

Code Conforming Wood Design

Wood Use Provisions in the 1999 SBC and 2000 IBC



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Expanding the Use of Wood Construction: A Comparative Analysis

2000 ICC *International Building Code* and the 1999 SBCCI *Standard Building Code*

Development of the *International Building Code*

The publication of the 2000 Edition of the *International Building Code (IBC)* (1) marked the end of regional code development by Building Officials and Code Administrators, International (BOCA), Southern Building Code Congress International (SBCCI), and International Conference of Building Officials (ICBO). The publication of the *IBC* signals a new era in model construction codes. The publication of the *IBC* by the International Codes Council completes the family of national model construction codes developed cooperatively by the three model code organizations.

In 1994 the three regional model code organizations created the International Code Council (ICC), a nonprofit organization dedicated to developing a single set of comprehensive and coordinated national model construction codes. The goal of the ICC was to have the new family of national model construction codes available by the year 2000 and they have met this goal. And, so, in 1996 work began on the creation of the *IBC*, developed primarily from the provisions of the three nationally recognized model building codes: the BOCA *National Building Code (NBC)* (2) promulgated by BOCA, *Standard Building Code (SBC)* (3) promulgated by SBCCI, and *Uniform Building Code (UBC)* (4) promulgated by ICBO. The model code organizations agreed that once the 2000 *IBC* was published, no further editions of their own codes would be maintained. In accordance with this agreement, ICBO published the last edition of the *UBC* in 1997, while BOCA and SBCCI halted publication of their codes after 1999.

The *IBC* is a comprehensive code and the coordinating document for the suite of I-Codes. In certain instances, *IBC* provisions are identical to those of the three regional model codes. In other instances, the provisions are a modification of requirements from one or more of the three regional model codes. Some provisions are entirely new and unique to the *IBC*.

About this Document

This document highlights some of the differences between the 1999 *SBC* and the 2000 *IBC* for wood products application and design. It is one of a series of three publications that compare the *IBC* to each of the three model codes. The intent is to highlight the traditional opportunities for wood in the *SBC* and the corresponding provision of the *IBC*. Where significant provisions of the *IBC* are identical or similar to those of the *SBC*, this fact is noted. Where provisions are significantly different, a comparison is provided.

The format of this document will assist the reader in applying the information contained herein to the actual text of the code. For that reason the various sections of this brochure are titled to correspond with the code chapters to which they apply. Chapter subject matter and number in the *IBC* are the same as in the *SBC* since both are based on the common code format utilized by the three model code organizations. Developed in 1988, the common code format was implemented by each of the model code organizations in subsequent editions of their codes. SBCCI, for example, adopted the common code format in its 1994 edition of *SBC*. This common code format, in turn, simplified the development of the *IBC* and should be an aid to users in the transition from one of the regional model codes to the *IBC*.

This publication is intended to give the reader insight into the provisions of the *IBC* that regulate wood products and it is based on the 2000 edition of the code. Although most of the information provided in this publication pertains to 2000 *IBC* provisions that address wood and wood construction, some of what is discussed has general application. The reader is encouraged to consult the current edition of the code and to consult the authority having jurisdiction for possible local amendments.

Comparing the IBC and the SBC

ADMINISTRATION (CHAPTER 1)

As mentioned above, the goal of the ICC is to have a “family” of model international codes available for adoption. At the time of publication of this brochure, there are 11 codes published by the ICC. Of these, 4 have applications to wood products: *International Building Code (IBC)*, *International Residential Code (IRC)* (5), *International Fire Code (IFC)* (6), and *International Performance Code for Buildings and Facilities (IPCBF)* (7). The most significant to wood products are the *IBC* and *IRC*.

The *IBC* is the general building code and coordinating document for the suite of *I-Codes*. The purpose of the *IBC* is to establish minimum requirements for structural strength, means of egress, stability, energy conservation, and safety to life from fire and other hazards attributed to buildings and structures. The provisions of the *IBC* do not, however, apply to one- and two-family dwellings and to certain multiple-family dwellings. The construction of those types of residential structures is addressed in the *IRC*.

ICC specifically establishes a separate document, the *IRC*, for regulation of detached one- and two-family dwellings and multiple single family townhouses, not more than three stories high with separate means of egress and their accessory structures. The format of the *IRC* closely resembles that of the Council of American Building Officials (CABO) *One- and Two-family Dwelling Code* (8). Under the scope section of the *IBC*, use of the *IRC* is mandatory for residential buildings meeting the *IRC*'s scope. This practice is different from that of *SBC* wherein all residential buildings were addressed, but which permitted compliance with the provisions of the CABO *One and Two Family Dwelling Code* as an alternate through adoption of Appendix C.

The *IBC*, like the *SBC*, makes use of optional appendix chapters, which can play an important role in the regulatory process if specifically adopted. Appendix chapters are not enforceable, unless specifically adopted by the authority having jurisdiction.

DEFINITIONS (CHAPTER 2)

Definitions for terms used in the *IBC* were primarily compiled using terms from the three existing model codes. In the *SBC* technical terms are defined in Chapter 2. In the *IBC* all defined words are listed in Chapter 2, but only words of general application are actually defined there. Words that are specific to the technical provisions of a chapter are defined in the corresponding chapter. Words unique to wood construction are defined in Chapter 23, Section 2302.

USE & OCCUPANCY CLASSIFICATIONS (CHAPTER 3)

Although occupancy classifications used in the *IBC* are similar to those of the *SBC*, there are a few differences that are highlighted in the following paragraphs.

Assembly. The *IBC* has five divisions of assembly occupancy while the *SBC* has only two. The *IBC* primarily bases its assembly occupancies on the use of the building, e.g., motion picture theaters and restaurants, while assembly occupancies in the *SBC* are primarily based on occupant load.

In the *SBC* large assembly (A-1) is defined by having an occupant load of 1,000 or more, or by the presence of a proscenium opening and an occupant load of 700 or more. Everything else, except for uses with an occupant load of 100 or less, is considered small assembly (A-2). There is no distinction in the *SBC* between actual uses, such as churches and movie theaters, and the *IBC* does not mention occupant loads or the presence of a proscenium opening, as in the *IBC*. The four *IBC* divisions of assembly occupancy in the *IBC* are defined by the general use of the space or building as follows:

- A-1: Uses intended for the production and viewing of performing arts or motion pictures.
- A-2: Uses intended for food and/or drink consumption.
- A-3: Uses intended for public assembly such as museums, auditoriums, churches, meeting halls, libraries, places of amusement, and other uses not classified elsewhere.
- A-4: Uses intended for viewing of indoors sporting events and activities with spectator seating.
- A-5: Uses intended for outdoor assembly such as amusement park structures and stadiums.

There is no distinction in the *IBC* between nightclubs and restaurants -- all occupancies serving food and drink are classified as occupancy group A-2. However, in the *SBC* nightclubs and restaurants with 100 occupants or less are classified as a Group B, business occupancy, and not an assembly use. The *IBC* does not provide a similar provision for small restaurants and bars. All are classified as A-2 in the *IBC*.

