National Academies has developed a long-term research agenda for earthquake engineering research needs that is well suited to investigative techniques involving use of the NEES experimental resources. Results from this study entitled "*Preventing Earthquake Disasters: The Grand Challenge in Earthquake Engineering. A Research Agenda for the Network for Earthquake Engineering Simulation (NEES)*," are available at <http://www.nationalacademies.org/publications/>. In addition, the Earthquake Engineering Research Institute has developed a long-term research and outreach plan for earthquake engineering research entitled "*Securing Society Against Catastrophic Earthquake Losses*," available at <http://www.eeri.org/titlepage.html>. Proposers are encouraged to review these publications before preparing proposals in

response to this program solicitation.

During the ten-year operational period, NEES resources will be operated and maintained by NEES Consortium, Inc. (<http://www.nees.org>). For NEESR research funded under this program solicitation, access to and scheduling and announcing of experiments at the NEES equipment sites will be coordinated by NEES Consortium, Inc., who will operate and maintain the equipment sites and the NEESgrid network. As it becomes available, information about NEES resources, i.e., the evolving policies on the shared use of the NEES equipment sites, sharing of data, and the evolving formats for data, metadata, and E-Notebooks, can be found at <http://www.nees.org> and <http://www.neesgrid.org>. Because these policies and formats are being developed by NEES Consortium, Inc. (<http://www.nees.org>) and the NEES system integration project (<http://www.neesgrid.org>), in conjunction with the earthquake engineering community, NSF expects awardees under this program solicitation to comply with these policies and formats, when established, for equipment facilities usage and documenting and sharing of NEESR results.

NSF will hold an informational meeting after release of this program solicitation to inform the earthquake engineering community of this funding opportunity and answer questions regarding this solicitation. In addition, NSF intends to issue a list of Frequently Asked Questions (FAQ) for this solicitation. Proposers should consult <http://www.eng.nsf.gov/nees/neesresearch> for information about the informational meeting and the FAQ.

II. PROGRAM DESCRIPTION

General Information Regarding NEESR

This program solicitation begins a new era in NSF-funded earthquake engineering research. As NEES comes on-line on October 1, 2004, it will represent the culmination of over a decade of planning and construction by the earthquake engineering community to develop advanced earthquake engineering research capabilities for the United States. NEES offers new opportunities in earthquake engineering to enable or enhance the study of problems of larger scope, requiring experimental resources, in a more systematic way than previously possible. As such, this solicitation is aimed at providing research funding to support innovative research into the performance of structural, nonstructural, geotechnical, hydraulic, and other civil and mechanical infrastructure systems during earthquake excitation or tsunamis. Projects funded under this solicitation are intended to be comprehensive in research scope and provide key research insights and results that will *rapidly* advance the state of the art.

NEESR proposals submitted under this solicitation are required to utilize appropriate equipment resources at one or more of the NEES equipment sites operated by the NEES Consortium, Inc. **NEESR proposals that do not require the use of NEES equipment sites operated by the NEES Consortium, Inc., will be returned without review.** Investigators who wish to conduct earthquake engineering research that does not require use of NEES equipment sites operated by the NEES Consortium, Inc., should submit proposals to one of the existing earthquake engineering programs within NSF/CMS (<http://www.eng.nsf.gov/cms/>).

NEESR projects will be supported at three levels of effort.

- Individual Investigator (II) awards will be made to individuals and small research teams;
- Small Group (SG) awards will be made to cross-disciplinary, and preferably multi-organizational, teams of researchers;
- Grand Challenge (GC) awards will support geographically distributed, cross-disciplinary, and multi-organizational teams.

II NEESR projects are intended to focus on a specific problem in detail. The SG awards are larger in scope and will involve a small cross-disciplinary investigating team. The GC awards are targeted to provide significant support for challenging problems that can be addressed only by a cross-disciplinary and multi-organizational team of investigators that addresses research, education, and technology transfer within the scope of the project.

