REVISION RECORD FOR THE STATE OF CALIFORNIA

EMERGENCY SUPPLEMENT

June 14, 2006

2001 Title 24, Part 2, California Building Code

PLEASE NOTE: The date of this Emergency Supplement is for identification purposes only. See the History Note Appendix for the adoption and effective dates of the provisions.

It is suggested that the section number as well as the page number be checked when inserting this material and removing the superseded material. In case of doubt, rely on the section numbers rather than the page numbers because the section numbers must run consecutively.

It is further suggested that the superseded material be retained with this revision record sheet so that the prior wording of any section can be easily ascertained. Please keep the removed pages with this revision page for future reference.

NOTE

Due to the fact that the application date for a building permit establishes the California Building Standards code provisions that are effective at the local level, which apply to the plans, specifications, and construction for that permit, it is strongly recommended that the removed pages be retained for historical reference.

VOLUME 2

Remove Existing Pages	Insert New Pages
2-38.55 through 2-38.56B	2-38.55 through 2-38.56.B
2-497 and 2-498	2-497 and 2-498

Item No. 5510A041

the incremental changes of the design overturning moment shall be distributed to the various resisting elements in the manner prescribed in Section 1630A.6. Overturning effects on every element, wherever possible, shall be carried down directly in a linear path to the foundation. See load combinations in Sections 1644A.4.1.1 and 1644A.4.1.2 for combining gravity and seismic forces.

1644A.9.2 Seismic Zones 3 and 4. *In Seismic Zones 3 and 4, where a lateral-load-resisting element is discontinuous, such as for vertical irregularity Type 4 in Table 16A-L or plan irregularity Type 4 in Table 16A-M, columns supporting such elements shall have the strength to resist the axial force resulting from the following load combinations, in addition to all other applicable load combinations:*

$$\phi C_n = D + 0.8L + \Omega_o \beta E \qquad (44A\text{-}9)$$

$$\phi C_n = \Omega_o \beta E - 0.9D \qquad (44A\text{-}10)$$

$\Omega_o \beta E$ in Formulas (44A-9) and (44A-10) need not exceed RE.

1644A.9.2.1 *The axial forces in such columns need not exceed the resultant of the probable strengths of the other elements of the structure that transfer such loads to the column.*

1644A.9.2.2 *Such columns shall be capable of carrying the above-described axial forces without exceeding the usable axial load capacity (ϕC_n) of the column. For designs using working stress methods, this capacity may be determined using an allowable stress increase of 1.7 or acceptable published factors for a given material or element.*

EXCEPTION: *See Exceptions 1 and 2 in Section 1643A.9.*

1644A.9.2.3 Columns.

1644A.9.2.3.1 *Such columns shall either resist the above-described axial forces without exceeding the usable axial capacity (ϕC_n), or shall meet the following detailing and member limitations:*

1. Chapter 19, Section 1921.4, for concrete, and Chapter 22, Section 2210, 2211.4 and 2211.5, for steel in structures in Seismic Zones 3 and 4, except for welded steel moment connections where the current SAC Guidelines for columns apply.

2. Chapter 19, Section 1921.8, for concrete, and Chapter 22A, Divisions I and IX, special provisions for developing plastic hinges at ultimate loading, for steel in structures in Seismic Zone 2.

1644A.9.2.3.2 [For OSHPD 1 & 4] *In order to qualify for a β value equal to 1.0, such columns shall meet the following detailing and member limitations:*

1. Chapter 19A, Section 1921A.4, for concrete, and Chapter 22A, Section 2210A, 2211.4, Items 4 and 5, for steel in structures in Seismic Zones 3 and 4, except for welded steel moment connections where the SAC Interim Guidelines for the Evaluation, Repair, Modification, and Design of Welded Steel Moment Frame Structures, FEMA 267, August, 1995, provisions for columns apply.

1644A.9.2.3.3 [For DSA/SS] *In order to qualify for a β value equal to 1.0, such columns shall meet the following detailing and member limitations:*

1. Chapter 19A, Section 1921A.4, for concrete, and Chapter 22A, Section 2210A, 2211.4, for steel in structures in Seismic Zones 3 and 4, except for welded steel moment connections where the current SAC Guidelines for the evaluation, repair, modification and design of welded steel moment frame buildings, FEMA 350, 351, 352, July 2000, provisions for columns apply.

