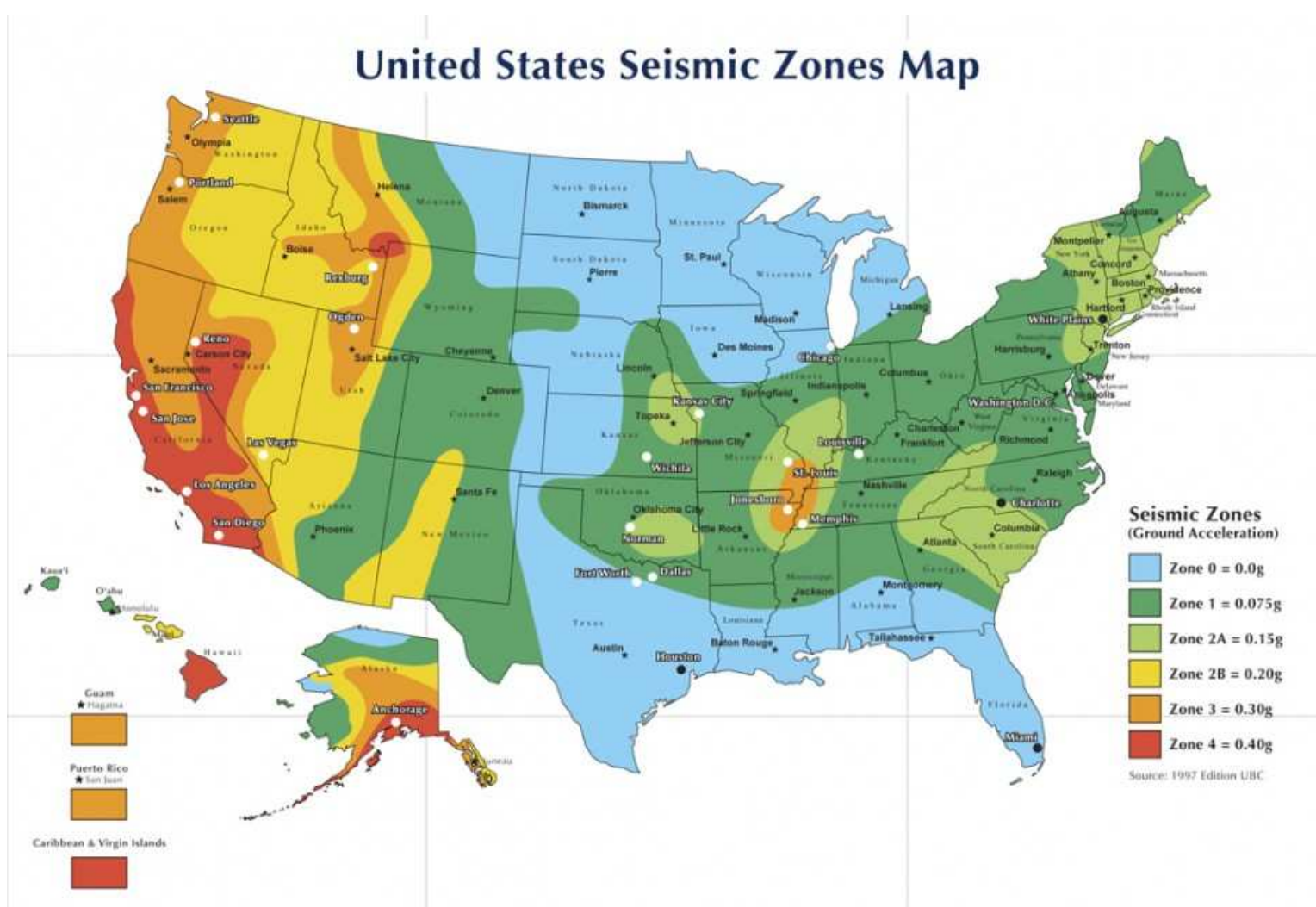


What Happened to Seismic Zones?



By Edwin T. Dean, PE, SE

Do you remember seismic zones? Depending on how long you have been involved in the building industry you may or may not remember seismic zones. May be you had experience with Zone 4 rated components or even today we get asked to design to Zone 3 or other seismic Zone requirements.



Seismic Zones are a vestige of the Uniform Building Code or UBC and were introduced in the 1949 edition when the USA seismic hazard map, published in 1948 by the US Coast and Geodetic Survey was adopted into the UBC. The first edition of the U.S. Uniform Building Code (UBC); however, was published in 1927 by the Pacific Coast Building Officials (PCBO), contained an optional seismic appendix, that used a coefficient C' which ranged from 7.5% to 10% g (% of gravity applied as a lateral inertial load). The 1949 maps were intended to be a better representation of the potential seismic accelerations of various regions or Zones throughout the US and ranged from 0 to 3. The Zone number correlated to a level of acceleration expressed as a % of gravity or g . The maps were intended to represent the likely levels of earthquake ground shaking and, therefore, the potential for structural damage. The maps evolved over time including the addition of a Seismic Zone 4 in 1976 and the division of Zone 2 into 2A and 2B in 1988. The ground accelerations associated with the Zones were probabilistic based and correlated to prescribed levels of ground accelerations with Zone 4 being the highest and 0 being negligible. However, they were also somewhat political in that the Zones in many cases follow the state boundaries and in California ultimately the whole state was defined as either Zone 3 or 4 so that they didn't have any Zone 2 areas within the states jurisdiction. Of course the reality is the potential intensity of seismic ground shaking does not recognize state boundaries and the jurisdictional convenience of Seismic Zones evolved as the US Geodetic Survey (USGS) developed a new generation of seismic maps.

So where did the Seismic Zones go? Nowhere really, they like much of engineering have just evolved into ever increasing sophistication and refinement. The large zones have been replaced by more detailed contour maps that provide a more refined representation of potential seismic ground shaking in a given location with a consistent return period. The maps will continue to evolve and future versions will map based on a measure of consistent risk for damage to new structures rather than seismic return periods. More on this in the future. The convenience of simple Zone references has been replaced by plots of ground accelerations developed from complex algorithms developed by USGS that account for many important factors that affect the earthquake ground motions that could be expected to occur at a particular building site.