GC and SG NEESR projects offer a unique opportunity for researchers outside the project team to utilize the project's test set-up to accommodate a considerably smaller experimental investigation of a "payload" component, referred to as a "payload project." This

payload component is not necessarily part of the main structural, geotechnical, or infrastructure system, e.g., the payload may be a mechanical, control, sensing, or nonstructural component that may detect or support operation of the overall system, but is not part of the load carrying system. Payload projects also may concern the load carrying structural system or its components. The GC or SG project's test set-up would provide the vehicle for testing the payload component(s). GC and SG projects may identify and include potential payload projects as part of the base proposal submission to this program solicitation. Alternatively, after an GC or SG award is made, NSF may fund payload projects separately, either to the project team or to researchers outside the project team, through the Small Grants for Exploratory Research (SGER) program.

Prior to award, meritorious proposals will be required to revise their project schedule, after consultation with NEES Consortium, Inc., to accommodate the time period when the requested NEES equipment site(s) will be available for the project. Based on the revised project schedule, NSF will determine an effective start date for the award that may be later than the start date originally proposed. NSF also may require revised budget information following consultation with NEES Consortium, Inc.

All NEESR project awardees will be required to attend an annual NEES research and education meeting to share progress to date from their research; these meetings will be open to the public.

NEESR projects funded under this program solicitation that involve team members from more than one organization will be required to submit to NSF an intellectual property agreement, signed by all participating organizations and consultants, within six months of the effective award date. Projects that do not submit the intellectual property agreement by the required six-month deadline may be terminated before the end of the first year of the project.

NEESR Requirements Regarding Telepresence and Data

NEES experimental, telepresence, data archival, simulation, and collaborative capabilities have been designed to provide an infrastructure for earthquake engineering research and education partnerships, and to encourage broad participation from different segments of the earthquake engineering community (e.g., researchers, educators, students, practitioners, consultants, government agencies, national laboratories, international collaborators, etc.).

NEES enables broad teleparticipation in experimentation at each NEES equipment site, for both private clients (e.g., remote collaborators involved on the project research team) and public clients (e.g., remote viewers such as K-12 faculty and students, an engineering class, and practicing engineers). The planned test dates of all experiments conducted by awards made under this solicitation must be announced on the NEES Consortium, Inc. web site (<http://www.nees.org>) and the experimental set-up must be configured to enable viewing by both private and public clients to the maximum extent practical. Viewing in this context means the ability to observe not only static www pages, but also includes a range of streaming images, subsets of NON-MISSION critical sensor data, results and background documentation. All of this should be in a format, which is appropriate to the intended educational outreach (public) clients/audience.

At all times, even when a specific test is not being conducted, a public telepresence website will be kept operational at each NEES equipment site allowing the general public to observe the real time events occurring in laboratory facilities (e.g., construction, experimentation, disassembly). In addition, NEES equipment sites must provide the ability to browse NON-MISSION critical documentation, representative data, and if practical video replay's of past experiments. The intent is to expand the community's awareness and understanding of the scientific process by allowing them into the laboratory in a safe manner, yet leaving them the opportunity to explore in a structured environment.

NEES has been designed to share both experimental facilities and the data generated from research that uses these facilities (experimental and analytical data). NSF advocates and encourages open scientific communication. NSF expects significant findings from supported research and educational activities to be *promptly* submitted for publication with authorship that accurately reflects the contributions of those involved. NSF expects PIs to share with other researchers, at no more than incremental cost and within a reasonable time, the data, samples, physical collections and other supporting materials created or gathered in the course of the work. NSF also encourages grantees to share software and inventions, once appropriate protection for them has been secured, and otherwise act to make the innovations they embody widely useful and usable.

All experimental data generated from NEESR shall be submitted electronically to the NEES data repository. Data in this context refers to all measurements, calibrations, observations, analyses, images, commentary, reports, logs, notes and/or electronic notebook entries which relate directly to the proposed experiments. Any data (as described above), which is recorded in hardcopy of any form, must be losslessly transcribed/converted into an appropriate searchable format on to electronic media. In addition, this information must be

properly characterized with appropriate metadata descriptors and then subsequently stored into one of the NEES accepted digital formats to facilitate archiving in accordance with the data, metadata, and formats and policies established by the earthquake engineering community through NEES Consortium, Inc. (<http://www.nees.org>) and the NEES system integration project (<http://www.neesgrid.org>).

International Collaboration

NSF encourages collaboration with international researchers. NEESR proposals including international collaboration should address their collaboration in the management plan and identify the names and institutions of the international collaborators, the nature and goals of collaboration activities, and the international synergies and benefits to be gained from the collaboration. NSF policies and procedures regarding participation of international researchers can be obtained from the NSF Office of International Science and Engineering (<http://www.nsf.gov/home/int/>).