1644A.9.2.4 *Transfer girders that support such columns or that provide support for the discontinuous lateral-load-resisting element shall resist the above-described axial forces or support reactions without exceeding the capacity ϕC_n for each mode of failure. For this case, the β factor shall correspond to the properties of the girder.*

1644A.9.3 At foundation. *See Section 1809A.4 for overturning moments to be resisted at the foundation soil interface. The foundation soil interface shall be capable of resisting the following load combinations on the allowable stress basis of Section 1809A.2 and Table 18A-I-A, and other load combinations need not apply:*

$$D + L + \frac{E}{1.4} \qquad (44A\text{-}11)$$

$$\frac{E}{1.4} - 0.9D \qquad (44A\text{-}12)$$

In order to determine the strength design basis loads for the elements of the foundation structure, the soil pressures and pile or caisson reactions due to these load combinations shall be load factored by 1.4. The resulting bending moments, shears and axial loads on the sections of the foundation structure are to be factored by the appropriate β value and shall be resisted by the corresponding usable strength ϕC_n of the section. If piles or caissons are required for overturning moment tension resistance due to the load combination (44A-12), then the minimum tensile load-carrying resistance ϕC_n shall be E/14.

1644A.10 Drift and Story Drift Limitations. *Drift or horizontal displacements of the structure shall be computed whre required by this code. For both Allowable Stress Design and Strength Design, the Maximum Inelastic Response Displacement, Δ_M, of the structure caused by the Design Basis Ground Motion shall be determined in accordance with this section. The drifts corresponding to the design seismic forces of Section 1644A.4.1, Δ_s, shall be determined in accordance with Section 1644A.10.1. To determine Δ_M, these drifts shall be amplified in accordance with Section 1644A.10.2.*

1644A.10.1 Determination of Δ_s. *A static, elastic analysis of the lateral force-resisting system shall be prepared using the design seismic forces from Section 1644A.4.1 and 1644A.6. The mathematical model shall comply with Section 1644A.2.3. The resulting deformations, denoted as Δ_s, shall be determined at all critical locations in the structure. Calculated drift shall include translational and torsional deflections.*

1644A.10.2 Determination of Δ_M. *The Maximum Inelastic Response Displacement, Δ_M, shall be computed as follows:*

$$\Delta_M = 0.7 R \Delta_s \qquad (44A\text{-}13)$$

1644A.10.3 Story drift defined. *Story drift is the displacement of one level relative to the level above or below using the Maximum Inelastic Displacement, Δ_M, at each level.*

1644A.10.4 Story drift limits. *Calculated story drift using Δ_M shall not exceed 0.025 times the story height for structures having a fundamental period of less than 0.7 second. For structures having a fundamental period of 0.7 second or greater, the calculated story drift shall not exceed 0.020 times the story height.*

EXCEPTION: [Not adopted by DSA/SS] *These story drift limits may be exceeded when it is demonstrated that greater drift can be tolerated by both structural elements and nonstructural elements that could affect life safety [for OSHPD 1 & 4] for buildings in seismic performance categories SPC-1 and SPC-2, and life safety and continued operation in SPC-3 through SPC-5 buildings.*

1644A.11 PΔ Effects. *The resulting member forces and moments and the story drifts induced by PΔ effects shall be considered in the evaluation of overall structural frame stability and*

shall be evaluated using the specified design forces and their corresponding displacements Δ_s. PΔ need not be considered when the ratio of secondary moment to primary moment does not exceed 0.10; the ratio may be evaluated for any story as the product of the unfactored total dead, floor live load and snow load above the story times the seismic drift Δ_s in that story divided by the product of the seismic shear in that story times the height of that story. In Seismic Zones 3 and 4, PΔ need not be considered where the story drift ratio does not exceed 0.02/R.

1644A.12 Vertical Component. *The following requirements apply in Seismic Zones 3 and 4 only.*

Horizontal cantilever components shall have the usable strength capacity ϕC_n to resist (0.7) H C_a W_p, or have an allowable or working stress capacity C_w to resist (0.5) H C_a W_p. The value of the seismic hazard factor H shall be as prescribed by Section 1643A.8 according to the occupancy and conditions of the building.

1644A.13 Lateral Force on Elements of Structures, Nonstructural Components and Equipment Supported by Structures. *Elements of structures and their attachments, permanent nonstructural components and their attachments, and the attachments for permanent equipment supported by a structure shall be designed to resist the total design seismic forces prescribed in Section 1644A.13.1. Attachments for floor- or roof-mounted, but not suspended, equipment weighing less than 400 pounds (181 kg), and furniture need not be designed.*

Attachments shall include anchorages and required bracing. Friction resulting from gravity loads shall not be considered to provide resistance to seismic forces.

