

The following items are the six recommended amendments proposed by the TUCC group:

**Item #1 - Repair and Reconstruction Ordinance:**

Available online at the CALBO website – there are proposed changes to the CBC/IBC via local amendment for post-disaster repairs. The proposed ordinance/code amendments, was developed because of the post-Paso Robles earthquake, where FEMA refused to recognize basic code language for re-imbusement of structural repairs to the current building code requirements. This language (if amended/adopted at a local level) would allow for substantial structural improvements to be funded in damaged structures. Most of the proposed language/code amendments are taken directly from the International Existing Building Code (IEBC).

**Item #2 – Structural Amendment Modifications to Section 1614, 1614.1 and 1614.1.3 are added to Chapter 16 of the 2007 California Building Code to read as follows:**

**Section 1614, Modification to ASCE 7**

**1614.1 General.** The text of ASCE 7 shall be modified as indicated in this Section.

**1614.1.3 ASCE7, Section 12.8.1.1.** Modify ASCE 7 Section 12.8.1.1 by amending Equation 12.8-5 as follows:

$$C_s = 0.04 \text{ } 0.044 S_{Dsl} \geq 0.01 \quad (\text{Equation 12.8-5})$$

**REASONS FOR AMENDMENT/INTERPRETATION/CLARIFICATION:**

Results from the 75% Draft of ATC-63, Quantification of Building System Performance and Response Parameters, indicate that tall buildings may fail at an unacceptably too low of a seismic level unless that minimum base shear level is increased to the value used in ASCE 7 – 02. Thus it is recommended that the adoption of the minimum base shear is appropriate due to the recent research in PEER and the ATC 63 project. The conclusion suggested that the reduction of the base shear in the previous code led to a trend in which tall buildings had decreasing safety with increasing height. To minimize the potential increased fire-life safety associated with such a seismic failure of tall buildings, this proposed modification increases the minimum base shear level to be consistent with previous edition of the building codes. The propose amendment to the current ASCE 7 is very well supported by the engineering community. Both the Structural Engineers Association of Northern California (SEAONC) and other structural engineering organizations from the state level are in support of adopting the revised minimum base shear.

**Item #3 – Structural Amendments Modifications to Section 1614, 1614.1 and 1614.1.7 are added to Chapter 16 of the 2007 California Building Code to read as follows:**

**Section 1614, Modification to ASCE 7**

**1614.1 General.** The text of ASCE 7 shall be modified as indicated in this Section.

1614.1.7 ASCE 7, Section 12.12.3. Replace ASCE 7 Section 12.12.3 as follows:

12.12.3 Minimum Building Separation. All structures shall be separated from adjoining structures. Separations shall allow for the maximum inelastic response displacement ( $\Delta_M$ ).

$\Delta_M$  shall be determined at critical locations with consideration for both translational and torsional displacements of the structure as follows:

$$\Delta_M = C_d \bar{\delta}_{\max} \quad (\text{Equation 16-45})$$

Where  $\bar{\delta}_{\max}$  is the calculated maximum displacement at Level x as defined in ASCE 7 Section 12.8.4.3.

Adjacent buildings on the same property shall be separated by at least a distance  $\Delta_{MT}$ , where

$$\Delta_{MT} = \sqrt{(\Delta_{M1})^2 + (\Delta_{M2})^2} \quad (\text{Equation 16-46})$$

And  $\Delta_{M1}$  and  $\Delta_{M2}$  are the maximum inelastic response displacements of the adjacent buildings.

Where a structure adjoins a property line not common to a public way, the structure shall also be set back from the property line by at least the displacement,  $\Delta_M$  of that structure.

Exception: Smaller separations or property line setbacks shall be permitted when justified by rational analysis.

