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editorial

Earthquake Engineering Research

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On November 15, 2004 the Network for Earthquake Engineering Simulation (NEES), a new large *collaboratory* on earthquake engineering research, will be officially launched by the National Science Foundation (NSF). Funded for a 10-year term, NEES is expected to provide a quantum leap in testing and simulation capabilities for seismic hazard mitigation, and to provide much of the fundamental knowledge required to develop performance-based design specifications. Four characteristics of a *collaboratory* are:

• Distributed research facilities: For the NEES collaboratory, NSF funded improvements and new equipment at 15 laboratories scattered throughout the United States. These facilities (**http://www.nacse.org/neesSiteSpecs**) represent a total initial investment of about $80M in state-of-the-art testing equipment.

• Shared instruments and facilities: The NEES facilities, while residing at specific universities, will be accessible to the entire earthquake engineering research community. This community is made up not only of university researchers but also of anyone interested in improving earthquake hazard mitigation.

• Community data system: The 15 laboratories are linked through an advanced network (NEESGrid) that will provide real-time communications between laboratories, linking numerical and experimental simulations. An essential part of this effort is the development of easy-to-access databases that will permit quick access by the profession to the entire set of experimental results and all ancillary information (metadata).

• Open community contribution system: Most importantly, the NEES network is a community resource. Researchers, designers, code officials, industry and any other interested party can become part of the research at these facilities. It is expected that other university and national and international laboratories will join the network soon.

The NEES facilities can be divided into four broad categories:

• *Field testing equipment*: (a) large vibrators for forced vibration testing of structural systems and soil-foundation-structural interaction (UCLA); (b) one large triaxial mobile shaker and two electro-hydraulic cubical shakers for wave propagation studies in soils (UT-Austin); (c) two permanently instrumented sites for liquefaction and soil-structure interaction studies (UC-Santa Barbara); and, (d) a large tsunami wave tank for studying intermediate to long wave behavior (Oregon State).

• *Geotechnical and Lifeline equipment*: (a) two upgraded centrifuges, featuring multiple degree-of-freedom gantry robots and 2D and 3D on-board triaxial shakers (UC-Davis and RPI), and (b) a lifeline testing system for testing of buried pipelines (Cornell).

• *Large structural testing facilities*: (a) a reconfigurable reaction wall-based facility for multi-substructure hybrid simulation (UC-Berkeley); (b) a hybrid testing facility with three fast actuators (Colorado); (c) a multi-directional, high capacity testing facility for structural components and systems (Lehigh); (d) a multi-axial subassemblage testing facility for testing of large-scale substructures (Minnesota); and (e) a set of three loading/boundary condition boxes with 6 DOF control (UIUC-Urbana).

• *Shake table facilities*: (a) a two shake tables (6 DOF) facility coupled with large reaction wall capabilities (Buffalo); (b) three reconfigurable 450 kN biaxial shake tables (UN-Reno); and (c) a very large, one-degree-of freedom shake table with a 20 MN vertical payload and adjacent soil pits / soil box for SSI studies (UC-San Diego).

How can structural engineers participate and benefit from NEES? There are numerous ways! A few examples, in ascending rank of importance and time commitment, include:

• Providing input to the research agenda through interactions with SEI, EERI, ATC, CUREE and similar organizations on topics of interest and importance to the seismic design community (contact: **relon@ce.gatech.edu**)

• Becoming involved with the review process to select the most meritorious and high-impact research proposals to be funded (i.e., join NSF award review panels; **http://www.cise.nsf.gov/faq/reviewer.cfm**)

• Becoming active participants by serving on advisory committees to research projects and helping with technology transfer efforts (contact current researchers),

• Becoming full partners on research proposals with local universities (researchers interested in seismic issues can be found at almost any medium to large-size university nationwide – see list of CUREE member institutions (**www.curee.org**)

• Becoming the leaders of research proposals in the utilization of new technologies, materials, and structural systems.

What benefits will you receive in return? Clearly a structural engineer who becomes involved with NEES will, as a minimum:

• Have immediate access to the most current and leading-edge research in seismic hazard mitigation,

• Become more knowledgeable about the latest in both experimental and analytical techniques used in seismic design,

Provide input into the development of code provisions and performance-based design specifications,

• And, gain access to the expertise of leading researchers in the field.

What can you do right now to advance your understanding of NEES and to make plans to become an active participant? First, visit **www.nees.org** and read the sections entitled "NEES Program Components" and "NEES Consortium, Inc.". Then make contact with researchers at an "Equipment Site" near you and plan a "field trip" to observe the site in action!▪