Educational. The *IBC* splits day care operations (care for less than 24 hours) into three separate groups, depending on the age and number of children. Occupancy group E is reserved for children over 2 ½ years of age, with an exception that infant daycare facilities with no more than 100 children where all care rooms have an exterior door and are located on the level of exit discharge could also be classified as E. If the exception is not met, day care for infants is classified as I-4. In the *SBC*, day care for six or more children of any age is classified as occupancy E.

Mercantile. Mercantile uses in the *IBC* are similar to those in the *SBC* with one exception. The *IBC* limits the quantity of nonflammable solid hazardous material and nonflammable or noncombustible liquid hazardous materials stored or displayed in a single control area. In doing so, the *IBC* uses the concept of “control area” to regulate spaces within the building enclosed and bounded by exterior building elements and/or fire-resistive interior assemblies. The *SBC* does not utilize the concept of “control area.” (For further information see the discussion on Chapter 7, Fire Resistance-Rated Construction.)

Mixed Use. The challenging problem of mixed-use buildings is handled slightly differently in the *IBC* than it is in the *SBC*. The *SBC* classifies a building containing two or more occupancies as a mixed occupancy building. Because each occupancy group differs from the others in the amount of combustible contents and other fire hazard characteristics, *SBC* generally requires fire resistance separation between occupancy groups. However, *SBC* also allows for a building consisting of multiple occupancies to be classified as a single occupancy provided the most restrictive occupancy requirements are applied throughout the building. The *IBC* utilizes a similar, but more detailed approach to mixed uses. *IBC* classifies a mixed occupancy building as containing either “separated uses” or “non-separated uses.”

Table I Code Comparison - Mixed Uses and Occupancies		
Code Provisions	IBC	SBC
Separated Uses	Allows mixed occupancies if they are separated as per 302.3.3 and the sum of the occupancy ratios ¹ does not exceed one.	Allows mixed occupancies if they are separated per Section 704. Allowable height and area of the building cannot exceed that applying to the principle intended use. Also, each portion of the building must conform to all other requirements of the code for the occupancy contained therein.
Non-separated Uses	Allows uses to be unseparated within a fire area ² if the fire area does not exceed the allowable height and area for the type of construction, based on the more restrictive occupancy group.	Allows uses to be unseparated provided the entire building conforms to the most restrictive type of construction requirements. Portions of the building used as accessory offices or for customary nonhazardous uses necessary to transacting business are permitted to be non-separated uses as provided in Section 704.1.2.

1. Occupancy ratios is the actual occupancy floor area divided by the tabular area permitted for that occupancy group in specific construction type

2. Fire area is the aggregate floor area enclosed and bounded by exterior walls or fire resistive building elements as defined in *IBC* Section 702.

Table I compare the methods for addressing mixed occupancy buildings.

GENERAL BUILDING HEIGHTS & AREAS (CHAPTER 5)

IBC provisions regulating allowable building heights and areas are generally based on the least restrictive provision of any of the three model codes. The ICC recognized that each code had rationale for establishment of its values. So, in the absence of fire loss data indicating that an allowable building area in one of the three model codes was problematic, the largest building area permitted by any of the model codes for an occupancy group was generally chosen. With respect to the *SBC* there is a notable exception to this general rule. *SBC* would allow 5-story buildings of Type V 1-hour, unsprinklered construction for Business and Residential use, but the *IBC* limits such construction (*IBC* Type III-B) to only four stories in height. Further, subsequent to the adoption of the 2000 *IBC*, amendments to the *IBC* have somewhat modified the original provisions by including some limits on overall building area and the method for calculation of increased area due to open spaces around the perimeter of the building. (See the discussion on area modifications.)

General Height and Area Limitations (Section 503)

Because of the approach taken by the ICC to generally retain the least restrictive building area allowances of the model building codes for any particular occupancy, the *IBC* generally provides larger per-floor areas for low-rise buildings than is allowed in the *SBC*. In some cases *IBC* floor areas represent a substantial increase over that found in the *SBC*. Table II provides maximum

unmodified height and area limits in the *IBC* (as contained in *IBC* Table 503) for certain use groups constructed of combustible construction (see Chapter 6 - Types of Construction for definitions of combustible construction). Too often, designers see this table as a barrier to using wood construction. However, the code permits very large wood frame buildings if designers apply the permitted modifications to the areas of the *IBC*. Appendix A of this document contains tables comparing the allowable heights and areas of the *SBC* and *IBC*.

In addition to the single-story floor areas being different in some instances as discussed above, provisions for calculating allowable areas of multistory buildings are handled very differently in the two codes. In the *SBC* the user is given the tabular area for single story buildings, the tabular area for multistory buildings, and the maximum building height in stories and feet. In the *SBC*, the maximum area of a building is the product of the tabular floor area times the number of stories. *IBC* calculations are more rigorous. In the *IBC*, a per-floor tabular area is given, as is the maximum building height in stories and in feet, but the maximum aggregate area of all floors in the building is limited to not more than three times the maximum adjusted allowable single-story area (in accordance with Section 503.3).

Table II Building Code Comparison - Allowable Area Increases		
Feature	<i>IBC</i>	<i>SBC</i>
Minimum open space for increase credit	20 feet	30 feet
Open space increase credit	Ratio of total perimeter to open perimeter – 75% maximum increase to allowable area	Ratio of total perimeter to open perimeter – 100% maximum increase to allowable area
Automatic sprinkler system increase credit (NFPA 13 system)	The allowable area increase for use of automatic sprinkler systems must be calculated: 300% increase for 1-story buildings, 200% increase for multi-story buildings	The allowable area of sprinklered buildings is included in Table 500. Table 500 includes: 300% increase for 1-story buildings, 200% increase for multi-story buildings

Modifications of height and area limitations are permitted as is discussed in the following sections of this document. Comparisons of modified allowable building areas based on use groups are presented in Appendix A of this brochure.

Height Modifications (Section 504)

Both the *IBC* and *SBC* provide for modifications to allowable building height. The modifications of both codes are somewhat different, but rely to a large degree on the installation of automatic sprinkler systems.

SBC Table 500, for example, contains limitations to story height and building height in vertical distance for each occupancy group and type of construction. The limitations are based on whether or not the building is equipped with a National Fire Protection Association (NFPA) NFPA-13 (9) automatic sprinkler system. *SBC* Table 500, therefore, recognizes the safety aspects of an NFPA-13 automatic sprinkler system by providing additional stories for sprinklered buildings. Table 500 also permits a single story increase of the unsprinklered building height when an NFPA 13 system is used and when unsprinklered building floor areas limitations are observed. The *SBC* does not permit height modifications for the installation of NFPA 13R (10) or NFPA 13D (11) systems.

SBC also provides a modification to the method of measuring building height when certain types of grade-level parking garages are erected below residential occupancies. The number of stories used in determining minimum type of construction for a residential occupancy may be measured from the floor above grade-level parking garage if the parking garage is of Type I or II construction, or open of Type III construction.

