

An Introduction to Model Codes



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by

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Part I

Introduction

Construction in the United States is a sophisticated process, governed by interrelated codes and standards that regulate building, plumbing, gas, mechanical, electrical, energy, fire, accessibility and other specialized aspects of construction. Codes generally set forth requirements for exits, fire protection, structural design, sanitary facilities, light and ventilation, environmental control, materials, and energy conservation.

Code writing and standard setting today is a dynamic process, involving constant interaction between the public and private sectors of the construction industry. Federal, state and local governments, and individuals involved in codes and standards writing and revision, represent the views of labor, management, manufacturers, design professionals, building owners and trade associations and contribute much time and technical expertise to the process.

To many who are introduced to the process for the first time, it appears complicated and overwhelming. This booklet provides a straightforward explanation of the nationally recognized model code organizations and the codes and standards development process. It is only through participation in the process that the interests of those concerned with the built environment can be adequately addressed.

Part II

Building Codes

The regulation of building construction in the United States is accomplished through a document known as a building code. This document is adopted by a state or local government's legislative body, then enacted to regulate building construction within a particular jurisdiction.

A building code is a collection of laws, regulations, ordinances or other statutory requirements adopted by a government legislative authority involved with the physical structure and healthful conditions for occupants of buildings. The purpose of a building code is to establish the minimum acceptable requirements necessary for protecting the public health, safety and welfare in the built environment. These minimum requirements are based on natural laws, on properties of materials, and on the inherent hazards of climate, geology and the intended use of a structure (or its "occupancy").

The primary application of a building code is to regulate new or proposed construction. Building codes only apply to an existing building if the building undergoes reconstruction, rehabilitation or alteration, or if the occupancy of the existing building changes to a new occupancy as defined by the building code.

The term "building code" is frequently used to refer to a family of codes that are coordinated with each other to address specific scopes of technical application. This set of codes generally consists of four documents: a building code, a plumbing code, a mechanical code and an electrical code.

Authority

The 10th Amendment to the U.S. Constitution gives states, which represent the people, the right to legislate for the protection of the public health, safety and welfare. The state's right to legislate is termed the "police power" of the state. This police power resides in the legislature of the state, allows for the passage of laws such as building codes and is the source of all authority to enact and enforce the codes. A state may choose to delegate a portion of its police power to the constituent local governmental units, such as cities, that are formed by the state legislature. In turn, the local governments may exercise such powers as are conferred upon them by the state legislature or the state constitution.

Twenty years ago, very few states had state building codes. If a building code was applicable to a site, the code was locally enacted. Since that time, approximately one-half of the states have withdrawn this delegation of power from the local government and have enacted a statewide building code. The state's building code preempts the local government's authority to enact a local code with the same scope and application. The state legislatures have generally taken this action for two reasons — to provide equal protection to all citizens throughout the state, and to develop statewide uniformity of building code laws for commerce purposes.

The administration and enforcement of building codes has traditionally been a local government activity. This is still true, despite the enactment of a statewide building code. A state legislature may enact a statewide building code law and then require the local governments to enforce that law with varying degrees of state agency supervision. A state legislature may enact a statewide building code with various degrees of

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application. For example, a statewide building code could be enacted that:

1. Regulates particular classes of buildings, such as those owned by the state, or those used for certain occupancies (such as health care);
2. Regulates particular buildings based on construction methods, such as factory-manufactured buildings;
3. Regulates all construction, except single-family dwellings, such as houses;
4. Regulates a single or narrow aspect of building construction, such as fire safety; or
5. Regulates all construction.

The diversity of the possible scope and application of statewide building codes is reflective of the independent authority that each state holds.

Local governments have traditionally enacted codes that reflected the local political climate and priorities, resulting in a bewilderingly complex body of regulation as one moves from town to town. In response to the economic disadvantages provided by such an approach, state and local governments are relying less on their own custom-drafted building codes and are adopting model building codes, thereby diminishing the apparent disorder and complexity in building code law and reducing significantly the cost of code development to state and local governments.

Model Building Codes

Concern for safety in buildings has been recorded in the laws of some of the most ancient civilizations. The regulation of building construction in the United States dates from the early settlement of our continent 350 years ago. Construction laws developed and became more complex as the surrounding cities grew and experienced the threats and consequences of disease, fire and structural collapse.

Early in this century, special interest groups, such as the insurance industry (which was concerned with the mounting losses of life and property due to fire), joined others with similar concerns to develop a model law, or guide document, that could be adopted by a legislative body to reduce those losses. The result was the development and production of a model code that was offered to states and local governments for their voluntary enactment as law. The model code (known as the *National Building Code*) was promulgated by the National Board of Fire Underwriters, later to become the American Insurance Association, and was intended to be a foundation on which the legislative body could create its own regulations. The document, or any portion thereof, could be adopted by a specific reference to it in the legislation based on the perceived needs of that legislative body. Similarly, the legislative body could, in the preparation of the law, designate the application of the code to a certain class or classes of structures or to certain building uses. The model code was simply a document that a legislative body could utilize to the extent that they found necessary or desirable.

This first model code gained widespread popularity among legislative authorities by providing an accessible source of comprehensive, contemporary and respected technical requirements without the difficulties and expense of investigation, research,

drafting and promulgation of individual local codes. Additionally, at approximately ten-year intervals, a new edition of the model code was produced. This allowed the governments to reflect current construction technology and keep their building code requirements up to date.

Beginning in 1915, code enforcement officials, or those municipal officials charged with the responsibility of enforcing building code laws, began regular regional and national meetings to discuss their common problems and concerns. From these meetings came the formation of three organizations of code enforcement officials. The first of these organizations, Building Officials Conference of America, now known as Building Officials and Code Administrators (BOCA) International, Inc., was created in 1915 and represented code officials from the eastern and mid-western portions of the United States. The second, formed in 1922, was the Pacific Coast Building Officials Conference, now known as the International Conference of Building Officials (ICBO), which represented code officials from the western United States. The third, formed in 1941, was the Southern Building Code Congress International (SBCCI), which represented the interests of code officials in the southern United States.

The purpose of these organizations was not only to provide a forum for the exchange of ideas and aid in the development of the infant profession of code enforcement, but also to promulgate a model code reflective of each organization's concerns and experiences. Each of these three organizations eventually produced its own model code with an objective similar to that of the original model code — a guide and example that legislative bodies could adopt as their own building code. In 1984, the American Insurance Association's *National Building Code* was withdrawn from circulation because these newer model codes were more popular among state and local governments. The insurance industry was aware that the model codes were fulfilling well the purposes for which its document was first established.

