

CODE APPLICATION NOTICE

Subject: Next Generation Attenuation Relations for
Use With the 2007 California Building Code

File No.: 2-1802A.6.2
Effective: 9/30/08

CODE SECTIONS

Section 1802A.6.2, 2007 California Building Code (CBC)

Section 21.2, ASCE/SEI 7-05 Minimum Design Loads for Buildings and Other Structures

2007 California Building Code

1802A.6.2 Supplemental ground-response report. *If site specific ground-motion procedures, as set forth in ASCE 7 Chapter 21, or ground-motion time-history analysis, as set forth in ASCE 7 Chapter 16, Section 17.3 or 18.2.3, are used for design, then a supplemental ground-response report may be required. All conclusions and ground-motion parameters shall be fully supported by satisfactory data and analysis.*

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ASCE/SEI 7-05 Minimum Design Loads for Buildings and Other Structures

21.2 Ground Motion Hazard Analysis

The requirements for Section 21.2 shall be satisfied where a ground motion hazard analysis is performed or required by Section 11.4.7. The ground motion hazard analysis shall account for the regional tectonic setting, geology, and seismicity, the expected recurrence rates and maximum magnitudes of earthquakes on known faults and source zones, the characteristics of ground motion attenuation, near source effects, if any, on ground motions, and the effects of subsurface site conditions on ground motions. The characteristics of subsurface site conditions shall be considered either using attenuation relations that represent regional and local geology or in accordance with Section 21.1. The analysis shall incorporate current seismic interpretations, including uncertainties for models and parameter values for seismic sources and ground motions. The analysis shall be documented in a report.

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PURPOSE

The purpose of this Code Application Notice (CAN) is to clarify the application of ASCE/SEI 7-05 Section 21.2 with respect to Next Generation Attenuation (NGA) relations that will be utilized to determine site-specific ground motion.

BACKGROUND

Attenuation relations are applied to estimate the ground motion distribution for each earthquake of a given magnitude, distance, and rupture mechanism. The U.S. Geological Survey (USGS) ground motion mapping of spectral acceleration has formed the basis of the Deterministic Site Hazard Analyses (DSHA) and Probabilistic Site Hazard Analyses (PSHA) that are submitted for specific hospital construction projects and are currently enforced in the 2007 CBC.

The attenuation relations used under the *USGS Project '97* and the *1997 California Probabilistic Seismic Hazard Mapping*, consist of Boore et al (1993), Geomatrix-Sadigh (1995) and Campbell and Bozorgnia (1994). Newer attenuation relations were used to develop the seismic hazard maps of the 2007 California Building Code, specifically, *USGS Project '02* and the *2002 California Probabilistic Seismic Hazard Maps*, which consist of Boore et al (1997), Sadigh et al (1997), Abrahamson and Silva (1997), Campbell and Bozorgnia (2003) and Spudich et al (1999). Changes in the PSHA due to these attenuation relations and other changes from the *1997 California Probabilistic Seismic Hazard mapping* are published in Cao et al 2003.

New data suggests an alternative to the current attenuation relations values. The 2008 National Seismic Hazard Maps published by USGS are based on NGA relations. These new maps are being proposed for inclusion in ASCE/SEI 7-10. These NGA relations are currently being proposed in geotechnical/geohazard reports for the DSHA and PSHA for hospital buildings.

The 2008 USGS seismic hazard maps used the NGA relations listed below:

1. Boore and Atkinson (2007)
2. Campbell and Bozorgnia (2007)
3. Chiou and Youngs (2006)

Two other NGA relations that are available but not part of the 2008 USGS seismic hazard maps are:

4. Abrahamson & Silva (2008)
5. Idriss (2008)

INTERPRETATION

1. If NGA relations are applied to a hospital building project, the three NGA relations used for the 2008 USGS seismic hazards maps (1, 2, and 3 above) shall be utilized to determine the site-specific ground motion. When supported by data and analysis, the two NGA relations (4 and 5 above) that were not used for the 2008 USGS maps shall be permitted as additions or substitutions. No fewer than three NGA relations shall be utilized.