IBC height modifications are more complicated and expansive. The *IBC*, for example, permits tradeoffs, i.e, increased number of stories or story height, for installation of automatic sprinkler systems in buildings equipped with NFPA 13 and, in certain cases, NFPA 13R systems. When *IBC* Section 903.3.1.1 is referenced, an NFPA 13 system is required for the tradeoff. For tradeoffs using NFPA 13R systems, reference is made to Section 903.3.1.2. No increase is permitted for use of an NFPA 13D system.

One specific tradeoff in the *IBC* allows one additional story in addition to a 20 foot increase to building height for buildings equipped with an NFPA 13 sprinkler system. For residential buildings, e.g., hotels, multi-family residences, fraternities, dormitories, a building equipped with an NFPA 13R system is permitted to be increased by one-story and 20 feet provided the building does not exceed four stories or 60 feet in height.

Area Modifications (Section 506)

As is the case with building height, the *IBC* and *SBC* provide for modifications to allowable building area. In practice, both codes permit area increases when either an automatic sprinkler system or large open space at the perimeter of the building is provided. The methodology for determining the allowable area increase and the amount of increases are different.

The *SBC* takes a simple approach by including building area increases associated with the use of automatic sprinkler system in the floor area values of Table 500. *SBC* Table 500 contains floor area limitations for single-story and multiple-story buildings for each occupancy group and type of construction. The limitations are based on whether or not the building is equipped with an NFPA-13 automatic sprinkler system. *SBC* Table 500, therefore, recognizes the inherent safety aspects of a NFPA-13 automatic sprinkler system by providing 300% of additional floor area for a single-story building and 200% of additional floor area for a multiple-story building. *SBC* also permits a general area modification where streets, public spaces or horizontal separations from property lines are 30 feet or larger for 25% of the total perimeter. Special occupancy-based modifications are also provided where open space is generally 60 feet or greater.

The *IBC* takes a more complicated approach. The tabular areas of *IBC* Table 503 apply to unsprinklered buildings. The tabular areas of *IBC* Table 503 are permitted to be increased in accordance with a formula if the building is sprinklered and/or the perimeter provides access for fire suppression ground operations. The allowable area is calculated based on the following equation:

$$A_a = A_t + \left[\frac{A_t I_f}{100} \right] + \left[\frac{A_t I_s}{100} \right]$$

where:

- A_a = Allowable area per floor (square feet)
- A_t = Tabular area per floor
- I_f = Area increase due to frontage exceed 25% of the perimeter (percent)
- I_s = Area increase due to sprinkler protection

The frontage increase (I_f) allows for the tabular areas to be increased when the width of the open space equals or exceeds 20 feet for at least 25 percent of the total perimeter (as compared to 30 feet in the *SBC*). I_f is unique to each building site and is calculated using the following equation:

$$I_f = 100 \left[\frac{F}{P} - 0.25 \right] \frac{w}{30}$$

where:

- w = Minimum fire separation distance
- F = Building perimeter which fronts on a public way or open space having 20 ft. minimum open width.
- P = Perimeter of entire building

Where the provisions of the *IBC* require that a building be equipped throughout with an automatic sprinkler system, sprinklers must be installed throughout in accordance with NFPA 13, NFPA 13R, or NFPA 13D as appropriate to the use of the building. However, the area increase is not applicable unless a full NFPA 13 system is installed. Similarly, *SBC* doesn't permit an area modification for the installation of NFPA 13R or NFPA 13D systems.

Unlimited Area Buildings (Section 507)

Unlimited area building provisions for non-combustible buildings are similar in the *IBC* and *SBC*. However, the *IBC* greatly expands the unlimited area building provisions for construction types that allow combustible materials. The *IBC*, for example, permits unlimited area single- and two-story buildings of use groups B, F, M and S of any construction type, including traditional wood-frame construction (*IBC* Type V), when the building is equipped with an automatic sprinkler system and has required open space of 60 feet around the entire perimeter. Although the *SBC* permits unlimited area single-story buildings of the same use groups and similar construction types, it does not provide for two-story unlimited area buildings regardless of occupancy or construction type. Some of the other *IBC* provisions for unlimited area buildings are as follow:

Unsprinklered Uses

One-story buildings of low hazard storage (S-2) or factory/industrial low hazard (F-2) occupancy are permitted to be of unlimited area regardless of construction type if the building is surrounded by a minimum of 60 feet of open space. There is no requirement that the construction be fire-rated construction. The *SBC* requires approval of the building official for omission of the sprinkler system.

Sprinklered, One-story Uses

The area of a one-story Group A-4 (assembly), B (business), F (factory/industrial), M (mercantile) or S (storage) buildings are permitted to be of unlimited area if the building is provided with an automatic sprinkler system and if the building is provided with 60 feet of open space surrounding the entire perimeter of the building.

Sprinklered, Two-story Uses

A two-story building of use group B (business), F (factory), M (mercantile) or S (storage) is permitted to be of unlimited area if the building is built with an automatic sprinkler system and if the building is surrounded on all sides with not less than 60 feet of open space.

Table III Building Code Comparison - Unlimited Area Buildings		
Feature	<i>IBC</i>	<i>SBC</i>
Unsprinklered Uses one-story	F-2, S-2, regardless of type of construction	Group A used for sports (without spectator seating) of Type III, IV and V construction (with 30 ft. horizontal separation on all sides); Group B, F, M or S, regardless of type of construction, where the use of water would be ineffective or present a hazard; and Group F and S, regardless of type of construction used for the processing or storage of noncombustible materials.
Sprinklered Uses one-story	Group A-4, B, F, M, S regardless of construction type	Groups B, F, M, or S regardless of construction Group E of Type III, IV or V construction type when subdivided with 1-hour smokestop partitions. Group A (without proscenium opening) of Type V 1-hr., IV or III construction.
Sprinklered Uses two-stories	B, F, M, S regardless of construction type	Not permitted
Required Open Space	60 feet	60 feet, (30 feet for Group A used for sports without spectator seating)
Reduced Open Space	Permitted under certain conditions	Permitted under certain conditions

The *IBC* provides for many new opportunities for unlimited area buildings, particularly those of combustible construction. Table III compares unlimited building provisions of the *IBC* and *SBC*.

Special Provisions (Section 508)

Both *IBC* and *SBC* have special provisions for parking structures below residential occupancies. The special provisions of the *IBC* apply to parking structures and mixed use structures containing parking (S-2) and multi-family dwelling units (R-2), A, B, and M occupancies..

SBC allows the number of stories for Group R occupancy to be measured from the floor above an open

or enclosed parking area of Type I or II construction or above an open parking structure of Type III construction (Section 503.2.2). *SBC* also allows greater heights and areas than shown in Table 500 for open parking garages of noncombustible construction in buildings of mixed types of construction.

