

2007 California Building Code



S. K. Ghosh, Ph.D., FPCI

President
S.K. Ghosh Associates Inc.
Palatine, Ill.

This article discusses the forthcoming 2007 California Building Code and provides a look at the current building code situation in California.

An article¹ discussing the still-current 2001 *California Building Code*² (CBC) appeared in the September–October 2002 issue of the *PCI Journal*. The 2001 CBC was published in April 2002 and had an effective date of November 1, 2002. This article provides an update on the 2007 CBC,³ which is expected to be published July 1, 2007.

BACKGROUND

California's Building Standards Commission, a body with members who are appointed by the governor and ratified by the state senate, produces the *California Building Standards Code* (of which the CBC is a part). The *California Building Standards Code* is published in its entirety every three years, with supplements published in the intervening years.

Normally, the 2001 CBC, which is the latest and current code, would have been based on the 2000 edition of the *Uniform Building Code* (UBC). However, the International Conference of Building Officials (ICBO), the publisher of the UBC, announced that the 1997 edition was going to be the last edition of the UBC⁴—long before that edition was even published. In fact, code change cycles were discontinued beyond 1996, so it was not possible to make any changes to the

1997 UBC once it was published (though several errata were issued by ICBO).

The 2000 *International Building Code* (IBC)⁵ is the successor of the 1997 UBC. For non-technical reasons, the 2000 IBC did not form the basis of the 2001 CBC. The basis of the 2001 CBC continued to be the 1997 UBC, thus extending the life of that code. The fact that the 1997 UBC, the parent document of the 2001 CBC, has not been modified since 1996 is a major disadvantage. For one, all the reference standards included in the 1997 UBC, such as the American Concrete Institute's ACI 318, are outdated.

In 2003, California's Building Standards Commission decided, in a split vote, that the National Fire Protection Association's model code NFPA 5000-2003,⁶ rather than the latest edition of the IBC, would form the basis of California's next building code. The first edition of NFPA 5000 was published in 2002, and the second edition in 2006.⁷ So far, it has been adopted only by one jurisdiction in Texas and one jurisdiction in Maine.

The California state administration changed before the decision to change the model code was implemented.

A 2004 CBC was never published. Following the recall of Governor Davis and the subsequent election of Governor

Schwarzenegger, California's Building Standards Commission was reconstituted. The first decision of the new commission was that the old commission's adoption of the NFPA 5000-based CBC was nonbinding. The commission's subsequent actions culminated in the adoption of a 2007 CBC based on the 2006 IBC⁸ on January 30, 2007. The effective date of the 2007 CBC is set to be January 1, 2008.

CBC STRUCTURE AND APPLICABILITY

The *California Building Standards Code* applies to all occupancies throughout the state of California. City, county, or city and county may establish more restrictive building standards reasonably necessary because of local climatic, geological, or topographic conditions.

Table 1 lists the parts of the *California Building Standards Code* (part 11 does not exist). Part 2, California Building Code, contains building design and construction requirements relating to fire and life safety, structural safety, and disabled access.

Volume 1 of the 2001 CBC contains administrative, fire and life safety, disabled access, and field inspection provisions, including all non-structural provisions and those structural provisions necessary for field inspections. Volume 1 of the 2001 CBC is integrated with volume 1 of the 1997 UBC.

Volume 2 of the 2001 CBC contains provisions for structural engineering design and is integrated with volume 2 of the 1997 UBC. This is not going to be the case for the 2007 CBC.

The 2007 CBC will still be composed of two volumes, however, because the 2006 IBC is not separated into volumes by structural and non-structural provisions. The division of the 2007 CBC volumes has yet to be determined.

Contrary to popular belief, a model code, such as the UBC or the IBC, is not directly adopted (with or without amendments) by local jurisdictions in California. Model codes are adopted into the CBC, which regulates all construction in California. Local jurisdictions may then make more restrictive amendments to the CBC. Less restrictive amendments are not allowed.

In California, a state agency called the Division of the State Architect (DSA) regulates certain structures:

- Community colleges;
- Public schools;
- Essential services buildings (state-owned or state-leased); and
- Historical buildings (through the Historical Building Board).

California's Office of Statewide Health Planning and Development (OSHPD) regulates other structures:

- Hospitals;
- Skilled nursing facilities;
- Intermediate-care facilities; and
- Correctional treatment centers.

The OSHPD-regulated buildings are classified by the categories listed in **Table 2**.

Table 3 lists the two sets of parallel chapters contained in recent editions of the CBC. The 2007 CBC will continue this practice.