**REASON FOR AMENDMENT/INTERPRETATION/CLARIFICATION:**

Section 12.12.3 of ASCE 7-05 including Supplement No. 1 does not provide requirements for separation distances between adjacent buildings. Requirements for separation distances between adjacent buildings, not structurally connected, were included in previous editions of the IBC and UBC. However, when ASCE 7-05 was adopted by reference for IBC 2006, these requirements were omitted. In addition, ASCE 7-05 defines ( $\bar{\delta}_x$  in Section 12.8.6 to refer to the deflection of Level x at the center of mass. The actual displacement that needs to be used for building separation is the displacement at critical locations with consideration of both the translational and torsional displacements. These values can be significantly different.

This code change fills the gap of this inadvertent oversight in establishing minimum separation distance between adjoining buildings which are not structurally connected. The purpose of seismic separation is to permit adjoining buildings, or parts thereof, to respond to earthquake ground motion independently and thus preclude possible structural and non-structural damage caused by pounding between buildings or other structures.

References:

1. IBC 2000 Section 1620.3.6, Building Separations; IBC 2003 Sections 1620.4.5, Building Separations;
2. "Recommended Lateral Force Requirements and Commentary, - Section C108.2.11, Building Separations," Structural Engineers Association of California, Sacramento, CA, 1999 Edition;
3. CBC 2002 (UBC 1997) Section 1630.9.2, Determination of  $\Delta_M$ ; Section 1630.10.1, General; and Section 1633.2.11, Building Separations.

**Item #4 – Structural Amendments Modifications to Structural Forces related to slender concrete wall design.**

Section 1908.1 is amended to read as shown below and Section 1908.1.17 is added to Chapter 19 of the 2007 California Building Code to read as follows:

**1908.1 General.** The text of ACI 318 shall be modified as indicated in Sections 1908.1.1 through ~~1908.1.16~~ 1908.1.17.

1908.1.17 ACI 318, Section 14.8, Modify ACI 318 Section 14.8.3 and 14.8.4 replacing equation (14-7), (14-8) and (14-9).

Modify equation (14-7) of ACI 318 Section 14.8.3 as follows:

$I_{cr}$  shall be calculated by Equation (14-7), and  $M_a$  shall be obtained by iteration of deflections.

$$I_{cr} = \frac{E_s}{E_c} \left( A_s + \frac{P_u}{f_y} \frac{h}{2d} \right) (d - c)^2 + \frac{l_w c^3}{3} \quad (14-7)$$

and the value  $E_s/E_c$  shall not be taken less than 6.

Modify ACI 318 Section 14.8.4 as follows:

14.8.4 – Maximum out-of-plane deflection,  $\Delta_s$ , due to service loads, including  $P\Delta$  effects, shall not exceed  $l_c/150$

If  $M_a$ , maximum moment at mid-height of wall due to service lateral and eccentric loads, including  $P\Delta$  effects, exceed  $(2/3)M_{cr}$ ,  $\Delta_s$  shall be calculated by Equation (14-8):

$$\Delta_s = \frac{2}{3} \Delta_{cr} + \frac{M_a - \frac{2}{3} M_{cr}}{M_n - \frac{2}{3} M_{cr}} \left( \Delta_n - \frac{2}{3} \Delta_{cr} \right) \quad (14-8)$$

If  $M_a$  does not exceed  $(2/3)M_{cr}$ ,  $\Delta_s$  shall be calculated by Equation (14-9):

$$\Delta_s = \left( \frac{M_a}{M_{cr}} \right) \Delta_{cr} \quad (14-9)$$

where:

$$\Delta_{cr} = \frac{5M_{cr}l_c^2}{48E_cI_g}$$

$$\Delta_n = \frac{5M_n l_c^2}{48E_c I_{cr}}$$

**REASONS FOR AMENDMENT/INTERPRETATION/CLARIFICATION:**

Section 14.8 was introduced in ACI 318-99 based on requirements of the Uniform Building Code and experimental research and on the basis that design of slender wall must satisfy both strength and serviceability requirements. ACI 318-05 provision was found to grossly under-estimate service load deflection. This update reduces the differences in serviceability provisions. The revision will essentially replace equations (14-8) and (14-9) with two new equations to reflect the UBC procedure for service load out-of-plane deflection. The proposed revision will be included in ACI 318-08.