Specific Requirements for NEESR Proposals

1. Individual Investigator NEESR Proposals (II)

Individual investigator (II) NEESR proposals are similar to traditional individual investigator research proposals. The size and scope of the project is less than that of a Small Group Award and may be conducted at one institution or several, within the budget constraints of this type of award.

II NEESR projects will have the following key features:

- Vision for investigating a significant problem in earthquake engineering requiring use of NEES equipment sites operated by the NEES Consortium, Inc.;
- Research outcomes that advance the state of the art in earthquake engineering;
- Comprehensive research plan to realize the vision;
- Research program encompassing experimental and analytical investigations;
- Project implementation plan, including a project schedule, project management plan, organizational chart for all project phases, plan for experimental planning, testing, and post-processing and analysis to use NEESgrid resources (e.g., collaborative tools, data repository, simulation tools, telepresence configured for both private and public clients), test set-ups to include both private and public clients, and plan for removal/disposal of experimental specimens;
- Education and outreach program, including an interactive project web site and activities that engage the earthquake engineering education community;
- Plan for dissemination and transfer of findings to the earthquake engineering community, including plan and schedule for dissemination of experimental and analytical results through the NEES data repository; and
- Project team with members from more than one organization must submit an intellectual property agreement signed by all participating organizations and consultants within six months of the effective award date.

2. Small Group NEESR Proposals (SG)

Small group research is intended to be conducted by a cross-disciplinary and, if appropriate, multi-organizational collaborative project team. The Principal Investigator must devote at least two months of effort annually to the project.

SG NEESR projects will have the following key features:

- Vision for investigating a significant problem in earthquake engineering requiring extensive use of NEES equipment sites operated by the NEES Consortium, Inc.
- Seminal, rather than incremental, research outcomes to advance the state-of-the-art in earthquake engineering;
- Strategic research plan to realize the vision;
- Research program encompassing experimental and analytical investigations;
- Opportunities provided under the SG award for payload projects to the extent practical;
- Project implementation plan, including a project schedule, project management plan, organizational chart for all project phases, plan for experimental planning, testing, and post-processing and analysis to use NEESgrid resources (e.g.,

collaborative tools, data repository, simulation tools, telepresence configured for both private and public clients), test set-ups to include both private and public clients, and plan for removal/disposal of experimental specimens;

- Education and outreach program, including an interactive project web site and activities that engage the earthquake engineering education community;
- Cross-disciplinary and, if appropriate, a multi-organizational project team;
- Project team and leadership diverse in gender, race, and ethnicity;
- Plan for dissemination and transfer of findings to the earthquake engineering community, including plan and schedule for dissemination of experimental and analytical results through the NEES data repository; and
- Project team with members from more than one organization must submit an intellectual property agreement signed by all participating organizations and consultants within six months of the effective award date.

3. Grand Challenge NEESR Proposals (GC)

Grand Challenge (GC) NEESR projects must take a comprehensive systems approach that warrants an in-depth, cross-disciplinary and multi-organizational investigation to achieve project goals, with a scope that includes research, education, and technology transfer activities, to be accomplished over a maximum five-year funded period. Proposers of GC research are encouraged to form a geographically-distributed project team that includes participants from other universities and colleges, minority-serving institutions, women's colleges, predominantly undergraduate institutions, national laboratories, private sector organizations, government agencies, and international collaborators, as appropriate.

The Principal Investigator must devote at least two months of effort annually to the project. GC NEESR projects may find it beneficial to include a project manager, who does not necessarily have to be affiliated with an academic institution.