While legislative bodies are not obligated to adopt a model code and may write their own code or portion of a code, studies conducted by the federal government have indicated that 97 percent of all United States cities with a building code have adopted one or more of the three model codes or have a code based on one of the model building codes. A model code has no legal standing until it is adopted as law by a legislative body. When it is adopted as law, the code's original formal status is restricted to the geographic boundaries of that legislative body's political jurisdiction. All owners of property within the boundaries of the jurisdiction are required to comply with the enacted building code.

In cases where a model code has not been adopted in a jurisdiction, the codes have assumed an authoritative status for building designers. Engineers and architects are licensed by the state to practice their profession and have a duty to be aware of the building features and elements that are a threat to the public and to the building user. The model codes, then, are utilized by design professionals for their design in such geographical areas, even though the codes may not be universally adopted as law.

Local and State Codes

Development of local and state codes varies considerably in degree and procedures. Almost all local and state codes are based on one of the model codes, particularly for engineering provisions.

State codes can be developed in a variety of ways. Some states adopt a particular



edition of a model code, leaving administrative matters to local jurisdictions. Others start with a model code and revise and administer a separate code only for state-funded buildings. Still others may require a special code for certain occupancies, such as schools and assembly buildings.

Local codes are also diverse in the extent to which the base model code is amended. Most local amendments are limited to administrative provisions, which are subject to change to meet other local regulations regarding implementation of ordinances. Engineering provisions are among the least amended, with a common reason for amendments related to unique site conditions that affect foundation design or applied wind and snow loads.

There are still large cities that have had the advantage of a large professional population willing and able to provide advice on customizing nationally recognized codes and standards for local use. The list of these cities shrinks each year as the model codes and national standards become more detailed in scope.

Local and state amendments to technical provisions in model codes and national standards should be avoided and opposed in every case. A concern with a provision thought to be incomplete or improper should be addressed through the code development process and procedure made available by the promulgating model code organization.

Involvement by Technical Organizations

Many representatives of professional organizations participate in codes and standards activities at local, state and national levels. Most of them will have members that also hold national membership, which presents an opportunity to promote the support of model codes and national technical standards.

Trade associations that represent suppliers of construction materials are another type of organization most likely to have significant participation in all codes and standards activities. By and large, these organizations maintain the same position as CABO (Council of American Building Officials) regarding consensus codes and standards.

Model Code Organizations

The three model code organizations in the United States are Building Officials and Code Administrators (BOCA) International, Inc., headquartered in Country Club Hills, Illinois; the International Conference of Building Officials (ICBO), of Whittier, California; and the Southern Building Code Congress International, Inc. (SBCCI), of Birmingham, Alabama.

Each of these organizations is a not-for-profit public benefit service corporation owned and governed by its voting members, which are units of city, county, state and the U.S. federal government. These governmental members designate as representatives in the affairs of the code organizations those persons they have employed to enforce or administer building regulations. Each organization holds annual business meetings, at which time the officers and directors are elected from and by the delegates. Each organization is formed with the mutually held purpose of collectively developing codes, training in all aspects of codes and code enforcement, and other such activities that may alleviate the burden of providing these services by member governmental agencies.

The major activities of the three model code organizations are code application technical assistance, plan review, training and education, product evaluation, and administration of the code development process.

The three model code organizations are generally predominant within specific geographic regions of the United States, with BOCA prominent in the east and portions of the mid-west, ICBO prominent in the west and portions of the mid-west, and SBCCI prominent in the south.

Membership in a model code organization is voluntary. A member need not adopt any of the codes published by the organization. Conversely, the codes can be adopted by a legislative body that may choose not to become a member of the model code organization. This is seldom the case since the benefits of membership are considerable. Annual membership fees range from \$40 to \$250, depending on the population of the jurisdiction. There are no fees associated with the adoption of model codes, except for the expenditure on the purchase price of the code books.

In addition to the voting members, each organization has a range of other membership categories that provide designers, manufacturers, trade associations, educators, inspection personnel, contractors, builders and others with the same level of professional services that are available to code enforcement agencies.

Each of the model code organizations maintains an employed staff of administrative and technical personnel responsible for the day-to-day business activities and, most importantly, for providing technical services to the members. All activities are conducted through and supervised by committees composed of volunteers selected from the membership. In terms of programs and specific services, the major activities are code application technical assistance, plan review, training and education, product evaluation, and administration of the code development process.

Code application technical assistance means that members can contact the organization for advice and consultation on the code requirements or research on the application of the code to a particular circumstance.

Regarding plan review, governmental members can submit the plans and specifications for a building that is to be constructed in a local jurisdiction for a review for code compliance. A report on compliance issues is returned to the code official. In some cases, the plan review service is available to non-governmental members.

Professional development activities allow all members to obtain manuals and textbooks on all subjects relative to codes and code enforcement. A wide range of seminars is offered at various locations throughout the year. A certification program is also available which, on successful completion of a written examination, demonstrates the competency of the code enforcement official in various technical aspects of the code.

In product evaluation, governmental members are advised of code compliance information on various materials, products and building systems through the issuance of technical evaluation reports. The program is diverse and embraces new building products and systems, as well as new methods of design, fabrication, testing and quality control agencies, and almost any feasible alternative equivalent to specific code requirements. Verification of product compliance to the criteria set forth in the code is the major membership advantage of this program. In the evaluation of a product for code compliance, there is often a need to develop criteria where none existed previously. These newly developed criteria are often incorporated into the code through a proposed code change when the need to apply them becomes more commonplace.

In the code development process, anyone may submit a proposed change to the code's content. The proposed change, reasons for the change and its substantiation will be published, discussed, considered and voted on in a public meeting of the membership.

Development of the Model Codes

The majority of construction codes in the U.S. are based on one of the three model code series: the *BOCA National Codes*, published by BOCA; the *Uniform Codes*, published by ICBO; or the *Standard Codes*, published by SBCCI. Each of these model codes adopts a variety of standards, either by reference (BOCA, ICBO and SBCCI) or by transcription (ICBO). Many professional organizations encourage a positive interface with the model code organizations to assure their standards are given a fair and proper hearing when introduced for inclusion into a model code. The following information is provided to familiarize those organizations and other individuals with procedures of the model code organizations.

1.0 Publication Cycle

1.1 Code Edition Time Frame

Historically, each of the model codes publishes a new edition every three years, with amendment supplements.

1.2 Annual Cycle Time Frame

Each of the model codes operates on an annual code development cycle, so that code changes submitted can be fully processed within a 12-month period. BOCA's cycle starts with a November deadline for code development proposals, with a Spring committee hearing and final action on committee recommendations at BOCA's Annual Conference in September.

ICBO has a July code development deadline, plus an October deadline for proposals related to annual meeting actions (which fluctuates with the dates of their Annual Conference), followed by February committee hearings and final action at ICBO's Annual Conference in September. ICBO has suspended their code development process for the Uniform Codes effective with the 1996-1997 cycle. This action was taken with due consideration for devoting efforts to the development of the International Codes.