**Item #5 – Amendment Modifications to Section 1704.4 – Special Inspection**

Amend Exception #1; to clarify that special inspection will be required for all concrete over 2,500 psi strength.

**Item #6 – Amendment Modifications to Chapter 23 to eliminate the use of gypsum board and stucco/plaster as shear resisting element.**

Eliminate the use of gypsum board and stucco as shear resisting elements.

**Chapter 23 - Wood**

The following Sections are modified and/or deleted to read as follows:

**Section 2306.4.5**

Delete all of Section 2306.4.5.

**Modify the text of Section 2308.9.3 to be replaced with the following:**

2308.9.3 Bracing

- A. Braced wall lines shall consist of braced wall panels, which meet the requirements for location, type and amount of bracing as shown in Figure 2308.9.3, specified in Table 2308.9.3(1) and are in line or offset from each other by not more than 4 feet (1219 mm). Braced wall panels shall start not more than 12.5 feet (3810 mm) from each end of a braced wall line. Braced wall panels shall be clearly indicated on the plans. Construction of braced wall panels shall be by one of the following methods:
1. Wood boards of 5/8-inch (16 mm) net minimum thickness applied diagonally on studs spaced not over 24 inches (610 mm) on center.
  2. Wood structural panel sheathing with a thickness not less than 5/16-inch (7.9 mm) for 16-inch (406 mm) stud spacing and not less than 3/8-inch (9.5 mm) for 24-inch (610 mm) stud spacing in accordance with Tables 2308.9.3(2) and 2308.9.3(3).
  3. Fiberboard sheathing 4-foot by 8-foot (1219 mm by 2438 mm) panels not less than 1/2-inch (13 mm) thick applied vertically on studs spaced not over 16-inches (406 mm) on center when installed in accordance with Section 2306.4.4 and Table 2306.4.4.
  4. Particleboard wall sheathing panels where installed in accordance with

2308.9.3(4).

5. Hardboard panel siding when installed in accordance with Section 2303.1.6 and Table 2309.9.3(5).

For cripple wall bracing see Section 2308.9.4.

For methods 1, 2, 3, 4, and 5, each braced wall panel must be at least 48-inches (1219 mm) in length, covering three stud spaces where studs are 16-inches (406 mm) apart and covering two stud spaces where studs are spaced 24-inches (610 mm) apart.

- B. All vertical joints of panel sheathing shall occur over studs. Horizontal joints shall occur over blocking equal in size to the studding except where waived by the installation requirements for the specific sheathing materials.
- C. Braced wall panel sole plates shall be nailed to the floor framing and top plates shall be connected to the framing above in accordance with Table 2304.9.1. Sills shall be bolted to the foundation or slab in accordance with Section 1805.6. Where joists are perpendicular to braced wall lines above, blocking shall be provided under and in line with the braced wall panels.

**Table 2308.12.4**

In footnotes “b” and “c” of Table 2308.12.4, delete all references to “gypsum board”, “lath and plaster”, “Portland cement plaster”, and “gypsum sheathing boards”.

**Chapter 25 – Gypsum Board and Plaster**

**Section 2505.1**

Delete Section 2505.1 completely.

**REASONS FOR AMENDMENT/INTERPRETATION/CLARIFICATION:**

Survey of structural failures after the Loma Prieta earthquake of 1989 showed the gypsum board, plaster and stucco finishes used for lateral force resistance performed poorly or failed completely. Further, once used to resist lateral forces, it is nearly impossible without completely replacing the material to achieve the initial design load resistance in these materials. To minimize the potential for increased fire-life safety problems associated with such seismic failures, this proposed modification increases the minimum acceptable shear resisting elements to be used for lateral designs and conventionally braced structures. Further, this continues a trend in and amongst local Bay Area jurisdictions that has been historically supported by the engineering community.