When the failure of the lateral-force-resisting anchorage, bracing or connection of nonrigid equipment would cause a life hazard, such elements shall be designed to resist the seismic forces prescribed in Section 1644A.13.1.

When allowable design stresses and other acceptance criteria are not contained in or referenced by this code, such criteria shall be obtained from approved national standards.

1644A.13.1 Design for total lateral force.

1644A.13.1.1 [Not adopted for DSA/SS] *The total design lateral seismic force, F_p, shall be determined from the following formula:*

$$F_p = 4.0\, H\, C_a\, I_p\, W_p \qquad (44A\text{-}14)$$

Alternatively, F_p may be calculated using the following formula:

$$F_p = a_p\, H\, C_a / R_p\, (1 + 3h_x/h_r)\, W_p \qquad (44A\text{-}15)$$

Except that:

$$F_g \text{ shall not be less than } 0.7\, H\, C_a\, I_p\, W_p \text{ and}$$
$$\text{Need not be more than } 4\, H\, C_a\, I_g\, W_g \qquad (44A\text{-}16)$$

WHERE:

h_x = *the element or component attachment elevation with respect to grade, h_x shall not be taken less than 0.0.*

h_r = *the structure roof elevation with respect to grade.*

a_p = *the in-structure Component Amplification Factor that varies from 1.0 to 2.5.*

A value for a_p shall be selected from Table 16A-O.

R_p is the Component Response Modification Factor that shall be taken from Table 16A-O, except that R_p for anchorages shall equal 1.5 for shallow expansion bolts, shallow chemical anchors or shallow cast-in-place anchors. Shallow anchors are those with an embedment length-to-diameter ratio of less than 8. Where anchorage is constructed of nonductile materials, or has nonductile behavior, or the component is attached with an adhesive surface joint, R_p shall equal 1.0. The β factor may be taken as 1.0 for anchorages requiring R_p equal to 1.0, 1.5 or 3.0.

The design lateral forces determined using Formula (44A-14) or (44A-15) shall be distributed in proportion to the mass distribution of the element or component.

Forces determined using Formula (44A-14) or (44A-15) shall be used to design members and connections that transfer these forces to the seismic-resisting systems. Members and connections shall use the load combinations and factors specified in Section 1644A.4.1.1 or 1644A.4.1.2. The member or connection actions due to F_p are the earthquake load E to be used in the load combinations. [For DSA/SS] The appropriate β factor shall be assigned for the elements and connections.

> ***EXCEPTION:*** *Where a probabilistic hazard analysis has been performed, the Exception 2 of Section 1643A.8.2 may be applied for the term HI_p in Formula 44-11.*

To determine the out-of-plane loading for elements such as walls or wall panels that have points of attachment at two or more different elevations, the following procedure may be used. For the vertical span of the element having a unit weight W_p between two successive attachment elevations h_x and h_{x+1} evaluate the force coefficients F_a/W_a at each of the two points, observing the minimum and maximum limits, and compute the average of the two values. The resulting average coefficient times the unit weight W_p provides the distributed seismic load for the span between the attachment points,and this load may be extended to the top of any wall parapet above the roof attachment point at h_r.

1644A.13.1.2 [For OSHPD 1 & 4] *Critical nonstructural components and systems, as defined in Table 11.1, Chapter 6, California Building Standards Administrative Code, and all components and systems in buildings in seismic performance categories SPC-3 through SPC-5 shall meet the requirements for new buildings, Section 1632A. All other elements of structures, nonstructural components and equipment supported by structures shall comply with provisions of Section 1645A.7 and this section.*

> ***EXCEPTIONS:*** *1. Anchorage and bracing of nonstructural components in buildings in seismic performance categories SPC-1 and SPC-2 with a performance level of NPC-3R may comply with the provisions of Section 1630A of the 1995 California Building Code using an importance factor I_p = 1.0. The capacity of welds, anchors and fasteners shall be determined in accordance with requirements of the 2001 California Building Code.*
>
> *2. Anchorage and bracing of nonstructural components in buildings in seismic performance categories SPC-1 and SPC-2 with a performance level of NPC-3 or higher, and SPC-3 and SPC-4, may comply with the provisions of Section 1630B of the 1998 California Building Code using an importance factor of I_p = 1.5. The capacity of welds, anchors and fasteners shall be determined in accordance with requirements of the 2001 California Building Code.*

A continuous load path of sufficient strength and stiffness between the component and the supporting structure shall be verified. Local elements of the supporting structure shall be verified for the component loads where they control the design of the elements of their connections. Increases in F_p, due to anchorage conditions (for example, shallow anchors) need not be considered. For NPC-3R, the adequacy of load path for nonstructural elements need only be verified when the total reaction at the point of support (including the application of F_p) exceeds the following limits:

1. 250 pounds for components or equipment attached to light frame walls. For the purposes of this requirement, the sum of the absolute value of all reactions due to component loads on a single stud shall not exceed 250 pounds.