SBCCI has a March deadline for code development proposals, with July committee hearings and final action at SBCCI's Annual Conference in October.

Each model code organization distributes to its membership and all other interested parties a monograph of proposed code changes and a monograph of committee recommendations. Each code change proposal is identified with a unique number so it can be tracked through the code development process.

BOCA and ICBO use a challenge procedure to establish hearing agendas at their Annual Conferences. Written challenges to published committee recommendations are in turn published as the hearing agenda for the Annual Conference. The challenges must be available a minimum of 30 days prior to debate at the Annual Conference. Code changes not challenged are automatically dispensed with in accordance

with the committee recommendations.

The SBCCI hearing agenda at its Annual Conference consists of all code change proposals acted on by the committee.

BOCA and ICBO complete their code development procedure with a final action vote by those governmental members who participated at each Annual Conference. SBCCI circulates a mail ballot to all voting members to conclude its code change cycle.

2.0 Code Change Submission

2.1 Who May Submit

Anyone may submit a code change proposal to any of the model codes.

2.2 Format of Submission

Proposals must identify the appropriate code and section to be revised, the proponent's name and address, the text as it is to be revised, and the reasons for making the proposed revision. Revised text is identified by lining through the portion that is to be deleted and underlining that portion that is to be added.

2.3 Substantiation and Documentation

Proponents are encouraged to submit adequate substantiating materials, such as test reports, research results and other pertinent data, to enable committee members to base their recommendations on relevant, factual information.

2.4 Staff Comments

Each model code organization prepares staff comments on code change proposals, explaining such factors as effects on other portions of the code and technical details that may be available for staff analysis. The intent is to provide the committees and voting members with useful information for determining the proper action to recommend on code change proposals.

2.5 Referenced Standards

The model codes, in setting forth comprehensive regulations for all aspects of building construction, reference a great number of standards that are promulgated by a variety of authoritative sources. The text of the codes describes the manner in which a particular standard is to be utilized for regulating purposes and then references the specific document.

BOCA and SBCCI identify referenced standards by the specific title of the standard and agency that promulgates the standard. All referenced standards are then listed in a separate chapter, which also lists the specific edition of the standard to be utilized.

ICBO allows adoption of standards by six different methods ranging from adoption by reference to adoption as guideline standards. Many of the standards are adopted and assembled into a single document called *Uniform Building Code* Volume 3. All standards adopted in the UBC are also listed in a separate chapter.

BOCA maintains and updates referenced standards on an annual basis

through committee action without processing code change proposals for each update; however, standards can only be added to or deleted from the *BOCA National Codes* through formal code change submittals. ICBO and SBCCI accomplish all additions and deletions of standards, as well as the updating of standards, through the formal code development process.

All standards adopted by ICBO, whether they are adopted by reference, transcribed into the book of standards or listed as guideline standards, are maintained and updated by ICBO through their formal code development process.

3.0 Committee Hearing

3.1 Committee Composition

In general, code development committees are composed of voting members of the model code organizations. Voting members are those individuals representing a code enforcement entity, such as a city, county or state.

There are variations to the general rule. For instance, SBCCI appoints professional and industry members to serve on their code development committees. ICBO's fire and life safety committee includes one member appointed by interested parties at the International Fire Code Institute. BOCA and ICBO appoint nonvoting advisory members to serve on its code development and ad-hoc committees.

Ad hoc committees appointed to study special topics are usually comprised of a variety of parties interested in the subject matter. The work product of ad hoc committees typically consists of proposed code changes that are subsequently processed through formal code development procedures.

3.2 Participation

All model code committee hearings are open to the public. Any attendee may participate in presenting testimony on any agenda item. Many professional organizations, due to their specialized knowledge of technical subjects, enjoy considerable credibility in code development hearings. Care is exercised to consider all viewpoints in these circumstances, but professional organizations called upon for technical support have a special responsibility to maintain objectivity and technical accuracy when testifying at such hearings.

3.3 Registration Procedure

There is no formal registration procedure required to participate in the hearings. Attendees are normally asked to complete an attendance sheet to facilitate distribution of committee reports.

3.4 Committee Recommendations

A committee recommendation is made on each code change proposal. The recommendations may be for approval as submitted, approval as revised at the committee hearing, or disapproval. ICBO and SBCCI committees have an additional option to recommend further study of an item that may be very complex or may be dependent on additional information that can be compiled in a reasonable amount of time.

Committee actions, with reasons for each recommendation, are published and distributed to the model code membership and other interested parties. These actions become the agenda base for a second public hearing and membership vote at the model code organization's annual meetings, as described in Section 1.2.

4.0 Annual Meeting

4.1 Registration for Public Hearing

Neither BOCA nor SBCCI requires any special registration or badge for their public hearings. Anyone may observe or participate in the code development hearings at the annual meetings. ICBO requires all persons presenting testimony at the code change session of their annual business meeting to wear a conference badge, with badges available for a modest fee to those persons who wish to participate only in the public hearing. There is no fee required of those who wish only to audit the ICBO hearings.

4.2 Membership Action on Changes

At an annual meeting, all assembled persons have full rights to the floor, except for voting. Voting is restricted to eligible voting members so designated in the bylaws of each model code organization.

Typically, the committee recommendation on each agenda item becomes the standing motion on the floor. This motion is then processed in general accord with Robert's Rules of Order. Modification of the committee recommendation may be accomplished by the majority vote shown in Table 1.

5.0 Publication

Final actions taken at the annual meeting are published either in the form of annual supplements or as part of the triennial model code editions.

Table 1 – Voting Majorities				
Committee Recommendation	Desired Action	Required Vote ^a		
		BOCA	ICBO	SBCCI
AS (A) Approval as Submitted (Approved)	AS (A)	½	1	1
	AM (AR)	2/3	3/4	3/4
	D	½	½	3/4
	W (FS)	—	½	3/4
AM (AR) Approval as Modified (Approval as Revised)	AS (A)	2/3	3/4	3/4
	AM (AR)	½ (2/3) ^b	½ (2/3) ^b	½ (2/3) ^b
	D	½	½	3/4
	W (FS)	—	½	3/4
D Denied (Disapproval)	AS (A)	2/3	3/4	3/4
	AM (AR)	2/3	3/4	3/4
	D	½	½	3/4
	W (FS)	—	½	3/4
W (FS) Withdrawn (Further Study)	AS (A)	—	3/4	3/4
	AM (AR)	—	3/4	3/4
	D	—	½	3/4
	W (FS)	—	½	3/4

Note a. The most restrictive vote is shown. BOCA requires only a simple majority to overturn any committee recommendation, after which a subsequent motion must be made to accomplish final action in accordance with these majorities. ICBO requires only a simple majority to approve a committee recommendation that has been amended by a 3/4 vote on the floor.

