News of the Profession

6.4 Quake Strikes Turkey on May 1, 2003

The following information was provided by teams from the Seismology Laboratory and the Earthquake Engineering Department of Kandilli Observatory and Earthquake Research Institute (KOERI), Bogaziçi University, Istanbul, Turkey.

A magnitude 6.4 earthquake struck the municipality of Bingöl, Turkey, on May 1, 2003. The tectonics of the region are controlled by the collision of the Arabian and Eurasian Plates, causing the lateral escape of the Anatolian block to the west. This block is bounded to the southeast by the East Anatolian fault, which is a 550-km-long, northeast-trending, left-lateral strike-slip fault. The 60-km-long northeastern segment of this fault goes through Bingöl.

The Bingöl city government reported that 168 people were killed and 520 injured. In the city, 308 housing units collapsed, 2,566 were heavily damaged, and 2,546 were lightly damaged.

Damage is concentrated in four districts located on both sides of the Murat River that divides the city in two. Generally the structural performance of buildings in the city center was poor in this moderate earthquake. Most of the reinforced concrete (RC) buildings in this area were heavily damaged. There was poor detailing at critical regions of structural elements such as insufficient lap splices and an insufficient amount of transverse reinforcement at the end regions of beams, columns, and beam-column joints. Poor-quality concrete is a common problem, as people prefer to produce their own by using the material they get from the Murat River as aggregate. The residential buildings were not engineered and their construction was uncontrolled. However, those that were built recently and had shear walls performed well. A significant portion of government buildings (schools, dormitories, state buildings) had the highest level of damage to RC structures, except for those built in the last five years. Education was disrupted, and a portion of the hospital in the city center was out of service.

Himis (composed of timber frames and braces with adobe infills) is a common nonengineered building type in eastern Turkey. It typically has thick perimeter walls and heavy roofs to provide heat insulation. The large mass of these structures caused high lateral forces resulting in poor performance; they sustained heavy damage and a few totally collapsed, primarily because of brittle behavior of material and weakness of connections between members.

Throughout the city, unreinforced masonry structures were heavily damaged, commonly with typical "x-type" shear cracking due to the brittle behavior of material. In many cases, infill walls partially collapsed due to the lack of restraints in the out-of-plane direction, causing a high level of nonstructural damage.

As part of its Learning from Earthquakes Program, funded by the National Science Foundation, EERI is coordinating a field investigation of the earthquake with some of its members in Turkey. Professors Polat Gülkan (Middle East Technical University, Ankara) and Mustafa Erdik (KOERI) are leading teams on preliminary investigations. Joining them will be Seref Polat, a structural designer with the engineering firm of Rutherford and Chekene in Oakland, California (currently on leave from a Ph.D. program at KOERI), and Professor William Mitchell, a political scientist with Baylor University and an authority on Turkey and past response and recovery efforts for Turkish earthquakes. An initial report and images have been linked to EERI's home page at **www.eeri.org**.

Announcement

BSSC Annual Meeting

The Building Seismic Safety Council (BSSC) 2003 Annual Meeting will be held at the U.S. Grant Hotel in San Diego June 18-20. Presentations include the changes proposed for the 2003 edition of the *NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures* and future needs, directions, and objectives for seismic safety. Technical presentations are expected to focus on BSSC strategic planning initiatives, the new generation of U.S. Geological Survey maps, energy dissipation techniques, and integration of the 2002 ASCE 7 as a basic reference standard in the *Provisions*. Plans for preparing an up-to-date homebuilders' guide also will be discussed.

For registration information, visit **www.bssconline.org**.

Call for Abstracts

4th National Seismic Conference and Workshop on Bridges

Abstracts are being solicited for the 4th National Seismic Conference and Workshop on Bridges and Highways to be held in Memphis, Tennessee, February 9-11, 2004. The conference will focus on advances in engineering and technology that provide increased seismic safety of highway bridges, other highway structures, and highway systems in the new millennium. In addition, an international forum will be conducted by invited speakers from countries that have implemented advanced earthquake design and mitigation technologies and approaches. Abstracts are due by June 13. For more information, visit **www.conferences.uiuc.edu/seismic.**