Table 1. *California Building Standards Code* Parts and Titles

Part	Title
1	California Building Standards Administrative Code
2	California Building Code
3	California Electrical Code
4	California Mechanical Code
5	California Plumbing Code
6	California Energy Code
7	California Elevator Safety Construction Code
8	California Historical Building Code
9	California Fire Code
10	California Code for Building Conservation
11	Not used
12	California Reference Standards Code

Table 2. Office of Statewide Health Planning and Development—Regulated Building Classifications

Classification	Category
1	General acute-care hospitals and skilled nursing and/or intermediate-care facilities
2	Single-story skilled nursing and/or immediate-care facilities utilizing Type V wood or light steel-frame construction
3	Licensed clinics
4	Correctional treatment centers

Table 3. *California Building Code* Parallel Chapters

Chapters	Subjects
16, 16A	Structural forces
17, 17A	Structural tests and inspections
18, 18A	Foundations and retaining walls
19, 19A	Concrete
20, 20A	Lightweight metals
21, 21A	Masonry
22, 22A	Steel
23	Wood

Table 4. Updating of Codes and Standards from 2001–2007 *California Building Code*

Provisions Topics	2001 CBC Standards	Standards Skipped	2007 CBC Standards
Design loads/design	ASCE 7-95	ASCE 7-98 ASCE 7-02	ASCE 7-05
Concrete	ACI 318-95	ACI 318-98 ACI 318-02	ACI 318-05
Masonry	None*	MSJC 1999 MSJC 2002	MSJC 2005
Steel	AISC ASD 1989 AISC LRFD 1993 AISC Seismic 1992	AISC Seismic 1997 [†] Supplement No.1, 1999 Supplement No.2, 2001 AISC 341 2002	AISC 360-2005 AISC 341-2005
Wood	NDS 1991	NDS 1997 NDS 2001	NDS 2005

*1997 UBC Chapter 21 formed the basis of the masonry chapter

[†]2001 California Building Code (CBC) Chapter 22A was updated to AISC Seismic 1997 and Supplement No. 1 dated 1999.

Note: AISC = American Institute of Steel Construction; ASCE = American Society of Civil Engineers; ASD = allowable stress design; CBC = *California Building Code*; LRFD = load and resistance factor design; MSJC = Masonry Standards Joint Committee; NDS = National Design Specification.

CBC chapters 16 through 23 are applicable to buildings not regulated by DSA or OSHPD and to OSHPD type 2 buildings. Section, equation, table, and figure numbers in chapters 16 through 23 of the 2007 CBC will be the same as those in the 2006 IBC.

CBC chapters 16A through 22A apply to buildings regulated by the DSA and to OSHPD types 1 and 4 buildings (OSHPD has only operational criteria for OSHPD 3 facilities). Section, equation, table, and figure numbers in chapters 16A through 22A of the 2007 CBC will be the same as those in the 2006 IBC, except that 16 will be replaced by 16A, 17 by 17A, and so forth.

The Department of Housing and Community Development (HCD) regulates the structural and non-structural provisions of hotels, motels, apartments, single-family dwellings, condominiums, dormitories, lodging houses, factory-built housing, and shelters for homeless people.

UPDATED STANDARDS AND SIGNIFICANT CHANGES

Volumes 1 and 2 of the 2007 CBC will be integrated with the non-structural and structural chapters, respectively, of the 2006 IBC. **Table 4** shows the updates to the major reference standards. In many cases, such updates will involve major changes in design practice.

For instance, concrete design changed substantially from the 1999 edition to the 2002 edition of ACI 318. A unified design, which seeks to provide a consistent basis to the design of reinforced as well as prestressed concrete beams and columns, was moved from an appendix into the main body of the document.

American Society of Civil Engineers' ASCE 7 load combinations and a corresponding set of strength reduction factors were also adopted into the main body of ACI 318-02. The

American Institute of Steel Construction's *Seismic Provisions for Structural Steel Buildings* (AISC 341-05) is quite different from the 1992 pre-Northridge earthquake edition of that document. It is quite different even from the 1997 edition, including Supplement No. 1 (dated 1999), which was adopted in chapter 22A (but not chapter 22) of the 2001 CBC.

All of the multi-million-dollar Federal Emergency Management Association–SAC research recommendations that were acceptable to the responsible AISC committees have now been incorporated into AISC 341-05. SAC was a joint venture of the Structural Engineers Association of California (SEAOC), the Applied Technology Council (ATC), and the California Universities for Research in Earthquake Engineering (CUREe).

One important consequence of the basis of the CBC changing from the 1997 UBC to the 2006 IBC is that anchor design will have to conform to the strength design procedure in Appendix D of ACI 318-05 instead of the current allowable stress design procedure of the 1997 UBC. This will be a significant change.

CALIFORNIA STRUCTURAL AMENDMENTS

There are no amendments to the 2006 IBC in chapters 16 through 23 of the 2007 CBC.