Note b. A simple majority (1/2 + 1) is required to sustain the committee recommendation. A larger majority, as noted, is required to further revise the committee recommendation.

Part III

Council of American Building Officials

Purpose

The Council of American Building Officials (CABO) was formed in 1972 as a forum to coordinate the efforts of the three model code organizations at the national level. CABO is composed of members of the Boards of Directors of each model code organization and is supported by their technical and educational staffs.

CABO was founded to promote the concept of model codes through a common, concentrated effort by the existing private-sector model code organizations. One of CABO's major objectives is national uniformity in the programs and policies of the organizations. CABO is affiliated with the National Evaluation Service, which is a national service for evaluating new and unique products and materials for code compliance. Additionally, CABO is the Secretary to the A117 Committee on Accessible and Usable Buildings and Facilities and the ANSI Committee on Manufactured Home Construction and Safety Standards. CABO also sponsors a certification program for building officials.

CABO's corporate mission statement reads: "The Council of American Building Officials is dedicated to the public's health, safety and related societal needs in the built environment through the development and use of consensus-based regulatory documents, enhancement of professionalism in code administration and facilitating acceptance of innovative building products and systems."

CABO was formed to operate as a liaison between the public and private organizations on national matters. It provides code officials with the opportunity to assemble and discuss topics of national interest, consequently uniting the efforts of BOCA, ICBO and SBCCI in matters of mutual and national interest.

CABO Board for the Coordination of the Model Codes

In the mid-1970s, it was recognized that the apparent conflicts and contradictions in the model codes were likely to be brought into close agreement if code drafters could view the same facts in the context of similar experiences. To this end, CABO established the National Coordinating Council (NCC) on January 6, 1975. The NCC was composed of two representatives from each of the three model code organizations. The NCC was charged with the following tasks:

1. To review the content of the three model codes to identify conflicts pertaining to means of egress and type of construction requirements.
2. To develop specific code change proposals to each of the model code



groups to eliminate such conflicts.

3. To develop specific code change proposals to eliminate conflicts in other areas, such as allowable height increases, maximum building heights, sanitation, light and ventilation, and general design requirements.
4. To process all code change proposals through the code change procedures of each participating organization.

Within a few months, the NCC's name was changed to the Board for the Coordination of the Model Codes (BCMC). In 1981, CABO invited the National Fire Protection Association (NFPA) to join the BCMC as a full voting member in order to include the NFPA standards into the coordination process.

In its 20-plus years, BCMC's efforts have fostered a cooperative environment among the model code organizations. The BCMC held its 76th and final meeting on October 12, 1995. Its successor organization is the ICC Board for the Development of Model Codes (BDMC) (see page 17).

CABO One and Two Family Dwelling Code

The *CABO One and Two Family Dwelling Code* was developed by BOCA, ICBO and SBCCI in 1971 primarily in response to a request from the homebuilding industry for a simple, stand-alone prescriptive code document that describes the most commonly accepted building practices. The current code development process used by CABO is based on a twelve-month cycle and a new edition of the code is published every three years.

CABO has a deadline of the first business day in January for code change proposals with committee hearings for initial recommendations in April and committee hearings for final action in October.

Under the CABO Code Development Procedures, anyone can submit a code change proposal prior to the deadline date. CABO publishes proposed code changes and makes them available to any interested party. After a public review period, Code Development Committees on Building, Plumbing and Mechanical, consisting of representatives from BOCA, ICBO, SBCCI, the design professions, and the insurance and homebuilding industries, hold their first hearing. Anyone may testify on proposed changes at the hearing. Committee actions on code change proposals at the hearing are published by the CABO Secretariat and any interested party disagreeing with the committee action may file a negative ballot.

The Code Development Committees hold a second hearing in October to address negative ballots and either sustain their original action or take an alternative action. The Committee actions resulting from the second hearing constitute final action.

The CABO procedures also provide an appeals mechanism on matters pertaining to

The *CABO One and Two Family Dwelling Code* was developed by BOCA, ICBO and SBCCI in 1971 primarily in response to a request from homebuilding industry.

In December 1995, maintenance of the *CABO One and Two Family Dwelling Code* and the *CABO Model Energy Code* was transferred to the International Code Council.

violations of the rules procedures.

The *CABO One and Two Family Dwelling Code* is referenced in all three model building codes.

CABO Model Energy Code

The *Model Energy Code* is a CABO document published jointly by BOCA, ICBO and SBCCI. The same CABO code development process that is used for the *One and Two Family Dwelling Code* is used for the *Model Energy Code*. The code is maintained by a Code Development Committee consisting of representatives each from BOCA, ICBO and SBCCI.

The Code Development Committee is charged with incorporating appropriate emerging thermal performance issues reflecting state-of-the-art information in building energy performance.

Part IV

The International Code Council

The International Code Council (ICC) was formed in 1994 as an umbrella organization created to support common code development. The ICC also has been charged with handling the development and maintenance of the International Codes and coordinating related supporting activities, and consists of representatives from BOCA, ICBO and SBCCI. The formal mission statement of the ICC is to “promulgate a comprehensive and compatible regulatory system for the built environment, through consistent performance-based regulations that are effective, efficient and meet government, industry and public needs.”

One reason that development of a single model code system is necessary is because of an increase in global economic trends, such as the North American Free Trade Agreement (NAFTA) and the General Agreement on Tariffs and Trade (GATT). American manufacturers need to remain competitive, putting their resources into the development of innovative products, rather than trying to comply with multiple, sometimes conflicting codes. The three model code organizations have responded by developing a complete set of construction codes — the International Codes.

The ICC goes beyond the efforts of CABO and the BCMC in that the ICC concentrates its efforts on code uniformity and compatibility, with an intent to support the entire inventory of training materials and manuals in support of the International Codes.



Development of the International Codes

Since 1994, the ICC has published the *International Plumbing Code (IPC)*, the *International Plumbing Code Commentary*, the *International Private Sewage Disposal Code (IPSDC)* and the *International Mechanical Code (IMC)*. Also scheduled for publication by the year 2000 are International Codes for zoning, fire prevention, building, property maintenance/housing, fuel gas, one- and two-family dwellings, and energy conservation.

The code development process (see Figure 1) for the International Codes, established by the ICC, is similar to that used by the three model code organizations, with a Spring Meeting and an Annual Conference. Any interested person or group may submit a code change proposal, with statements indicating the type of change requested, how the change affects the intent of the section and the impact of the change on the application of the code. Supporting statements are also to be submitted, identifying the purpose of the proposed code change, the reasons why the proposal is superior to the existing text, the shortcomings of the current code provisions, and all available sustaining material.