GC NEESR projects will have the following key features:

- Strategic vision for a system-level problem in earthquake hazard mitigation requiring extensive use of NEES equipment sites operated by the NEES Consortium, Inc.;
- Seminal, rather than incremental, research outcomes that will advance the state-of-the-art in earthquake engineering;
- Strategic research plan to realize the vision;
- Research program encompassing a full spectrum of experimental and analytical investigations;
- Opportunities provided under the GC to accommodate payload projects;
- Project implementation plan, including a project schedule, project management plan, organizational chart for all project phases, plan for experimental planning, testing, and post-processing and analysis to use NEESgrid resources (e.g., collaborative tools, data repository, simulation tools, telepresence configured for both private and public clients), test set-ups to include both private and public clients, and plan for removal/disposal of experimental specimens;
- Education and outreach program, including an interactive project web site and activities that engage the broad earthquake engineering education community;
- Geographically-distributed, cross-disciplinary and multi-organizational project team;
- Project team and leadership diverse in gender, race, and ethnicity;
- Plan for dissemination and transfer of findings to the earthquake engineering community, including plan and schedule for dissemination of experimental and analytical results through the NEES data repository;
- Project team with members from more than one organization must submit an intellectual property agreement signed by all participating organizations and consultants within six months of the effective award date; and
- External advisory board.

III. ELIGIBILITY INFORMATION

U.S. universities and colleges and U.S. non-profit, non-academic organizations may submit NEESR proposals as the lead organization. NEESR proposals involving integrated partnerships (e.g., multi-organizational arrangements including other universities and colleges, minority-serving institutions, women's colleges, predominantly undergraduate institutions, national laboratories, private sector organizations, government agencies, and international collaborators) are encouraged. Note that the number of participating

organizations and project participants is not necessarily a measure of quality. NEESR proposals must justify that all participating organizations and project participants are integral to achieving the goals and functions of the project.

NEESR proposals involving more than one organization must be submitted as a single administrative package from the lead academic institution or non-profit organization; collaborative proposals with multiple administrative packages will not be accepted.

IV. AWARD INFORMATION

All awards are subject to the quality of proposals received and availability of funding.

- GC Awards
 - approximately two per year
 - funding up to \$1,400,000 per year per award for up to five years

- SG Awards
 - approximately five per year
 - funding up to \$600,000 per year per award for up to four years

- II Awards
 - approximately twelve per year
 - funding up to \$150,000 per year per award for up to three years

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Letters of Intent (*optional*):

A Letter of Intent is requested for each proposal that will be submitted for possible funding under this solicitation. Letters of Intent must be submitted by lead principal investigators at U.S. universities, colleges or non-profit organizations via e-mail to neesr@nsf.gov by December 8, 2003. Letters of Intent from co-principle investigators, subawardees or other participating organizations are not to be submitted.

The Letter of Intent should include:

- Title of proposal.
- The names and affiliations of the principal investigator and *all* co-principal investigator(s).
- The telephone and facsimile numbers and e-mail addresses of the principal investigator and an authorized organizational representative of the submitting institution.
- A list of all participating institutions, organizations and subawardees, including names, telephone and facsimile numbers and e-mail addresses.

Letters of Intent are not mandatory but are strongly encouraged to enable NSF to begin organization of the review panels before the

proposal submission deadline so as to expedite the review process. NSF will acknowledge the receipt of all Letters of Intent via e-mail to the principal investigator.

Full Proposal Instructions:

Proposals submitted in response to this program announcement/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/cgi-bin/getpub?gpg>. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

Multi-organizational collaborative NEESR proposals may only be submitted if a single award is requested by the lead organization (with subawards administered by the lead organization). Collaborative NEESR proposals that are the simultaneous submission of proposals from different organizations, with each organization requesting a separate award, will be returned without review.

NEESR proposal review criteria will be based on the type of proposal submitted: II, SG, or GC. Therefore, proposal titles must begin with one of the following phrases: Individual Investigator proposal titles must begin with the phrase "**NEESR-II**;" Small Group proposal titles must begin with the phrase "**NEESR-SG**;" Grand Challenge proposal titles must begin with the phrase "**NEESR-GC**." Proposals with titles that do not begin with one of these three phrases will be returned without review since NSF will not assign the category (II, SG, or GC) to use for proposal review.

Individual Investigator (II) NEESR proposals are limited to the standard 15-page limit for the project description. Because of their larger scopes, Small Group (SG) and Grand Challenge (GC) NEESR proposals will be limited to 20 and 25 pages, respectively, for the project description. The project schedule and a draft intellectual property agreement (not necessarily signed by all parties at the time of proposal submission; required only if members of the project team are from more than one organization) should be submitted as supplementary documents. Letters of endorsement are not permitted to be included as a part of the proposal.