2. 1,000 pounds for components or equipment attached to roofs, or walls of reinforced concrete or masonry construction.

3. 2,000 pounds for components or equipment attached to floors or slabs-on-grade.

EXCEPTION: *If the anchorage or bracing is configured in a manner that results in significant torsion on a supporting structural element, the effects of the nonstructural reaction force on the structural element shall be considered in the anchorage design.*

[For OSHPD] *The total design lateral force , F_p, shall be determined from the following formula:*

$$F_p = \beta H C_a I_p W_p \qquad (44A\text{-}14)$$

Alternatively, F_p may be calculated using the following formula:

$$F_p = \beta a_p H C_a (1 + 3h_x/h_r) W_p / R_p \qquad (44A\text{-}15)$$

Except that:

F_p *shall not be less than* $0.7\beta H C_a I_p W_p$ *and need not be more than* $4\beta H C_a I_p W_p$. *(44A-16)*

Where:

β *is the value for the connection, not the element to which it is attached. The values of* β *for connections, bracing and materials shall be as prescribed in Section 1645A.7.2.*

I_p *is the value used for the structure selected from Table 16A-K.*

h_x *is the elemement or component attachment elevation with respect to grade.* h_x *shall not be taken less than 0.0.*

h_r *is the structure roof elevation with respect to grade. The value of* h_x/h_r *need not exceed 1.0.*

a_p *is the in-structure Component Amplification Factor that varies from 1.0 to 2.5.*

A value for a_p *shall be selected from Table 16A-O.*

R_p *is the Component Response Modification Factor that shall be taken from Table 16A-0, except that* R_p *for anchorages shall equal 1.5 for shallow expansion bolts, shallow chemical anchors or*

(Text continues on page 2-38.57.)

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HISTORY NOTE APPENDIX

CALIFORNIA BUILDING CODE
(Title 24, Part 2, California Code of Regulations)

For prior history, see the History Note Appendix to the *California Building Code,* 1998 Triennial Edition published in December 1998 and effective July 1, 1999.

1. (DSA/SS 2/01) Adoption of necessary structural safety amendments to the 1998 California Building Code (CCR Title 24, Part 2) for public schools, community colleges and state-owned or state-leased essential service buildings. Approved by the Building Standards Commission on September 25, 2001 and effective on November 1, 2002.

2. (OSHPD 2/01) Adoption of the material and structural standards of the 1997 Uniform Building Code with necessary amendments (CCR, Title 24, Part 2) for hospital buildings and correctional treatment centers. Approved by the Building Standards Commission on September 25, 2001 and effective on November 1, 2002.

3. (HCD 1/01) Adoption of amendments to the California Building Code (CCR, Title 24, Part 2) for hotels, motels, lodging houses, apartment houses, dwellings, employee housing, factory-built housing, and permanent building and accessory buildings in mobile home parks and special occupancy parks. Approved by the Building Standards Commission on November 28, 2001 and effective on November 1, 2002.

4. (SFM 1/01) Adoption of various amendments to the fire and panic safety standards in the California Building Code (CCR, Title 24, Part 2) for State Fire Marshal regulated occupancies. Approved by the Building Standards Commission on November 28, 2001 and effective on November 1, 2002.

5. **Errata October 1, 2002:**

Page 2-1: Delete the words "**Note: This chapter has been revised in its entirety**" from the heading.

Page 2-18: In the last paragraph of **Section 1632.1** revise "[For OSHPD 1]" to "[For OSHPD 2]".

Page 2-38.12: In **Section 1627A**, under ***APPROVED EXISTING BUILDING***, revise "***[For OSHPD 1, 2 and 4]***" to "***[For OSHPD 1 and 4]***".

Page 2-38.23: Revise language in **Section 1632A.6**.

Page 2-38.29: Revise **Section 1637A** title to "***SITE DATA FOR HOSPITALS AND STATE OWNED OR STATE-LEASED ESSENTIAL SERVICES BUILDINGS***".