Voting members of any model code group will determine the results of the public hearing. Voting members will be given the opportunity to revise the committee recommendation on each proposal, and to approve the proposal as submitted or to deny the proposal. Additionally, there are three Final Hearings, coinciding with the

Annual Conferences of BOCA, ICBO and SBCCI. Only representatives of BOCA's Active A or B Class Members, ICBO's Class A Members and SBCCI's Active Members may vote at their respective Conferences. The final action on all challenged proposals will be based on the aggregate count of the ballots received at all three Conferences.

The ICC Board for the Development of Model Codes

On December 3, 1995, the ICC Board of Directors approved the creation of a successor organization to BCMC. This successor organization is called the Board for the Development of Model Codes (BDMC). While BCMC was charged with the objectives already discussed, the objectives of the BDMC will reflect a different intent. BDMC will address emerging technology and concepts and will coordinate the treatment of such matters in codes and standards. The process will utilize a collection of committees similar to the “task groups” utilized by BCMC, and the board will serve as a governing body to gather interested parties for collective attention to a topic.

ICC CODE CHANGE PROCESS

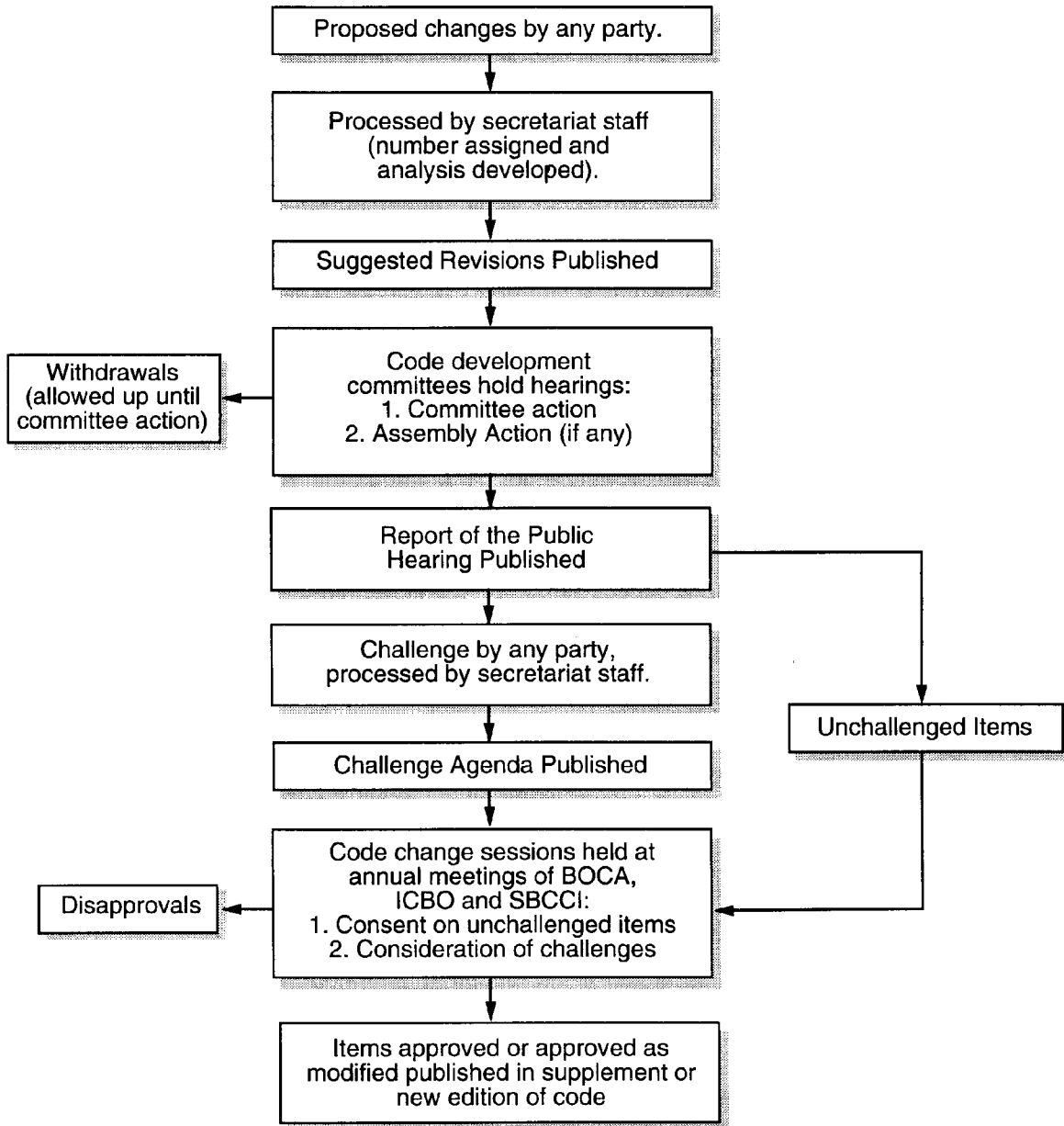


Figure 1
MAJOR STEPS IN THE ICC CODE DEVELOPMENT
PROCESS AND CYCLE

Part V

The Code Enforcement Process

In the United States, the traditional enforcement of all building codes rests with the local governments with varying degrees of oversight by the different states.

In the United States, a state legislature may enact a state building code with a considerable range of scope and application, thereby preempting a local government from legislating its own code with the same scope. The traditional enforcement of all building codes, however, remains with the local governments with varying degrees of oversight by the different states. The local governments are responsible for creating the organizational structure for the code enforcement process, designating the person or persons responsible for enforcement, and providing the necessary resources.

The organization, directed by the code enforcement official, comes in all sizes and shapes. It could simply consist of a one-person department that reports directly to political leaders, such as the mayor or legislative body; or it could be a larger organization that has specialists in all engineering disciplines, and which operates as a major city or county department. The size and shape of each organization is determined by the amount and nature of construction activity; the relative importance of code enforcement in the priorities of the jurisdiction; and the financial resources available to support the activity. To implement the enforcement process by the organization, a building permit process is established for review, inspection and approval of proposed activities to secure compliance with the building code.

Figure 2 is a simplified construction permit process function flow chart that is intended to reflect the major steps in the code enforcement process as practiced by the approximately 15,000 permit-issuing local governments in the United States.

In the figure, Function A starts the process when the owner of the land or his agent applies for a permit to start construction. Building codes prohibit the start of construction until the proposed work is reviewed and approved and a building permit is issued. With the application, the owner must set forth all details of the proposed construction, including complete plans, diagrams, specifications, computations, test results and any other data necessary to describe the building and its prospective use. The level of required detail is that which is necessary for the code enforcement official to determine if the proposed construction complies with the building code.