Amendments to the 2006 IBC in chapters 16A through 22A of the 2007 CBC are numerous. Many of these amendments are essentially the same as those made to the 1997 UBC provisions for the 2001 CBC. However, there are a small number of new amendments as well. One of the new amendments requires that the seismic design category of a structure designed using chapters 16A through 22A and 23 be no lower than D, even where a lower seismic design category is indicated by the provisions of the 2006 IBC.

CALIFORNIA NON-STRUCTURAL AMENDMENTS

Amendments to the 2006 IBC for the non-structural provisions of the 2007 CBC were also made and included substantial amendments to the fire safety provisions. The Office of the California State Fire Marshal (OSFM) initiated an extensive review of the fire safety provisions of the 2006 IBC after early analysis indicated that significant reductions in life safety and property protection would occur if the 2006 IBC provisions were adopted without amendments. The amendment package developed by the OSFM sought to retain a level of fire protection similar to that provided by the 2001 CBC, which is based on the 1997 UBC.

Several significant fire safety amendments in the code modified the permitted maximum building height and floor area limits. Height and area provisions, which limit building size based on the combustibility of the construction and the level of hazard posed by the building's use, are key elements in limiting the spread of fire in buildings. The 2007 CBC provides five types of construction to measure combustibility and twenty-six occupancies to differentiate building uses based on the level of hazard. Early analysis revealed that without the California amendments, the maximum allowable area for many combinations of type of construction and occupancy would increase more than 150% from the 2001 CBC.

One approved height and area amendment limits the area increases permitted when automatic sprinklers are provided. More specifically, an amendment to section 504.2 of the 2006 IBC will permit either a one-story increase in height or a 100% increase in floor area for automatic sprinklers, but not both, as is permitted in the 2006 IBC.

Another amendment to section 506.4 of the 2006 IBC limits the floor area of a multistory building by reducing it from three to two times that permitted for a single-story building. It is important to note that these and other fire safety amendments received wide support from California building and fire officials.

The OSFM amendments only apply to those occupancies under the jurisdiction of the OSFM. These include occupancy group A (assembly), group E (educational), group H (hazardous), group I (institutional), and group R (residential), among others. Although the fire safety amendments are substantial, compromises during the lengthy code adoption process will create a level of fire safety in the 2007 CBC that is somewhere between the higher level provided by the 2001 CBC and the lower level provided by the 2006 IBC.

The California Fire Safety Advisory Council (CFSAC), an alliance of concrete and masonry organizations in California, played a vital role in the promotion and passage of the California fire and life safety amendments. PCI is part of the CFSAC.

With these amendments in California, there may be a precedent for activities in other states and the national model building codes. The complete amendment package is available from Mark Kluver, the recently retired manager of the Portland Cement Association's regional code services.

LOCAL AMENDMENTS

Significant amendments by local jurisdictions appear unlikely at this time, though some will probably be made by the larger jurisdictions. Potential jurisdictional amendments will be clearer after the 2007 CBC is published on July 1, 2007.

CONCLUSIONS

The 2001 CBC, based on the 1997 UBC, is about to be replaced by the 2007 CBC, which will be based on the 2006 IBC. The expected publication date is July 1, 2007, and the effective date is January 1, 2008.

Design professionals, code enforcement personnel, educators, students, and others involved in the building construction industry will have to become familiar with different wind, seismic, and material design standards (concrete, masonry, steel, and wood) that are three editions more recent. Fire-resistant design requirements have changed as well, with the overall result being a decrease in the fire-resistive requirements. Immediate training is needed, and it will take some time to fully realize the impact of these changes.

ACKNOWLEDGMENTS

Mark Kluver, formerly of the Portland Cement Association, contributed the section on non-structural amendments; his help is gratefully acknowledged. Kluver may be contacted at kluver@comcast.net. Thorough reviews of the manuscript by Kluver, Susan Dowty of S. K. Ghosh Associates Inc., Chris Tokas of the California office of Statewide Health Planning and Development, and Dave Walls, the executive director of the Building Standards Commission of State of California, are deeply appreciated.

REFERENCES

1. Ghosh, S. K. 2002. 2001 California Building Code. *PCI Journal*, V. 47, No. 5 (September–October): pp. 102–104.
2. Building Standards Commission. 2002. *2001 California Building Code*. Sacramento, CA: Building Standards Commission.
3. Building Standards Commission. Forthcoming. *2007 California Building Code*. Sacramento, CA: Building Standards Commission.
4. ICBO. 1997. *Uniform Building Code*. Vols. 1 and 2. Whittier, CA: ICBO..
5. International Code Council (ICC). 2000. *International Building Code*. Falls Church, VA: ICC.
6. National Fire Protection Association (NFPA). 2003. *NFPA 5000 Building Construction and Safety Code*. Quincy, MA: NFPA.
7. NFPA. 2006. *NFPA 5000 Building Construction and Safety Code*. Quincy, MA: NFPA.
8. International Code Council (ICC). 2006. *International Building Code*. Falls Church: VA: ICC.