NEESR proposals must have the entire project description, including the required elements listed above as well as the required elements contained in the 8 bullets below, submitted to FastLane in a single file upload. Information regarding the Supported File Formats and Corresponding File Extensions can be found at: <https://www.fldemo.nsf.gov/a1/A1AcceptableFileExtensions.html>

The project scope, budget, and schedule must incorporate all activities required to conduct the entire project. Proposers should consult the *NEES Facilities Users Guide* (<http://www.nees.org>), as well as the NEES equipment site(s) intended to be used in the project, during proposal preparation for information on the shared use of NEES equipment sites, including protocols, scheduling, and experimental planning information. The project scope, budget, and schedule must incorporate all activities required to conduct the project. Proposers should contact the intended use NEES equipment site for any special testing protocols, e.g. a NEES equipment site may have site-specific requirements such as pre-testing protocols (e.g., computational simulations and/or tests on small-scale models) that must be completed before the actual experiment is run. Proposers will be responsible for obtaining any required permits for field testing and making all arrangements for field testing.

NEESR Proposals for all three types of grants under this solicitation must include the following items in the project description, in addition to the other required items in the NSF Grant Proposal Guide:

- Page one of the project description: A table that lists each project team member's name, title, affiliation, expertise, role in the project, and annual time allotted for project activities. Note: GC projects should not include the names of External Advisory Board members; NSF expects that a competent board will be assembled after the award is made;
- Page two of the project description: A one-page summary of the resources at the NEES equipment site(s) to be utilized in the proposed project and the planned schedule and duration of use of each NEES equipment site;
- Literature review that justifies the "gap" in earthquake engineering knowledge that the project proposes to address;
- Well-defined anticipated broader impacts of the proposed research activities, including expected research outcomes to advance the state-of-the-art in earthquake engineering;
- Impact on the current and future earthquake engineering workforce;
- How the proposal addresses each key feature listed above for the type of proposal (II, SG, or GC) submitted;
- Summary of discussions during proposal preparation with the NEES equipment site(s) that will be used in the project; and
- Functional budget.

When preparing the proposal budget, proposers should include the following:

- Budget for the conduct of all activities associated with the project, including any special costs associated with experimentation using the requested NEES equipment site;
- Budget to document and archive all experimental and analytical project data, including full documentation of all data, associated metadata, and E-Notebook(s) into the NEES data repository;
- Budget for travel to participate in one NEES research and education awardees meeting per year, to present and share progress to date on the project; and
- Budget to develop and maintain a project web site.

Proposers are reminded to identify the program announcement/solicitation number (03-589) in the program announcement/solicitation block on the proposal Cover Sheet. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost Sharing:

Cost sharing is not required in proposals submitted under this Program Solicitation.

C. Due Dates

Proposals must be submitted by the following date(s):

Letters of Intent (*optional*):

December 08, 2003
and December 8 annually thereafter

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

January 22, 2004
and January 22 annually thereafter

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this announcement/solicitation through the FastLane system. Detailed instructions for proposal preparation and submission via FastLane are available at: <http://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 announcement/solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this announcement/solicitation.

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. Proposers are no longer required to provide a paper copy of the signed Proposal Cover Sheet to NSF. Further instructions regarding this process are available on the FastLane Website at: <http://www.fastlane.nsf.gov>

VI. PROPOSAL REVIEW INFORMATION

Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

The National Science Board approved revised criteria for evaluating proposals at its meeting on March 28, 1997 ([NSB 97-72](#)). All NSF proposals are evaluated through use of the two merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

On July 8, 2002, the NSF Director issued [Important Notice 127](#), Implementation of new Grant Proposal Guide Requirements Related to the Broader Impacts Criterion. This Important Notice reinforces the importance of addressing both criteria in the preparation and review of all proposals submitted to NSF. NSF continues to strengthen its internal processes to ensure that both of the merit review criteria are addressed when making funding decisions.

In an effort to increase compliance with these requirements, the January 2002 issuance of the GPG incorporated revised proposal preparation guidelines relating to the development of the Project Summary and Project Description. Chapter II of the GPG specifies that Principal Investigators (PIs) must address both merit review criteria in separate statements within the one-page Project Summary. This chapter also reiterates that broader impacts resulting from the proposed project must be addressed in the Project Description and described as an integral part of the narrative.