Function B is the process in which the code official reviews the design of the project and the supporting information to determine building code compliance. Every jurisdiction does not necessarily have the in-house capability or capacity to conduct a thorough plan review in all respects, but it may engage other agencies or departments to accomplish the review. The depth and scale of a plan review is largely dependent on the complexity of the proposed construction with greater attention paid to more detail as the structure's size or height increases. This function has particular importance as errors or omissions in design are relatively easy to correct at the plan review stages, as compared to when construction has progressed and the deficiency is discovered in place.

Function C reflects the necessary work as a result of the determination by the code

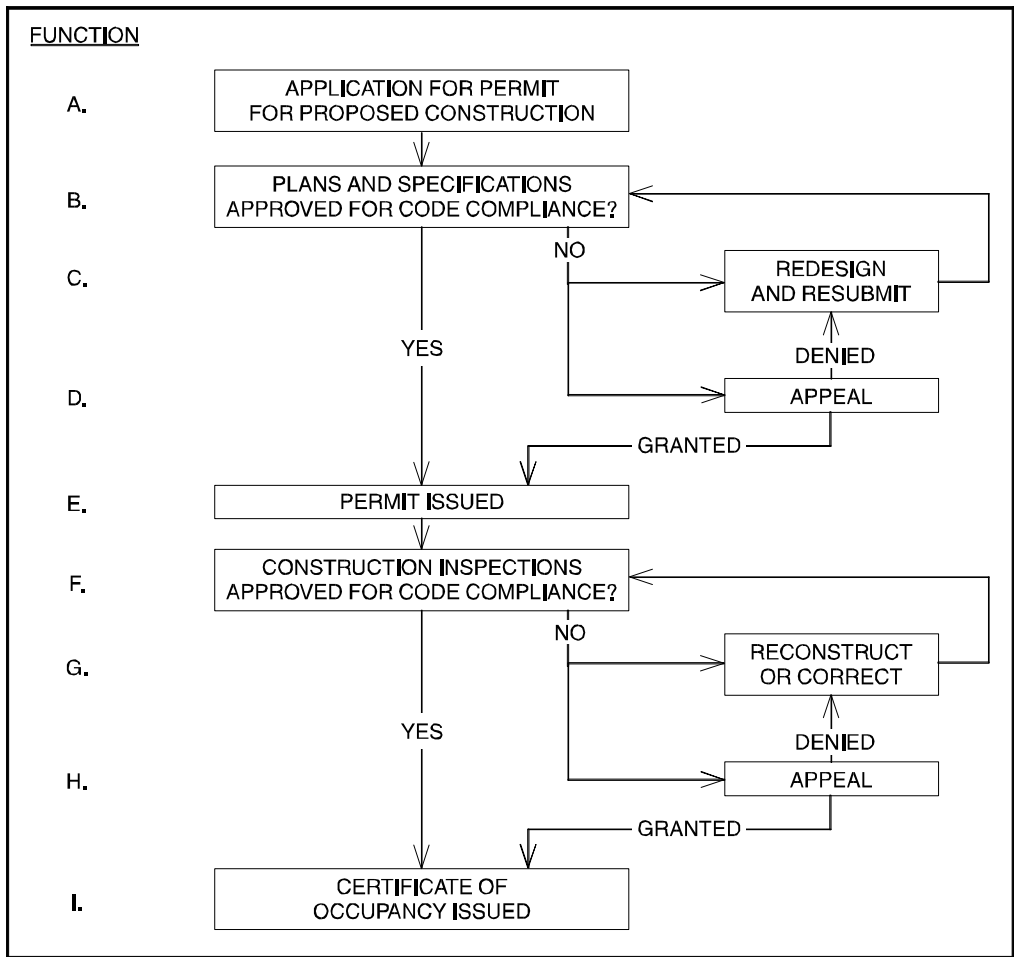


Figure 2
TYPICAL CONSTRUCTION PERMIT PROCESS
FUNCTION FLOW CHART

official that additional work is required on the plans and specifications based on the plan review. If a deficiency, error or code violation is discovered in the plan review, the owner is advised to revise the plans and other documents and resubmit the corrected materials for another plan review. This process is repeated until all information meets code compliance.

Function D is an option available to the permit applicant aggrieved by the decision of the code official during the plan review process. If the applicant believes that the proposed design satisfies the intent of the code, the applicant may file an appeal in accordance with the procedure prescribed by the jurisdiction. This process is normally accomplished in a public hearing before an appeals board at which time all information is presented for and against the proposal. The appeals board may uphold, modify or reverse the decision of the code official, and the applicant proceeds in accordance with the decision.

Function E is the issuance of the construction permit to the owner, or the owner's agent. A construction permit authorizes the owner to proceed with the construction work in compliance with the plans and specifications, which are approved based on the

plan review. The building permit can be withdrawn by the code official if the work is not accomplished as it was authorized. Additionally, as a condition of the building permit, the code official is permitted to enter the site at all reasonable times to perform inspections during the construction process.

Function F corresponds to the code official's responsibility to visit the construction site during construction for inspections to determine that the work is being accomplished in accordance with the approved plans and specifications. The frequency of inspections is based on the complexity of the work, with certain elements that have critical roles in the structural or fire performance of the building requiring more detailed and frequent inspections. The inspections are performed as the construction work progresses, typically before critical building elements are concealed.

The subjects of common and typical inspections are:

1. Site and terrain;
2. Foundation system;
3. Structural frame system;
4. Fire protection system;
5. Mechanical equipment and systems;
6. Plumbing facilities;
7. Electrical equipment and systems; and
8. Final.

It is the code official's duty to verify, through plan review and inspection, that the element is properly installed.

If an inspection reveals work that does not comply with the approved plans and specifications or is substandard in workmanship, the code official will issue a correction notice. A correction notice requires the contractor to correct that which has been identified as not in compliance with the approved work. All construction that complies with the code can continue.

Function G reflects the necessary work as a result of the code official's identification of a construction deficiency and issues an order that certain work be removed, reconstructed or corrected. On completion of the corrected work, the inspection is repeated. Continued correction notices or ignored notices may result in all work on the site being stopped until all deficiencies have been corrected. More aggressive legal action can be pursued for blatant code violations. The resulting judicial proceedings may result in financial penalties or, at the extreme, criminal charges or imprisonment.

Function H is an option available to the permit applicant aggrieved by the decision of the code official during the inspection process. At this time, the permit holder has an option to appeal the decision of the code official. As in Function D, the applicant proceeds in accordance with the decision of the appeals board.

Function I takes place when all inspections have been performed, all deficiencies have been corrected and the construction work is complete. A certificate of occupancy is issued indicating that the building complies with the building code and authorizing the occupancy of the building in accordance with the approved use.