TYPES OF CONSTRUCTION (CHAPTER 6)

Many of the requirements related to construction type will be familiar to *SBC* users. However, there are significant differences in terminology used in the *IBC* from that used in the *SBC*. In the *IBC* there are five types of construction as compared to six in the *SBC*. The difference lies in the number of noncombustible designations – two for the *IBC* versus three for the *SBC*. Most definitions of

Table IV Comparison of Types of Construction between the <i>IBC</i> and <i>SBC</i>		
General Description	<i>IBC</i> Designation	<i>SBC</i> Designation
Noncombustible	Type I (A & B) Type II (A) Type II (B)	Type I Type II Type IV 1-hr Protected Type IV Unprotected
Mixed noncombustible and combustible	Type III (A) Type III (B)	Type V 1-hr Protected Type V Unprotected
Combustible – heavy timber and traditional wood frame	Type IV (Heavy Timber) Type V (A) Type V (B)	Type III (Heavy Timber) Type VI 1-hr Protected Type VI Unprotected

construction types in the two codes are similar although the specific numerical name designations and order of numbering are different. Table IV compares the construction type designations contained in the two codes.

A significant difference occurs between the two codes where fire-retardant treated wood is permitted to be used. Table V summarizes these applications. While the *SBC* permits use of fire-retardant wood in some applications in noncombustible types of construction, the *IBC* has broadened those applications.

As mentioned above, designers often believe that using a combustible type of construction brings with it restrictions in building size that may not meet building needs. While wood frame construction (*IBC* Type V) is the most limited in building area, many of the restriction can be offset by adding sprinklers or providing open space around the building. Further, using heavy timber construction (*IBC* Type IV – *SBC* Type III) can provide floor areas comparable to noncombustible construction and *IBC* Type III (*SBC* Type V) construction permits the use of a significant amount of wood, particularly if the building is located away from the property line.

In Section 602.3 the *IBC* defines Type III Construction as being “that type in which the exterior walls are of noncombustible materials and the interior building elements are of any material permitted by the code.” The section goes on to say that fire-retardant treated wood is permitted in exterior wall assemblies in lieu of noncombustible materials when the rating of the wall is required to be 2-hours or less. Table VIII provides a snapshot of situations in which a Type III building can be wholly of wood

Table V Comparison of Allowable Use of Fire Retardant Treated Wood between IBC and SBC			
<i>IBC</i> Construction Type	Building Assembly	<i>IBC</i>	<i>SBC</i>
Type I and II Construction	Roof structures	Permitted in buildings not over two-stories (T601, note c3)	Permitted in buildings not over two-stories (T600, note e).
	Exterior walls	Permitted when the wall is non-load bearing and a fire rating is not required (603.1.1.2)	Permitted in noncombustible non-load bearing walls over 30 ft from property line (T600, note k).
	Interior walls	Permitted in non-load bearing partitions where the fire rating is 2 hours or less (603.1.1.1)	Permitted in non-load bearing partitions in Types I, II, & IV (609).
Type III and IV Construction	Exterior walls	Permitted in exterior walls when the required rating is 2-hours or less.	Permitted in Type IV non- load bearing walls over 30 ft from property line (T600, note k).
Type V Construction	All Assemblies	Requirements for <i>IBC</i> Type V construction and <i>SBC</i> Type VI are identical. Use of FRTW is unrestricted	

construction. It compares the unmodified allowable areas and heights of Type IIIB (unprotected) with those of Type IIB (noncombustible unprotected).

The area and height modifications discussed previously for sprinklers and open space are applicable to these values.

Table VI Comparison of IBC Type IIB and Type IIIB Construction Allowable Areas and Heights					
<i>IBC</i> Occupancy Group	Table 503 Base Allowable Area (sq ft)		Table 503 Base Allowable Height (stories/feet)		Horizontal Distance Required from Property Line to Allow 2-hr Rating or Less (T601 & T602)
	Type IIB	Type IIIB	Type IIB	Type IIIB	
A-3 church	9500	9500	2/55	2/55	Regardless of distance to property line, rating for load bearing & non-load bearing exterior walls are 2-hr or less for these occupancies
B	23000	19000	4/55	4/55	
E	14500	14500	2/55	2/55	
M	12500	12500	4/55	4/55	
R-1 hotel	16000	16000	4/55	4/55	

FIRE-RESISTANCE-RATED CONSTRUCTION (CHAPTER 7)

This chapter differs from the *SBC* in a number of significant ways. The general terminology for fire-resistive assemblies used in the *IBC* is very different from what is found in the *SBC*. The *IBC* often requires that a fire-rated assembly perform a particular function and, in those situations, the assemblies

<p align="center">TABLE VII Building Code Comparison - Fire Rated Assemblies</p>		
Feature	<i>IBC</i>	<i>SBC</i>
Fire Partition	A rated vertical assembly with specific continuity and opening protection provisions, required for separation of dwellings and corridors, among other uses	Not specifically used although fire resistant partitions in the <i>SBC</i> are addressed with respect to fire separation requirements of 704.2.
Fire Barrier	A rated horizontal or vertical assembly with specific continuity and opening protection provisions, required for separation of mixed occupancies, shaft protection, exit stair separation, and elevator lobbies among other uses	Not specifically used. In the <i>IBC</i> a fire barrier separates occupancies. The <i>SBC</i> also establishes occupancy separation requirements, but does not name them “fire barriers.”
Party Wall	Any wall located on a property line between adjacent buildings which is used or adapted for joint service between the two buildings. Party walls create separate buildings. Party walls are constructed as fire walls without openings.	Essentially the same. In the <i>SBC</i> a party wall is a fire wall on an interior lot line, used or adapted for joint service between buildings.
Fire Wall	A rated wall extending from the foundation to the roof, of combustible or non-combustible construction, able to withstand collapse of construction on either side. Used to separate buildings for area limitations, fire walls are required to be continuous and extend beyond the exterior walls of the building. The required rating depends on the construction type and the occupancy groups involved.	Similar, but different. Both codes use fire walls to separate buildings. The <i>IBC</i> , however, relates fire wall ratings to occupancy groups. In the <i>SBC</i> the fire resistance rating is independent of occupancy group. The fire resistance rating of a fire wall in the <i>SBC</i> is 4-hours. In the <i>IBC</i> , fire wall ratings vary. Further, in the <i>SBC</i> fire walls are required to be of noncombustible construction.

are referred to by particular names. Some of these terms are used in the *SBC*; others are new (see Table VII).

An important difference between the two codes involves the way in which fire walls are addressed.

Similar to the *SBC*, fire walls in the *IBC* are primarily used to separate buildings – that is, each part of a building or structure included within fire walls are considered separate buildings with the exception

that fire walls within a building permitted to be of unlimited area are not considered as establishing separating buildings. However, in the IBC the rating of the fire wall is occupancy group dependant.