Effective October 1, 2002, NSF will return without review proposals that do not separately address both merit review criteria within the Project Summary. It is believed that these changes to NSF proposal preparation and processing guidelines will more clearly articulate the importance of broader impacts to NSF-funded projects.

The two National Science Board approved merit review criteria are listed below (see the [Grant Proposal Guide](#) Chapter III.A for further information). The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which he/she is qualified to make judgments.

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

NSF staff will give careful consideration to the following in making funding decisions:

Integration of Research and Education

One of the principal strategies in support of NSF's goals 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 diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- 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.

Additional Review Criteria:

1. NSF Review Process for II, SG and GC NEESR Proposals

In addition to the two NSB approved merit review criteria, reviewers will be asked to address the quality of and the extent to which the NEESR proposal addresses each of the key features for the pertinent proposal submission: Individual Investigator, Small Group, or Grand Challenge.

2. Additional NSF Review Process for GC NEESR Proposals

Grand Challenge NEESR proposals will first be reviewed by panels that also will consider SG and II proposals, with ad hoc mail reviews as needed. The panels will prepare recommendations for GC proposals to be considered for a second merit review by NSF. NSF/CMS staff will review these recommendations and select a shortlist of GC NEESR proposals to be invited by NSF for review by the Grand Challenge Research Panel. Principal investigators that make the shortlist will be required to brief the Grand Challenge Research Panel in person at NSF headquarters in Arlington, VA. Each invited Principal Investigator may bring up to one additional project team member as a second briefing participant.

Briefing proposers will be advised as such in March 2004 and given a specific date and time window in April 2004 to meet with the panel. Grand challenge NEESR proposers should plan their schedules to be available for this second and final step of the merit review process. Briefing dates will not be rescheduled. Travel and other costs will be the responsibility of proposers. One week prior to the briefing, proposers will be asked to submit a ten-page maximum proposal addendum to address reviewer comments; this addendum will be included as part of the Grand Challenge Research Panel review.

B. Review Protocol and Associated Customer Service Standard

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this announcement/solicitation will be reviewed by 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.

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 Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

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 date of receipt. The interval ends when the Division Director accepts the Program Officer's recommendation.

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 Division 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.A. 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 (NSF-GC-1); * or Federal Demonstration Partnership (FDP) Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/home/grants/grants_gac.htm. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Website at <http://www.nsf.gov/cgi-bin/getpub?gpm>. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Website at <http://www.gpo.gov>.

Special Award Conditions:

All experimental and analytical data generated during the research project, including full documentation of the associated metadata and the complete E-Notebook, will be required to be submitted to the NEES data repository, in accordance with the data, metadata, and E-Notebook formats and policies established by the earthquake engineering community via NEES Consortium, Inc. (<http://www.nees.org>) and the NEES system integration award (<http://www.neesgrid.org>).

NEESR research projects funded under this program solicitation that involve more than one organization will be required to submit to NSF an intellectual property agreement, signed by all participating organizations and consultants, within six months of the effective start date of the NSF award. Projects that do not submit the intellectual property agreement by the required six-month deadline may be terminated before the end of the first year of the project.

Awardees will be required to attend an annual NEES research and education awardees meeting; this meeting will be open to the public.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for the PI and all Co-PIs. 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 FastLane, for preparation and submission of annual and final project reports. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system.

VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries regarding this program should be made to:

- Steven McCabe, Program Director, Directorate for Engineering, Division of Civil & Mechanical Systems, 545 S, telephone: (703) 292-7003, email: smccabe@nsf.gov

Cognizant Program Officer(s):