Some building elements are fabricated and assembled away from the construction site

and are not able to be inspected by the code enforcement official. An example of this might be a plant-fabricated structural wall assembly, which is constructed in an adjacent state and shipped to the construction site as an assembled unit. In an effort to verify that such elements conform to the building code, the codes allow agencies to be officially recognized to perform the necessary inspection functions at the distant point of fabrication. The recognized agency must issue a certificate indicating that it has inspected the element during its fabrication and that the element complies with the building code. The certificate accompanies the element as it arrives on the construction site. This certificate gives reasonable assurance to the code official of the element's code compliance. It is the code official's duty to verify through plan review and inspection that the element is properly installed.

In some cases, an agency can combine plant inspection responsibilities with product testing, which may also be a code requirement. An example of this would be assembled equipment intended for a building's central heating system. Codes allow designated agencies to be officially recognized to perform those functions. The agencies must not only be authoritative in the field of testing, but must also demonstrate the capability to conduct such tests in accordance with the appropriate standards. Where the testing and fabrication of a building element or equipment occurs off the construction site or beyond the jurisdictional limitations of the code official, building codes permit reliance on a recognized agency to perform the necessary testing and inspections to verify compliance with the code. The products that are then fabricated are identified by a certificate or label to indicate that the necessary tests have been completed, the required inspections have been conducted, and the product complies with the building code and appropriate standards.

Part VI

Standards

A standard is “a prescribed set of rules, conditions or requirements concerned with the definition of terms; classification of components; delineation of procedures; specification of dimensions, materials, performance, design or operations; descriptions of fit and measurement of size; or measurement of quality and quantity in describing materials, products, systems, services or practices.” There are thousands of standards in existence dealing with an endless array of consumer products, manufacturing methods, quality of materials and procedures for various operations and processes. Of concern to the model code process are those standards that play a key role in institutionalizing construction practices and procedures across the United States. A standard, in conjunction with a criterion that is the quality or quantity required by the building code as measured by that standard, can simplify the model code text and utilize the considerable expertise of those participating in specialized standards-writing activities. Any group of manufacturers, associations, consumers, users or agencies can cooperatively develop a standard for its own purposes and reasons. Only when the standard is developed in accordance with definitive rules of procedure and consensus does the standard obtain the stature appropriate and necessary for regulatory use in model codes. Additionally, a standard to be utilized by a model code must measure quantity or quality appropriate for regulation by the code.

For various reasons, an owner may utilize a standard and specify a criterion for performance of a building element over and above that which the applicable code requires. This is common and reflects a key fundamental aspect of a model code — a statement of minimum performance requirements and characteristics, with the protection of the public health, safety and welfare as its primary intent.

Classification of Standards

There are three model construction codes in the United States, but there are thousands of standards, addressing virtually every construction application, from design practices and test methods to material specifications. The objective of a construction code is to coordinate this massive quantity of information into an orderly, intelligible and responsive system to safeguard health, safety and general welfare.

There are three basic classifications of standards used in building codes: design standards, material standards and test standards. Design standards define methods of design, fabrication or construction, and specify accepted design procedure, engineering formulas and calculation methods, as well as good practice standards. Material standards are specifications establishing quality requirements and physical properties of materials or manufactured products. Test standards include structural unit and system tests, durability tests and fire tests.

When a particular performance property of a material, product or system is required by the model code, the code will specify the standard with which the product is to comply or be tested. It will also state the criteria for determining code compliance.

Only when the standard is developed in accordance with definitive rules of procedure and consensus does the standard obtain the stature appropriate and necessary for regulatory use in model codes.

Referenced Standards

Since not all standards are intended to be utilized by a model code, a model code must state the standards which are applicable and also when they are applicable. This is accomplished through a specific reference in the code to a given standard which clearly identifies when and how the standard is to be utilized. For example, a code will require that a building element be able to perform to a certain criterion and then reference a standard for use in measuring the performance of any proposed system intended to accomplish that performance.

The International Code Council has established a policy governing referenced standards that requires such standards to comply with the following requirements:

1. The need for the standard to be referenced shall be established.
2. A standard or portions of a standard intended to be enforced shall be written in mandatory language.
3. The standard shall be appropriate for the subject covered.
4. All terms shall be defined when they deviate from an ordinarily accepted meaning or a dictionary definition.
5. The scope or application of a standard shall be clearly described.
6. The standard shall not have the effect of requiring proprietary materials.
7. The standard shall not prescribe a proprietary agency for quality control or testing.
8. The test standard shall describe, in detail, preparation of the test sample, sample selection or both.
9. The test standard shall prescribe the reporting format for the test results. The format shall identify the key performance criteria for the element(s) tested.
10. The measure of performance for which the test is conducted shall be clearly defined in either the test standard or in code text.
11. The standard shall not state that its provisions shall govern whenever the referenced standard is in conflict with the requirements of the referencing code.
12. The preface to the standard shall announce that the standard is promulgated according to a consensus procedure.
13. The standard shall be readily available.
14. The standard shall be developed and maintained through a consensus process such as ASTM or ANSI.

The model codes place great reliance on the use of standards produced in the private sector. Each standard is specifically identified in the code text with the manner and scope of required conformity to the standard. Assume, for example, that the code requires a reinforced concrete structural element to be designed in accordance with the ACI 318 standard. ACI 318 uniquely identifies the standard *Building Code Requirements for Reinforced Concrete*, which is published by the American Concrete Institute (ACI). This standard is also listed in the code as one of the referenced standards. The last chapter of each model code published by BOCA, ICBO, SBCCI and ICC summarizes all such referenced standards and lists the promulgating organization, a unique standard reference number, and the standard edition year and

Each referenced standard is evaluated annually to ensure that the standard reflects current construction technology and that the code references the current standard edition.

title. It also cross references code sections in which the standard is invoked. Each referenced standard is evaluated annually to ensure that the standard reflects current construction technology and that the code references the current standard edition. The model code may also establish additional requirements or delete others as not applicable under the specific model code.

A code-referenced standard may, and frequently does, reference other standards which are intended to be used in conjunction with the primary standard. References to a secondary standard by another standard are acceptable, provided that all such references are unambiguous and clearly reflect the requirements for code compliance. Similarly, the secondary standard may contain a reference to another standard. This tiered system of standards usage has proven very effective in accomplishing the use of relevant standards while minimizing confusion and the need to duplicate the effort expended by participants in the voluntary standards-writing processes.

Standards referenced in this tiered manner are regulations which are as binding as if all of the standards' text were to appear word-for-word in the code text itself. If all of the standards that are referenced in the code and applicable through standards references were to be reprinted and appear in the code, the code would be several thousand pages in length. The advantage of this manner of utilizing referenced standards is that the code is kept to a volume that is manageable, concise and up-to-date.