IBC Table 705.4 permits most occupancy groups to employ 3-hour fire walls. Four-hour walls, which are required in all but one instance in the *SBC* (townhouses), are required only in buildings of Group H-1 and H-2 occupancy groups. In some situations fire walls in the *IBC* can be rated as low as 2-hours. Additionally, *IBC* Section 705.3, which requires that fire walls be of noncombustible materials, contains an exception which permits fire walls in Type V Construction (wood-frame) to be of combustible materials. The structural performance requirements of the fire wall are the same whether the wall is combustible or non-combustible. The designer must demonstrate the structural integrity of the wall, given collapse of the building on either side.

A helpful difference between the two codes is the inclusion of prescriptive tables for fire rated assemblies in Table 719.1 of the *IBC*. This information is useful to the building designer, reducing the need to look for this information in other resources. Specifically, *IBC* Section 720.6.2 incorporates provisions of the “component additive method” and Section 720.6.3 specifies procedures for use of the design methodology for exposed heavy timber members (large-section wood members).

STRUCTURAL DESIGN (CHAPTER 16)

Chapter 16 of both codes prescribe minimum loads that must be used in the design of buildings and structures to insure structural safety. The purpose of Chapter 16 is to insure that every building and structure has sufficient strength to support loads and forces it will likely encounter during its life without any structural elements being unduly stressed. Chapter 16 covers general requirements, loads, load combinations, serviceability and deflections of structural members.

Except for wind and seismic load values and design procedures, the provisions of the *IBC* and *SBC* are very similar. As in *SBC*, *IBC* load values primarily come from the American Society of Civil Engineers (ASCE) standard *Minimum Design Loads for Buildings and Structures* (ASCE 7) (12). Whereas, *SBC* references ASCE 7-95 (the 1995 edition of the standard), *IBC* is primarily based on ASCE 7-98. Seismic load values in *IBC* and *SBC* derive from ASCE 7-95 and the National Earthquake Hazard Reduction Program’s (NEHRP) *Recommended Provisions for the Development of Seismic Regulations for New Buildings* (13). *IBC* seismic values are based on the 1998 version of the NEHRP standard, while *SBC* is based on the 1991 NEHRP standard.

The main difference between *SBC*’s use of ASCE 7-95 and *IBC*’s use of ASCE 7-98 involves wind loads. *IBC* wind provisions are 3-second gust wind speeds while *SBC* wind provisions are based on fastest-mile wind speeds. The wind speed map in Figure 1609 of the *IBC* presents 3-second gust wind speed contours, which are significantly different from the fastest-mile wind speed contours of the *SBC*. To assist the user of the code in transitioning from 3-second gust wind speeds and fastest mile wind speeds, the *IBC* provides a convenient table for converting the wind speed of the two methodologies (Table 1609.3.1). This conversion table enables continued use of industry design standards such as AF&PA’s *Wood Frame Construction Manual: SBC High Wind Edition (WFCM)* (14), which is referenced as an alternate methodology for design of one- and two-family buildings in both codes. The *IBC* provides for a simplified procedure for determining wind loads on low-rise buildings (buildings with a mean roof height not exceeding 60 ft) similar to that of the *SBC*. The special low-rise provisions in the *IBC* were developed from ASCE 7-98 and the provisions of *SBC*

1606.2.

IBC seismic design issues are much more extensive than those of *SBC*. Much of the seismic loading values of the *IBC* were derived from the *UBC* and *NEHRP*. Important to buildings located in high wind areas is the requirement in 1609.1.5 that lateral-force-resisting systems need to meet seismic detailing requirements and limitations even when wind load effects are greater than seismic load effects. This requirement is intended to ensure that fastening of wood members will adequately meet the multidimensional forces of earthquakes in addition to the monotonic forces of a wind event. The *IBC*, like *SBC*, specifically exempts seismic-force-resisting system of wood frame buildings that conform to the seismic provisions of conventional light-frame construction provisions of Chapter 23 from analysis of seismic forces.

Finally, it should be noted that the *IBC* requires structures located in flood hazard areas to be designed in accordance with *ASCE 24-98* (Flood Resistance Design and Construction Standard) (15), a standard which is not referenced in the *SBC*. *SBC* referenced its own Standard for Floodplain Management.

WOOD (CHAPTER 23)

Chapter 23 of both the *IBC* and *SBC* govern materials, design, construction, and quality of wood members and their fasteners. Chapter 23 contains a number of specifications intended to provide guidance to nonprofessional as well as professional users of the code. Chapter 23 of the *IBC* requires that the design of wood structural elements or systems be based on allowable stress design (ASD), load and resistance factor design (LRFD), or conventional light-frame construction provisions in Section 2308. *SBC* Chapter 23 does not identify the design method although the provisions are based on ASD.

The *IBC* contains the same material as the *SBC* with some reorganization while adding detail regarding seismic and wind loading, shear walls, and diaphragms. For example, the *IBC* institutes minimum requirements for connecting roof framing to walls and provisions for roof framing connections outside high wind areas. As a convenience to the user, the *IBC* includes joist and rafter span tables and a number of illustrations that were referenced in the *SBC*. The *IBC* deletes the termite infestation map and provisions for under slab soil treatment.

Otherwise, many of the *IBC*'s prescriptive provisions for conventional construction of light-frame wood structures are similar to those found in the *SBC*. The primary differences between the *IBC* provisions and those in the *SBC* primarily involve seismic issues, with the biggest being the way walls are braced for lateral loading.

Exterior walls are required to be braced for lateral loading. The traditional exterior wall was sheathed with wood boards applied diagonally. This system provided adequate bracing for lateral loading and has been used as the basis for comparing other methods and systems. The bracing requirements of the *SBC* are quite simple and assume a regular rectangular building. The *SBC* generally requires bracing at each corner of a building and at every 25 ft of exterior wall. The bracing requirements of the *IBC* are much more complex and reflect the seismic-sensitive provisions of the *UBC*. The *IBC* sets out six conditions defining irregular structures and institutes wall bracing requirements for these buildings. The *IBC* braced wall provisions include cantilevers and conditions

where load bearing walls do not align vertically in two or more story buildings. Otherwise, for regular rectangular buildings, walls bracing requirements are similar.

It should be noted that the conventional construction provisions in the *IBC* do not apply to one- and two-family dwellings. Conventional construction requirements for one-, two-family dwellings and multiple single-family townhouse units are contained in the *International Residential Code (IRC)*. Therefore, the scope of the *IBC* is significantly different from that of the *SBC* with respect to residential structures. *SBC* addresses the requirements of all residential buildings and structures including one- and two-family dwellings, but it also allows the optional use of the Council of American Building Officials (CABO) *One and Two Family Dwelling Code* for Group R3 occupancies. The *IBC*, on the other hand, makes mandatory the use of a separate document, the *IRC*, for one- and two-family dwellings, and multiple single-family dwellings meeting the definition of townhouse.

SBC prescriptive wood construction provisions are generally applicable to light wood-framed residential buildings located in non coastal areas – that is, in areas where wind speeds do not exceed 80 mph. *SBC* conventional construction provisions are not limited to certain seismic zones. *IBC* conventional construction provisions are more restrictive in application. Although the *IBC* does not specifically limit conventional construction to residential buildings, its use is limited by Section 2308.2 to buildings with floor loads not exceeding 40 psf, (i.e., residential buildings). The conventional prescriptive provisions in the wood chapter of the *IBC* are further limited by wind and seismic thresholds. Structures that do not fall within the general limitations of 2308 must comply with the design requirements of Chapter 16.