Page 2-38.45: Revise description to read "This map delineates the boundaries of the seismic hazard zones as given in Section 1629A.4.1 for hospitals and public schools in California".

Page 2-38.52: Revise item 1. in **Section 1644A.9.2.3.2** to read as follows: "*Chapter 19A, Section 1921A.4, for concrete, and Chapter 22A, Section 2210A, 2211A, items 4 and 5, for steel in structures in .....*".

Page 2-38.57: Revise **Section 1645A.7.1.3** Item 2. to read "*Nonstructural components, as listed in the 1995 California Building Code, Part 2, Title 24,...*" Revise Item 3. to read "*Equipment listed in the 1995 California Building Code, Part 2, Title 24,...*"

Page 2-38.66: In Table 16A-R-3, for *Site Class E*, in the right column replace the "0" with an "*". For *Site Class F*, in the left column replace the "0" with an "*". In Table 16AR-4, for *Site Class E*, in the right column replace the "0" with an "*".

Page 2-39: Revise title of **Section 1701.4** Item 3. to "**Spray-applied fire-resistive materials.**" Revise title of **Section 1701.5** Item 1.1 to "***[For OSHPD 2] Placing record.***"

Page 2-41: Revise title of **Section 1704.1.2.1** to "***[For HCD 1] Factory-built housing.***"

Page 2-42.2: Revise title of **Section 1704.6.4** Item 17. to "***Glued-laminated timber.***" Revise Title of Item 18 to "***Post installed anchors.***"

Page 2-96.6: In Section 1809A.5.1, replace "... *Type S3 or S4 soils,* ... " with "... Type S_D, S_E or S_F soils, ..."

Page 2-184.74: In the last line of Section 1923A, replace "*Section 1916A.4.2.*" with "*Section l916A.7.1.*"

Page 2-236.11: Revise the title of **Section 2106A.1.12.4** Item 2. to "***Shear walls***." Revise the title of **Section 2106A.2.3.3** to "***Walls and piers.***" and the heading "***Thickness of Walls.***" to ***"Thickness of walls.***"

5. (DSA/SS EF 01/03) Emergency adoption/approval of technical design and construction building standards for the adaptive reuse of existing building public school use; CCR, Title 24, Part 2. Approved by the California Building Standards Commission on May 14, 2003 and filed with Secretary of State on May 15, 2003. Effective May 15, 2003.

6. (DSA/SS EF 03/03) Emergency re-adoption/re-approval of technical design and construction building standards for the adaptive reuse of existing building public school use; CCR, Title 24, Part 2. Approved by the California Building Standards Commission on July 16, 2003 and filed with Secretary of State on May 15, 2003. Effective September 10, 2003.

7. (BSC EF 1/03) Amend Title 24, Part 2, Vol. 2, Chapters 2, 16, 17, 19, 22B and 23. Various sections. Filed with the Secretary of State on July 18, 2003. July 18, 2003.

8. (DSA/SS 3/02) Adoption of various amendments to the California Building Code (CCR, Title 24, Part 2) for seismic design of irregular structures. Approved by the Building Standards Commission on May 14, 2003 and effective July 30, 2004.

9. (OSHPD 3/02) Adoption of various amendments to the California Building Code (CCR, Title 24, Part 2) for seismic design of irregular structures. Approved by the Building Standards Commission on May 14, 2003 and effective July 30, 2004.

10. (DSA/SS EF 03/03) Emergency re-adoption/re-approval of technical design and construction building standards for the adaptive reuse of existing building public school use; CCR, Title 24, Part 2, Vol. 2. Approved as permanent by the California Building Standards Commission on January 7, 2004 and filed with the Secretary of State on January 8, 2004. Effective January 8, 2004.

11. (BSC EF 1/03) Amend Title 24, Part 2, Vol. 2, Chapters 2, 16, 17, 19, 22, 22B and 23, various sections; filed as permanent adoption with the Secretary of State on September 20, 2004; effective date September 20, 2004.

12. (OSHPD EF 01/05) Amend Title 24, Part 2, Vol. 2, Chapter 16A, Div. VI-R. Approved by the California Building Standards Commission on December 13, 2005. Filed with the Secretary of State on December 14, 2005 with an effective date of December 14, 2005.

13. (OSHPD EF 01/05) Amend Title 24, Part 2, Vol. 2, Chapter 16A, Div. VI-R. Re-adopted/approved by the California Building

Standards Commission on March 22, 2006. Filed with the Secretary of State on March 30, 2006 with an effective date of March 30, 2006.