In summary, a code will specify the use of a standard to define the measurement of a performance feature of a building element or system. A specified and referenced standard, in conjunction with a code-established criterion, defines the performance level required by the code as measured by the standard.

American National Standards Institute (ANSI)

ANSI is a private, not-for-profit membership organization founded in 1918 to coordinate the development of voluntary standards in the United States. It was founded by five professional and technical societies and three agencies of the federal government.

The role of ANSI is to encourage development of standards and develop procedures that provide criteria, requirements and guidelines for coordinating and developing consensus for American National Standards. The goal is the development of a single, consistent set of national voluntary standards by a variety of technical groups, trade associations and professional societies. ANSI does not develop the standards it accepts, however. The writing of the standards is done by accredited standards developers, such as American Society of Civil Engineers (ASCE), American Society for Testing and Materials (ASTM), American Welding Society (AWS), American Society of Mechanical Engineers (ASME), National Fire Protection Association (NFPA) and Underwriters Laboratories Inc. (UL).

Many of these standards are referenced in building codes. The private-sector standards system, however, is much farther reaching than building codes. ANSI currently lists more than 10,500 approved standards promulgated by more than 260 accredited standards developers. Such standards are used extensively for design,

manufacture, application and procurement.

In the development of an ANSI-approved standard, due processing procedures that include, but are not limited to, the following must be observed:

1. Membership: Open to any directly or materially affected interest, where no single interest is in a position of dominance.
2. Procedures: Must be in writing and be readily available.
3. Notification: Must be adequate notification of meetings, voting deadlines, etc. A period of public review must be provided.
4. Consideration of views and objections: All comments and objections received must be given consideration, and an effort must be made to resolve all objections.
5. Review: All standards must be periodically reviewed and a decision be made to revise, reaffirm or withdraw the document. Such review should be conducted every three to five years.
6. Appeals: The standards developer must provide the opportunity for appeal of any action or inaction related to the standards development process.

Upon completion of the approved standards development process, the ANSI Board of Standards Review (BSR) approves the standard after evaluation of evidence that demonstrates that the due process requirements were met and that a consensus was achieved. The ANSI BSR also ensures that the standard is within the approved scope of the accredited developer, that duplication of content has been avoided, and that all appeals have been completed. ANSI also utilizes standards boards to aid in the planning and coordination of ANSI activities, such as the Construction Standards Board, the Safety Standards Board, the Electrical Standards Board and others.

Additional information on ANSI standards development procedures may be found in the publication, *ANSI Procedures for the Development and Coordination of American National Standards*.

Standards Development Process

Standards affecting the design construction process in the United States are developed by voluntary consensus standards-writing organizations, by accredited committees, by trade associations and by government.

Examples of voluntary consensus standards developers are the American Concrete Institute (ACI), the American Society of Civil Engineers (ASCE), the American Society for Testing and Materials (ASTM), and the American Water Works Association (AWWA). Government agencies, such as the Occupational Health and Safety Administration (OSHA), the Consumer Product Safety Commission (CPSC), and state government transportation agencies, unilaterally develop standards with their own staffs and usually with no input from either the public or affected persons. Many standards-writing organizations, such as ASCE, encourage the use of standards developed by nationally recognized consensus processes, such as the ANSI-accredited processes, in their building standards development.

Part VII

Conclusion

The construction code system in the United States relies on the voluntary cooperative efforts of those persons and organizations within the private sector of the construction community. All of the organizations have developed a model comprehensive regulatory system that is legally responsive to both public needs and technological developments. The standards system in the United States and the use of standards in model codes places the cumulative scientific, engineering and industrial knowledge of the United States at the fingertips of participants in the construction community. The code enforcement official accepts with confidence the measurement methods and practices dictated by these standards. Code enforcement officials can then direct their attention to the criteria for application of these standards to accomplish the objectives of the code to enhance and preserve the public health, safety and welfare in the built environment of the United States.

Part VIII

Publications

CABO

CABO/ANSI A117.1-1992, Accessible and Usable Buildings and Facilities
CABO One and Two Family Dwelling Code, 1995 edition
CABO Model Energy Code, 1995 edition

ICC International Codes

ICC International Mechanical Code, 1996 edition
ICC International Plumbing Code, 1997 edition
ICC International Private Sewage Disposal Code, 1997 edition

BOCA National Codes

BOCA National Building Code, 1996 edition
BOCA National Fire Prevention Code, 1996 edition
BOCA National Property Maintenance Code, 1996 edition
BOCA National Energy Conservation Code, 1993 edition
BOCA National Mechanical Code, 1993 edition
BOCA National Plumbing Code, 1993 edition
BOCA National Private Sewage Disposal Code, 1993 edition

ICBO Uniform Codes

Uniform Building Code, 1997 edition
Uniform Mechanical Code, 1997 edition
Uniform Fire Code, 1997 edition
Uniform Housing Code, 1997 edition
Uniform Code for the Abatement of Dangerous Buildings, 1997 edition
Uniform Sign Code, 1997 edition
Uniform Administrative Code, 1997 edition
Uniform Building Security Code, 1997 edition
Uniform Code for Building Conservation, 1997 edition
Uniform Zoning Code, 1997 edition

SBCCI Standard Codes

Standard Amusement Device Code, 1997 edition
Standard Building Code, 1997 edition
Standard Existing Buildings Code, 1997 edition
Standard Fire Prevention Code, 1997 edition
Standard Gas Code, 1997 edition
Standard Housing Code, 1997 edition
Standard Mechanical Code, 1997 edition
Standard Plumbing Code, 1997 edition
Standard Swimming Pool Code, 1997 edition
Standard Unsafe Building Abatement Code, 1997 edition

Part IX

Organization Addresses

Building Officials and Code Administrators International, Inc.

4051 W. Flossmoor Road
Country Club Hills, IL 60478-5795
Telephone: (708) 799-2300 Facsimile: (708) 799-4981
<http://www.bocai.org>

Council of American Building Officials

5203 Leesburg Pike
Falls Church, VA 22041
Telephone: (703) 931-4533 Facsimile: (703) 379-1546
<http://www.cabo.org>

International Code Council

900 Montclair Road
Birmingham, AL 35213-1206
Telephone: (205) 599-9777 Facsimile: (205) 592-7001
<http://www.intlcode.org>

International Conference of Building Officials

5360 Workman Mill Road
Whittier, CA 90601-2298
Telephone: (562) 699-0541 Facsimile: (562) 699-8031
<http://www.icbo.org>

National Evaluation Service

900 Montclair Road
Birmingham, AL 35213-1206
Telephone: (205) 591-1853 Facsimile: (205) 592-7001

Southern Building Code Congress International, Inc.

900 Montclair Road
Birmingham, AL 35213-1206
Telephone: (205) 591-1853 Facsimile: (205) 592-7001
<http://www.sbcci.org>