City and County of San Francisco
Department of Building Inspection
1660 Mission Street, San Francisco, CA 94103

Structural Bulletin
SB 09-09

Subject: **R-values for Concrete Shear Walls**

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2007 CBC Section 1613 refers to ASCE7-05 Table 12.2-1 for R-values to be used in the lateral analysis and design. Where the lateral force resisting system of a building comprises reinforced concrete shear walls, the lateral analysis shall be based on an R-value of either 5 or 6, in accordance with ASCE7-05 Table 12.2-1.

ASCE7-05 Table 12.2-1 indicates R=6 for concrete shear walls that are part of a building frame system. The intent of a building frame system is for floor and roof dead and live loads to be primarily supported by the frame, and for the shear walls to resist seismic loads. The Commentary to 2003 NEHRP (FEMA 450-2, page 44) states that a "few percent of the building area" may be supported by the shear walls and still be considered a building frame system. Therefore, R=6 is permitted to be used if the shear walls support no more than 5% of the total floor and roof dead and live loads of the entire building, in addition to the self weight of the shear walls.

ASCE7-05 Table 12.2-1 indicates R=5 for concrete shear walls in a bearing wall system, where floor and roof dead and live loads are supported by the shear walls. Therefore, where concrete shear walls support more than 5% of the total floor and roof dead and live loads of the entire building, the system shall be considered a bearing wall system, and a value of R=5 shall be used. Further, the use of floor level beam elements between full height column elements that are incorporated into the shear walls to create imaginary frames to support floor and roof dead and live loads shall not qualify as a frame system, and shall not justify the use of R=6.

Where concrete shear walls are used, the 2007 CBC, through ASCE7-05 Table 12.2-1, specifically requires classification of the structural system as either a building frame system or a bearing wall system, or some other system listed in Table 12.2-1. The Code further requires an R-value of 5 to be assigned to a bearing wall system and a value of 6 to be assigned if the shear walls are used in a building frame system. The 2008 SEAOC Blue Book, Article 9.01.010, questions whether two different R-values are appropriate and recommends use of a single R-value regardless of whether the shear walls are part of a bearing wall system or building frame system. Such recommendations contradict the provisions of ASCE7-05 Table 12.2-1. In addition, the SEAOC Blue Book article does not specify what single R-value should be used. The Blue Book article raises questions to which no clear answers are provided. While DBI acknowledges the questions raised by the Blue Book, DBI, as a code enforcement body, is compelled to enforce the provisions of 2007 CBC and ASCE7-05.

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