The conventional construction provisions in the *IRC* came primarily from the CABO *One- and Two-Family Dwelling Code* (later the *International One- and Two-Family Dwelling Code*). Those provisions have been updated to some extent. The differences between the *IRC* provisions for wood construction and those in the *SBC* are minor. There are precalculated joist and rafter tables that did not exist in the *SBC*. There are also a number of illustrations that may be familiar to users of the CABO One- and Two-Family Dwelling Code, but which may be new to *SBC* users.

AF&PA's *Wood Frame Construction Manual: SBC High Wind Edition (WFCM)*(14) is referenced in both the *IBC* and *IRC* as an alternate design standard for construction of light-frame wood buildings in high wind areas. It is also a convenient design manual for buildings that are not subject to high winds. The WFCM provides prescriptive construction and engineering guidelines for light-frame wood buildings. The easy-to-use WFCM often negates the need for professional design services for one and two-family dwellings.

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**Comparison of IBC-SBC Allowable Building Area Based on Percentage of Open Perimeter
Large Restaurant**

IBC Use Group A-2 vs SBC Group A-2 Assembly Small

	SBC Type of Construction				
	V 1-Hr.	V Unprotected	III (HT)	VI 1-Hr.	VI Unprotected
SBC Multistory Unsprinklered Floor Areas	12,000	12,000	12,000	7,500	5,000
SBC Sprinklered Floor Areas	24,000	24,000	24,000	22,500	15,000
SBC Allowable Stories	2	2	2	1	1
	IBC Type of Construction				
	3A	3B	4 (HT)	5A	5B
IBC Tabular (Unsprinklered) Areas	14,000	9,500	15,000	11,500	6,000
IBC Allowable Stories	3	2	3	2	1
IBC Maximum Stories for Increase	3	2	3	2	1

Unsprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹		SBC	24,000	24,000	24,000	7,500	5,000
		IBC	42,000	19,000	45,000	23,000	6,000
25%		SBC	32,000	32,000	32,000	10,000	6,667
		IBC	52,500	23,750	56,250	28,750	7,500
50%		SBC	40,000	40,000	40,000	12,500	8,333
		IBC	63,000	28,500	67,500	34,500	9,000
75%		SBC	48,000	48,000	48,000	15,000	10,000
		IBC	73,500	33,250	78,750	40,250	10,500
100%		SBC	48,000	48,000	48,000	15,000	10,000
		IBC	73,500	33,250	78,750	40,250	10,500

Sprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹		SBC	48,000	48,000	48,000	22,500	15,000
		IBC	126,000	57,000	135,000	69,000	24,000
25%		SBC	64,000	64,000	64,000	30,000	20,000
		IBC	136,500	61,750	146,250	74,750	25,500
50%		SBC	80,000	80,000	80,000	37,500	25,000
		IBC	147,000	66,500	157,500	80,500	27,000
75%		SBC	96,000	96,000	96,000	45,000	30,000
		IBC	157,500	71,250	168,750	86,250	28,500
100%		SBC	96,000	96,000	96,000	45,000	30,000
		IBC	157,500	71,250	168,750	86,250	28,500

¹ The SBC requires a minimum fire separation distance of 30 feet for open space increase; the IBC requires a minimum of 20 feet

**Comparison of IBC-SBC Allowable Building Area Based on Percentage of Open Perimeter
IBC Use Group A-2 vs SBC Group B - less than 100 occupants**

	SBC Type of Construction				
	V 1-Hr.	V Unprotected	III (HT)	VI 1-Hr.	VI Unprotected
SBC Multistory Unsprinklered Floor Areas	21,000	14,000	25,500	13,500	9,000
SBC Sprinklered Floor Areas	42,000	28,000	51,000	40,500	27,000
SBC Allowable Stories	2	2	2	2	2
	IBC Type of Construction				
	3A	3B	4 (HT)	5A	5B
IBC Tabular (Unsprinklered) Areas	14,000	9,500	15,000	11,500	6,000
IBC Allowable Stories	3	2	3	2	1
<i>IBC Maximum Stories for Increase</i>	3	2	3	2	1

Unsprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹		SBC	42,000	28,000	51,000	27,000	18,000
		IBC	42,000	19,000	45,000	23,000	6,000
25%		SBC	56,000	37,333	68,000	36,000	24,000
		IBC	52,500	23,750	56,250	28,750	7,500
50%		SBC	70,000	46,667	85,000	45,000	30,000
		IBC	63,000	28,500	67,500	34,500	9,000
75%		SBC	84,000	56,000	102,000	54,000	36,000
		IBC	73,500	33,250	78,750	40,250	10,500
100%		SBC	84,000	56,000	102,000	54,000	36,000
		IBC	73,500	33,250	78,750	40,250	10,500

Sprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹		SBC	84,000	56,000	102,000	81,000	54,000
		IBC	126,000	57,000	135,000	69,000	24,000
25%		SBC <td>112,000</td> <td>74,666</td> <td>136,000</td> <td>108,000</td> <td>72,000</td>	112,000	74,666	136,000	108,000	72,000
		IBC <td>136,500</td> <td>61,750</td> <td>146,250</td> <td>74,750</td> <td>25,500</td>	136,500	61,750	146,250	74,750	25,500
50%		SBC <td>140,000</td> <td>93,333</td> <td>170,000</td> <td>135,000</td> <td>90,000</td>	140,000	93,333	170,000	135,000	90,000
		IBC <td>147,000</td> <td>66,500</td> <td>157,500</td> <td>80,500</td> <td>27,000</td>	147,000	66,500	157,500	80,500	27,000
75%		SBC <td>168,000</td> <td>112,000</td> <td>204,000</td> <td>162,000</td> <td>108,000</td>	168,000	112,000	204,000	162,000	108,000
		IBC <td>157,500</td> <td>71,250</td> <td>168,750</td> <td>86,250</td> <td>28,500</td>	157,500	71,250	168,750	86,250	28,500
100%		SBC <td>168,000</td> <td>112,000</td> <td>204,000</td> <td>162,000</td> <td>108,000</td>	168,000	112,000	204,000	162,000	108,000
		IBC <td>157,500</td> <td>71,250</td> <td>168,750</td> <td>86,250</td> <td>28,500</td>	157,500	71,250	168,750	86,250	28,500

¹ The SBC requires a minimum fire separation distance of 30 feet for open space increase; the IBC requires a minimum of 20 feet

**Comparison of IBC-SBC Allowable Building Area Based on Percentage of Open Perimeter
IBC Use Group A-3 vs SBC Group A-1**

