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November 16, 2009

California Building Standards Commission
2525 Natomas Park Drive, Suite 130
Sacramento, California 95833

Subject: Comments to the Proposed Adoption of and Amendment to the 2009 IRC

Dear Commission Members:

The California Building Officials (CALBO) Structural Safety Committee is comprised of Civil and Structural engineers with a wide variety of experience who are employed throughout the state by local jurisdictions, state government, and private engineering firms. The committee represents the interests of local government in matters pertaining to structural safety issues.

As such, the committee has reviewed both the 2009 International Residential Code (IRC) and the amendments proposed by HCD and would like to offer the following comments for consideration.

IRC Section R404.1.1 allows the option of designing masonry foundation walls using either a prescriptive approach provided in the text of the IRC or by recognized standards. Similarly, IRC Section 404.1.2 allows the same design options for concrete foundation walls. The committee is concerned that the prescriptive approach will allow the construction of foundation walls without sufficient reinforcing steel, which can result in inadequate strength and ductility during a seismic event.

In Seismic Design Categories (SDC) D_0, D_1, and D_2, the prescriptive approach permits concrete and masonry walls 8 feet high, with 4 feet of unbalanced backfill. In SDC C, walls are permitted to be 10 feet high, with 10 feet of unbalanced backfill. Additionally, foundation walls in SDC C are permitted to be constructed of rubble stone masonry and may support an unbalanced backfill of 8 feet in height.

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It is the committee's opinion that the prescriptive approach should be limited to foundation walls not exceeding 4 feet in height or an unbalanced backfill height of 3 feet for both masonry and concrete foundation walls in SDC's C, D_0, D_1, and D_2. Foundation walls exceeding these limits should be constructed in conformance with recognized standards. Foundation walls constructed of masonry rubble should not be permitted in SDC C.

It is the committee's recommendation that the proposed amendments contained in Exhibit A (attached) be incorporated into the 2010 California Residential Code.

HCD has proposed amendments to 2009 IRC Chapter 10, Sections R1001.3, R1001.4, R1003.3, and R1003.4 and Table R1001.1 that add Seismic Design Category C to the classifications where reinforcing and anchorage of masonry chimneys is applicable. The committee believes that to effectively implement the intent of these proposed amendments and to ensure that these sections are applied to detached one- and two-family dwellings instead of only to townhouses, additional language is needed.

The current exception in 2009 IRC Section R301.2.2 exempts detached one- and two-family dwellings from seismic requirements contained elsewhere in the IRC. Because the HCD-amended sections in Chapter 10 are each titled as either *seismic reinforcing* or *seismic anchorage*, the current R301.2.2 exception would signify that these "*seismic*" titled sections only apply to townhomes in Seismic Design Category C. The 2009 IBC contains language in Sections 2113.3 and 2113.4 with minimum reinforcing and anchorage standards for all masonry chimneys located in SDC C, regardless of the use or occupancy of the building.

Prior California Building Code editions, based upon the Uniform Building Code going back to the 1973 edition of the UBC, have required minimum reinforcing and anchorage of masonry chimneys, regardless of the use or occupancy of the building. This requirement was based upon documented poor performance of unreinforced/unanchored masonry chimneys during even moderate earthquakes. Further, the Masonry Institute of America's (MIA) second edition of a 1974 publication titled, *Residential Fireplace and Chimney Handbook – Design Specifications Construction Code Requirements*, specifies this minimum reinforcing and anchorage.

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This MIA publication is based upon 1973 UBC Chapter 37 and the HUD (federal) minimum property standards Manual of Acceptable Practices Section 604.7, both of which are printed in that Masonry Institute of America's publication.

It is the committee's recommendation that the changes contained in Exhibit B (attached) be made a part of the 2010 California Residential Code to clarify the intent of the proposed amendment.

On a final note, the committee recognizes the importance of providing prescriptive construction provisions for a variety of construction materials. Prescriptive provisions allow for economical construction of structures and afford builders the option of selecting a construction material best suited for a given environment. Given this benefit, it is a concern of the committee that allowing construction of non-engineered structures of materials that have historically not performed well in high seismic regions would not serve the citizens of the State of California well. Therefore, the committee respectfully recommends that the prescriptive provisions in the IRC be limited to the construction of light wood frame structures only, a practice consistent with conventional construction provisions in previous building codes adopted in California.

Thank you for the opportunity to comment on the proposed adoption of and amendments to the 2009 International Residential Code. If you have questions or would like additional information please feel free to contact me directly at (530) 225-4127.

Respectfully,

Bill Nagel, S.E.
Committee Chair
CALBO Structural Safety Committee

EXHIBIT A

Proposed Modifications to the 2009 IRC Chapter 4
November 16, 2009

R404.1.1.1 Masonry foundation walls. Concrete masonry and clay masonry foundation walls shall be constructed as set forth in Table R404.1.1(1), R404.1.1(2), R404.1.1(3) or R404.1.1(4) and shall also comply with applicable provisions of Sections R606, R607 and R608. In buildings assigned to Seismic Design Categories C, D_0, D_1 and D_2, concrete masonry and clay masonry foundation wall shall also comply with Section R404.1.4.1. Rubble stone masonry foundation walls shall be constructed in accordance with Sections R404.1.8 and R607.2.2. Rubble stone masonry walls shall not be used in Seismic Design Categories C, D_0, D_1 and D_2.

