BULLETIN: SEISMIC S_S MAP TO ASSIST 2016 CBC PRE-CHECK (PC) PLAN HOLDERS

PURPOSE: To assist pre-check (PC) designers in establishing the seismic threshold for multiple option PCs based on the changes to the seismic design provisions in the 2016 California Building Code (CBC).

DISCUSSION: Under the 2010 and prior CBC, the seismic design provisions allowed the seismic ground motions for building structures to be capped at an S_S (mapped MCE_R, spectral response acceleration parameter at short periods) of 1.5 regardless of the actual mapped seismic ground motion provided the structure complied with certain criteria. For example, ASCE 7-05 Section 12.8.1.3 allowed such a cap provided the structure had a fundamental period less than 0.5 seconds, was less than 5 stories in height, and contained no structural irregularities.

Under the 2013 CBC, the seismic design provisions were modified in Section 1616A.1.12 to no longer allow the ground motions to be capped at a specific ground motion. Instead, the ground motions for short and regular structures were allowed to use the larger of either $0.8S_S$ or S_S=1.5.

Under the 2016 CBC, the seismic design provisions in Section 1616A.1.12 have been modified further.

- The ground motion cap is now based on S_{DS} and is the larger of either $0.7S_{DS}$ or S_{DS} = 1.0.
- A structure must meet four new limitations in order to qualify for the ground motion cap. The four new limitations are limits on the fundamental period of the structure, the redundancy factor, the Site Class and the Risk Category.

The peak mapped S_S in the state is approximately 3.73. Consequently, in order for relocatable buildings to be placed or relocated anywhere is the state, the PC designs must be designed for a S_{DS} not less than 1.74 determined as follows:

$$S_{DS} = (0.7)(2/3)(Fa)(S_S)$$
$$= (0.7)(2/3)(1.0)(3.73) = 1.74$$

To assist the PC designers and manufacturers, California Geological Survey (CGS) created a map of the state showing select S_S contours. The map is shown in Attachment A. The map shows S_S contours that were derived based on the ground motions in ASCE 7-10 utilizing the 2008 USGS map data, for use with the 2016 CBC.

The map denotes school sites and county boundaries so manufacturers and designers can get a general sense of the number of school sites within each contour range and county. The lowest contour range selected is for S_S equal to or less than 2.14. This contour range represents the area of the state where PCs that were previously designed to S_S=1.5, and now qualify for the 70% cap on S_{DS}, could be placed (i.e. 2.14*0.7=1.5). The remaining contours were selected to provide information for PC manufacturers and designers to assist in their decision making process as to select other S_S thresholds.

The map is provided as informational only and is not suitable to be used for design of or siting of structures on specific school sites.

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ATTACHMENT S

A: S_S Risk-Adjusted Maximum Considered Earthquake Ground Motion Parameter (MCE_R) for 0.2s Spectral Response Acceleration, Site Class B