- **Clifford Astill**, Program Director, **Geoenvironmental Engineering and Geohazards Program**, Directorate for Engineering, Division of Civil & Mechanical Systems, 545 S, telephone: (703) 292-7004, fax: (703) 292-9053, email: castill@nsf.gov
- **Perumalsamy N. Balaguru**, Program Director, **Infrastructure Materials and Structural Mechanics Program**, Directorate for Engineering, Division of Civil & Mechanical Systems, 545 S, telephone: (703) 292-7020, fax: (703) 292-9053, email: pbalagur@nsf.gov
- Ken P. Chong, Program Director, **Mechanics and Structures of Materials Program**, Directorate for Engineering, Division of Civil & Mechanical Systems, 545 S, telephone: (703) 292-8360, fax: (703) 292-9053, email: kchong@nsf.gov
- Richard J. Fragaszy, Program Director, **Geomechanics and Geotechnical Systems Program**, Directorate for Engineering, Division of Civil & Mechanical Systems, 545 S, telephone: (703) 292-8360, fax: (703) 292-9053, email: rfragasz@nsf.gov
- Miriam Heller, Program Director, **Information Technology and Infrastructure Systems Program**, Directorate for Engineering, Division of Civil & Mechanical Systems, 545 S, telephone: (703) 292-8360, fax: (703) 292-9053, email: mheller@nsf.gov
- Shih Chi Liu, Program Director, **Sensor Technologies for Civil and Mechanical Systems Program**, Directorate for Engineering, Division of Civil & Mechanical Systems, 545 S, telephone: (703) 292-8360, fax: (703) 292-9053, email: sliu@nsf.gov
- Steven L. McCabe, Program Director, **Structural Systems and Hazard Mitigation of Structures Program**, Directorate for Engineering, Division of Civil & Mechanical Systems, 545 S, telephone: (703) 292-8360, fax: (703) 292-9053, email: smccabe@nsf.gov
- Vilas Mujumdar, Program Director and **NEES Equipment Site Project Coordinator**, Directorate for Engineering, Division of Civil & Mechanical Systems, 545 S, telephone: (703) 292-7262, fax: (703) 292-9053, email: vmujumda@nsf.gov
- Joy M. Pauschke, Program Director, **Network for Earthquake Engineering Simulation (NEES)**, Directorate for Engineering, Division of Civil & Mechanical Systems, 545 S, telephone: (703) 292-7024, fax: (703) 292-9053, email: jpauschk@nsf.gov
- Masayoshi Tomizuka, Program Director, **Dynamic Systems and Control Program**, Directorate for Engineering, Division of Civil & Mechanical Systems, 545 S, telephone: (703) 292-7012, fax: (703) 292-9053, email: mtomizuk@nsf.gov
- Dennis Wenger, Program Director, **Infrastructure Systems Management and Hazard Response Program**, Directorate for Engineering, Division of Civil & Mechanical Systems, 545 S, telephone: (703) 292-7014, fax: (703) 292-9053, email: dewenger@nsf.gov

For questions related to the use of FastLane, contact:

- Kimberly J. Bryant, Program and Technology Specialist, Directorate for Engineering, Division of Civil & Mechanical Systems, 545 S, telephone: (703) 292-7006, fax: (703) 292-9053, email: kbryant@nsf.gov

IX. OTHER PROGRAMS OF INTEREST

The NSF *Guide to Programs* is a compilation of funding for research and education in science, mathematics, and engineering. The NSF *Guide to Programs* is available electronically at <http://www.nsf.gov/cgi-bin/getpub?gp>. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the *Guide to Programs* will be announced in the NSF *E-Bulletin*, which is updated daily on the NSF Website at <http://www.nsf.gov/home/ebulletin>, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's *Custom News Service* (<http://www.nsf.gov/home/cns/start.htm>) to be notified of new funding opportunities that become available.

The NSF Guide to Programs is a compilation of funding opportunities for research and education in science, mathematics, and engineering. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter. Beginning in fiscal year 1999, the NSF Guide to Programs only will be available electronically, at <http://www.nsf.gov/cgi-bin/getpub/gpg>. Many NSF programs offer announcements concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices listed in Appendix A of the GPG. Any changes in NSF's fiscal year programs occurring after press time for the Guide to Programs will be announced in the NSF *E-Bulletin*, available electronically on the NSF Web site at: <http://www.nsf.gov/home/ebulletin/>. The direct URL for recent issues of the Bulletin is <http://www.nsf.gov/home/ebulletin/>. Subscribers can also sign up for NSF's Custom News Service to find out what funding opportunities are available.

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The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF, although some programs may have special requirements that limit eligibility.

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the GPG Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

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 or (800) 281-8749
- **To Order Publications or Forms:**

Send an e-mail to: pubs@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; 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 applicant 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 needing information as part of the review process or in order to coordinate programs; 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," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). 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 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 this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Division of Administrative Services, National Science Foundation, Arlington, VA 22230.

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