R404.1.2.2 Reinforcement for foundation walls. Concrete foundation walls shall be laterally supported at the top and bottom. Horizontal reinforcement shall be provided in accordance with Table R404.1.2(1). Vertical reinforcement shall be provided in accordance with Table R404.1.2(2), R404.1.2(3), R404.1.2(4), R404.1.2(5), R4041.2(6), R404.1.2(7), or R404.1.2(8). Vertical reinforcement for flat basement walls retaining 4 feet (1219mm) or more of unbalanced backfill is permitted to be determined in accordance with Table R404.1.2(9). For basement walls supporting above-grade concrete walls, vertical reinforcement shall be the greater of that required by Tables R404.1.2(2) through R404.1.2(8) or by Section R611.6 for the above-grade wall. In buildings assigned to Seismic Design Category C, D_0, D_1 or D_2, concrete foundation walls shall also comply with Section R404.1.4.2.

R404.1.4 Seismic Design Category D_0, D_1 or D_2.

R404.1.4.1 Masonry foundation walls. In addition to the requirements of Table R404.1.1(1) plain masonry foundation walls in buildings assigned to Seismic Design Category C, D_0, D_1 or D_2, as established in Table R301.2(1), shall comply with the following.

1. Wall heights shall not exceed ~~8 feet (2438mm)~~ 4 feet (1219 mm).

2. Unbalanced backfill height shall not exceed ~~4 feet (1219mm)~~ 3 feet (914 mm).

3. Minimum nominal thickness for plain masonry foundation walls shall be 8 inches (203mm).

4. Masonry stem walls shall have a minimum vertical reinforcement of one No. 3 (No. 10) bar located a maximum of 4 feet (1219mm) on center in grouted cells.

EXHIBIT A

(continued)

5. Vertical reinforcement shall be tied to the horizontal reinforcement in the footings.

6. Foundation walls in buildings assigned to Seismic Design Category C, D_0, D_1 or D_2, as established in Table R301.2(1), supporting more than ~~4 feet (1219mm)~~ 3 feet (914 mm) of unbalanced backfill or exceeding ~~8 feet(2438mm)~~ 4 feet (1219 mm) in heights shall be constructed in accordance with ~~Table R404.1.1(2), R404.1.1(3) or R404.1.1(4)~~ the provisions of ACI 530/ASCE 5/TMS 402 or NCMA TR68-A. Masonry foundation walls shall have two No. 4 (No. 13) horizontal bars located in the upper 12 inches (305mm) of the wall.

R404.1.4.2 Concrete foundation walls. In buildings assigned to Seismic Design Category C, D_0, D_1 or D_2, as established in Table R301.2(1), concrete foundation walls that support light-frame walls shall comply with this section, and concrete foundation walls that support above-grade concrete walls shall comply with ACI 318, ACI 332 or PCA 100 (see Section R404.1.2). In addition to the horizontal reinforcement required by Table R404.1.2(1), plain concrete walls supporting light-frame walls shall comply with the following.

1. Wall height shall not exceed ~~8 feet (2438mm)~~ 4 feet (1219 mm).

2. Unbalanced backfill height shall not exceed ~~4 feet (1219mm)~~ 3 feet (914 mm)

3. Minimum thickness for plain concrete foundation walls shall be ~~7.5 inches (191 mm) except that~~ 6 inches (152 mm) ~~is permitted where the maximum wall height is 4 feet, 6 inches (1372 mm)~~.

Foundation walls ~~less than 7.5 inches (191 mm) in thickness,~~ supporting more than ~~4~~ 2 feet (1219 mm) of unbalanced backfill or exceeding ~~8~~ 3 feet (2438 mm) in height shall be provided with horizontal reinforcement in accordance with Table R404.1.2(1), and ~~vertical reinforcement in accordance with Table R404.1.2(2), R404.1.2(3), R404.1.2(4), R404.1.2(5), R404.1.2(6), R404.1.2(7) or R404.1.2(8). Where Tables R404.1.2(2) through R404.1.2(8) permit plain concrete walls,~~ not less than No. 4 (No. 13) vertical bars at a spacing not exceeding 48 inches (1219 mm) ~~shall be provided~~.

EXHIBIT B

Proposed Modifications to the 2009 IRC Chapter 10

November 16, 2009

R1001.3 Seismic reinforcing. Masonry or concrete chimneys in all structures regulated by this code assigned to Seismic Design Category C, D_0, D_1 or D_2 shall be reinforced. Reinforcing shall conform to the requirements set forth in Table R1001.1 and Section 609, Grouted Masonry.

R1001.4 Seismic anchorage. Masonry or concrete chimneys in all structures regulated by this code assigned to Seismic Design Category C, D_0, D_1 or D_2 shall be anchored at each floor ceiling or roof line more than 6 feet (1829 mm) above grade, except where constructed completely within the exterior walls. Anchorage shall conform to the requirements of Section R1001.4.1.

R1003.3 Seismic reinforcing. Masonry or concrete chimneys shall be constructed, anchored, supported and reinforced as required in this chapter. In all structures regulated by this code assigned to Seismic Design Category C, D_0, D_1 or D_2 masonry and concrete chimneys shall be reinforced and anchored as detailed in Section R1003.3.1, R1003.3.2 and R1003.4. In Seismic Design Category A and B ~~or C~~, reinforcement and seismic anchorage is not required.

R1003.4 Seismic anchorage. Masonry and concrete chimneys and foundations in all structures regulated by this code assigned to Seismic Design Category C, D_0, D_1 or D_2 shall be anchored at each floor, ceiling or roof line more than 6 feet (1829 mm) above grade, except where constructed completely within the exterior walls. Anchorage shall conform to the requirements in Section R1003.4.1.