	SBC Type of Construction				
	V 1-Hr.	V Unprotected	III (HT)	VI 1-Hr.	VI Unprotected
SBC Single-story Unsprinklered Floor Areas	12,000	8,000	12,000	0	0
SBC Single-story Sprinklered Floor Areas	36,000	24,000	36,000	0	0
SBC Allowable Stories	1	1	1	0	0
	IBC Type of Construction				
	3A	3B	4 (HT)	5A	5B
IBC Tabular (Unsprinklered) Areas	14,000	9,500	15,000	11,500	6,000
IBC Allowable Stories	3	2	3	2	1
<i>IBC Maximum Stories for Increase</i>	<i>3</i>	<i>2</i>	<i>3</i>	<i>2</i>	<i>1</i>

Unsprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹		SBC	12,000	8,000	12,000	-	-
		IBC	42,000	19,000	45,000	23,000	6,000
25%	SBC	16,000	10,667	16,000	-	-	
	IBC	52,500	23,750	56,250	28,750	7,500	
50%	SBC	20,000	13,333	20,000	-	-	
	IBC	63,000	28,500	67,500	34,500	9,000	
75%	SBC	24,000	16,000	24,000	-	-	
	IBC	73,500	33,250	78,750	40,250	10,500	
100%	SBC						
	IBC						

Sprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹		SBC	36,000	24,000	36,000	-	-
		IBC	126,000	57,000	135,000	69,000	24,000
25%	SBC	48,000	32,000.00	48,000	-	-	
	IBC	136,500	61,750	146,250	74,750	25,500	
50%	SBC	60,000	40,000	60,000	-	-	
	IBC	147,000	66,500	157,500	80,500	27,000	
75%	SBC	72,000	48,000	72,000	-	-	
	IBC	157,500	71,250	168,750	86,250	28,500	
100%	SBC						
	IBC						

¹ The SBC requires a minimum fire separation distance of 30 feet for open space increase; the IBC requires a minimum of 20 feet

**Comparison of IBC-SBC Allowable Building Area Based on Percentage of Open Perimeter
IBC Use Group A-3 vs SBC Group A-4**

	SBC Type of Construction				
	V 1-Hr.	V Unprotected	III (HT)	VI 1-Hr.	VI Unprotected
SBC Multistory Unsprinklered Floor Areas	12,000	8,000	12,000	7,500	5,000
SBC Multistory Sprinklered Floor Areas	24,000	16,000	24,000	22,500	15,000
SBC Allowable Stories	2	2	2	1	1
	IBC Type of Construction				
	3A	3B	4 (HT)	5A	5B
IBC Tabular (Unsprinklered) Areas	14,000	9,500	15,000	11,500	6,000
IBC Allowable Stories	3	2	3	2	1
<i>IBC Maximum Stories for Increase</i>	<i>3</i>	<i>2</i>	<i>3</i>	<i>2</i>	<i>1</i>

Unsprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹		Unsprinklered Building Aggregate Floor Area (square feet)				
		25%	SBC	24,000	16,000	24,000
	IBC	42,000	19,000	45,000	23,000	6,000
50%	SBC	32,000	21,333	32,000	10,000	6,667
	IBC	52,500	23,750	56,250	28,750	7,500
75%	SBC	40,000	26,667	40,000	12,500	8,333
	IBC	63,000	28,500	67,500	34,500	9,000
100%	SBC	48,000	32,000	48,000	15,000	10,000
	IBC	73,500	33,250	78,750	40,250	10,500

Sprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹		Sprinklered Building Aggregate Floor Area (square feet)				
		25%	SBC	48,000	32,000	48,000
	IBC	126,000	57,000	135,000	69,000	24,000
50%	SBC	64,000	42,666	64,000	30,000	20,000
	IBC	136,500	61,750	146,250	74,750	25,500
75%	SBC	80,000	53,333	80,000	37,500	25,000
	IBC	147,000	66,500	157,500	80,500	27,000
100%	SBC	96,000	64,000	96,000	45,000	30,000
	IBC	157,500	71,250	168,750	86,250	28,500

¹ The SBC requires a minimum fire separation distance of 30 feet for open space increase; the IBC requires a minimum of 20 feet

**Comparison of IBC-SBC Allowable Building Area Based on Percentage of Open Perimeter
Use Group B**

	SBC Type of Construction				
	V 1-Hr.	V Unprotected	III (HT)	VI 1-Hr.	VI Unprotected
SBC Multistory Unsprinklered Floor Areas	21,000	14,000	25,500	13,500	9,000
SBC Multistory Sprinklered Floor Areas	42,000	28,000	51,000	27,000	18,000
SBC Allowable Stories	5	2	5	2	2
	IBC Type of Construction				
	3A	3B	4 (HT)	5A	5B
IBC Tabular (Unsprinklered) Areas	28,500	19,000	36,000	18,000	9,000
IBC Allowable Stories	5	4	5	3	2
<i>IBC Maximum Stories for Increase</i>	3	3	3	3	2

Unsprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹		SBC	IBC	SBC	IBC	SBC	IBC		
		25%	105,000	85,500	28,000	57,000	127,500	108,000	27,000
50%	SBC	140,000	106,875	37,333	71,250	170,000	135,000	36,000	24,000
	IBC							67,500	22,500
75%	SBC	175,000	128,250	46,667	85,500	212,500	162,000	45,000	30,000
	IBC							81,000	27,000
100%	SBC	210,000	149,625	56,000	99,750	255,000	189,000	54,000	36,000
	IBC							94,500	31,500

Sprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹		SBC	IBC	SBC	IBC	SBC	IBC		
		25%	210,000	256,500	140,000	171,000	255,000	324,000	54,000
50%	SBC	280,000	277,875	186,666	185,250	340,000	351,000	72,000	48,000
	IBC							175,500	58,500
75%	SBC	350,000	299,250	233,333	199,500	425,000	378,000	90,000	60,000
	IBC							189,000	63,000
100%	SBC	420,000	320,625	280,000	213,750	510,000	405,000	108,000	72,000
	IBC							202,500	67,500

¹ SBC requires a minimum fire separation distance of 30 feet for open space increase. IBC requires a minimum of 20 feet

**Comparison of IBC-SBC Allowable Building Area Based on Percentage of Open Perimeter
Use Group E**

	SBC Type of Construction				
	V 1-Hr.	V Unprotected	III (HT)	VI 1-Hr.	VI Unprotected
SBC Unsprinklered Floor Areas	18,000	12,000	18,000	12,000	8,000
SBC Sprinklered Floor Areas	36,000	36,000	36,000	24,000	24,000
SBC Allowable Stories	2	1	2	2	1
	IBC Type of Construction				
	3A	3B	4 (HT)	5A	5B
IBC Tabular (Unsprinklered) Areas	23,500	14,500	25,500	18,500	9,500
IBC Allowable Stories	3	2	3	1	1
<i>IBC Maximum Stories for Increase</i>	<i>3</i>	<i>2</i>	<i>3</i>	<i>1</i>	<i>1</i>

Unsprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹		SBC	36,000	12,000	36,000	24,000	8,000
		IBC	70,500	29,000	76,500	18,500	9,500
25%	SBC	48,000	16,000	48,000	32,000	10,667	
	IBC	88,125	36,250	95,625	23,125	11,875	
50%	SBC	60,000	20,000	60,000	40,000	13,333	
	IBC	105,750	43,500	114,750	27,750	14,250	
75%	SBC	72,000	24,000	72,000	48,000	16,000	
	IBC	123,375	50,750	133,875	32,375	16,625	
100%	SBC						
	IBC						

Sprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹		SBC	72,000	36,000	72,000	48,000	24,000
		IBC	211,500	87,000	229,500	74,000	38,000
25%	SBC	96,000	48,000.00	96,000	64,000	32,000	
	IBC	229,125	94,250	248,625	78,625	40,375	
50%	SBC	120,000	60,000	120,000	80,000	40,000	
	IBC	246,750	101,500	267,750	83,250	42,750	
75%	SBC	144,000	72,000	144,000	96,000	48,000	
	IBC	264,375	108,750	286,875	87,875	45,125	
100%	SBC						
	IBC						

¹ The SBC requires a minimum fire separation distance of 30 feet for open space increase; the IBC requires a minimum of 20 feet

**Comparison of IBC-SBC Allowable Building Area Based on Percentage of Open Perimeter
IBC Use Group 1-2 - 24-hour care to more than 5 children, 1 1/2 years of age or less**

vs

SBC Group I Unrestrained

	SBC Type of Construction				
	V 1-Hr.	V Unprotected	III (HT)	VI 1-Hr.	VI Unprotected
SBC Multistory Unsprinklered Floor Areas	0	0	0	0	0
SBC Sprinklered Floor Areas	31,500	0	24,000	22,500	0
SBC Allowable Stories	1	0	2	1	0
	IBC Type of Construction				
	3A	3B	4 (HT)	5A	5B
IBC Tabular (Unsprinklered) Areas	12,000	0	12,000	9,500	0
IBC Allowable Stories	1	0	1	1	0
<i>IBC Maximum Stories for Increase</i>	<i>1</i>	<i>0</i>	<i>1</i>	<i>1</i>	<i>0</i>

Unsprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹		SBC					IBC				
		Area	Stories	Area	Stories	Area	Stories	Area	Stories	Area	Stories
25%	SBC	-	-	-	-	-	-	-	-	-	-
	IBC	12,000	-	12,000	-	9,500	-	-	-	-	-
50%	SBC	-	-	-	-	-	-	-	-	-	-
	IBC	15,000	-	15,000	-	11,875	-	-	-	-	-
75%	SBC	-	-	-	-	-	-	-	-	-	-
	IBC	18,000	-	18,000	-	14,250	-	-	-	-	-
100%	SBC	-	-	-	-	-	-	-	-	-	-
	IBC	21,000	-	21,000	-	16,625	-	-	-	-	-

Sprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹		SBC					IBC				
		Area	Stories	Area	Stories	Area	Stories	Area	Stories	Area	Stories
25%	SBC	31,500	-	48,000	-	22,500	-	-	-	-	-
	IBC	48,000	-	48,000	-	38,000	-	-	-	-	-
50%	SBC	42,000	-	64,000	-	30,000	-	-	-	-	-
	IBC	51,000	-	51,000	-	40,375	-	-	-	-	-
75%	SBC	52,500	-	80,000	-	37,500	-	-	-	-	-
	IBC	54,000	-	54,000	-	42,750	-	-	-	-	-
100%	SBC	63,000	-	96,000	-	45,000	-	-	-	-	-
	IBC	57,000	-	57,000	-	45,125	-	-	-	-	-

¹ The SBC requires a minimum fire separation distance of 30 feet for open space increase; the IBC requires a minimum of 20 feet

**Comparison of IBC-SBC Allowable Building Area Based on Percentage of Open Perimeter
Use Group M**

	SBC Type of Construction				
	V 1-Hr.	V Unprotected	III (HT)	VI 1-Hr.	VI Unprotected
SBC Multistory Unsprinklered Floor Areas	13,500	9,000	13,500	9,000	6,000
SBC Multistory Sprinklered Floor Areas	27,000	18,000	27,000	18,000	12,000
SBC Allowable Stories	5	2	5	2	2
	IBC Type of Construction				
	3A	3B	4 (HT)	5A	5B
IBC Tabular (Unsprinklered) Areas	18,500	12,500	20,500	1,400	9,000
IBC Allowable Stories	4	4	4	3	1
<i>IBC Maximum Stories for Increase</i>	3	3	3	3	1

Unsprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹						
		25%	SBC	67,500	18,000	67,500
	IBC	55,500	37,500	61,500	4,200	9,000
50%	SBC	90,000	24,000	90,000	24,000	16,000
	IBC	69,375	46,875	76,875	5,250	11,250
75%	SBC	112,500	30,000	112,500	30,000	20,000
	IBC	83,250	56,250	92,250	6,300	13,500
100%	SBC	135,000	36,000	135,000	36,000	24,000
	IBC	97,125	65,625	107,625	7,350	15,750

Sprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹						
		25%	SBC	135,000	90,000	135,000
	IBC	166,500	112,500	184,500	12,600	36,000
50%	SBC	180,000	120,000	180,000	48,000	32,000
	IBC	180,375	121,875	199,875	13,650	38,250
75%	SBC	225,000	150,000	225,000	60,000	40,000
	IBC	194,250	131,250	215,250	14,700	40,500
100%	SBC	270,000	180,000	270,000	72,000	48,000
	IBC	208,125	140,625	230,625	15,750	42,750

¹The SBC requires a minimum fire separation distance of 30 feet for open space increase; the IBC requires a minimum of 20 feet

**Comparison of IBC-SBC Allowable Building Area Based on Percentage of Open Perimeter
Use Group R-1**

	SBC Type of Construction				
	V 1-Hr.	V Unprotected	III (HT)	VI 1-Hr.	VI Unprotected
SBC Multistory Unsprinklered Floor Areas	18,000	12,000	18,000	10,500	7,000
SBC Multistory Sprinklered Floor Areas	36,000	24,000	36,000	21,000	14,000
SBC Allowable Stories - Unsprinklered	5	2	3	3	2
SBC Allowable Stories - Sprinklered	5	5	3	3	2
	IBC Type of Construction				
	3A	3B	4 (HT)	5A	5B
IBC Tabular (Unsprinklered) Areas	24,000	16,000	20,500	12,000	7,000
IBC Allowable Stories	4	4	4	3	2
<i>IBC Maximum Stories for Increase</i>	3	3	3	3	2

Unsprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹		SBC	90,000	24,000	54,000	31,500	14,000
		IBC	72,000	48,000	61,500	36,000	14,000
25%		SBC	120,000	32,000	72,000	42,000	18,667
		IBC	90,000	60,000	76,875	45,000	17,500
50%		SBC	150,000	40,000	90,000	52,500	23,333
		IBC	108,000	72,000	92,250	54,000	21,000
75%		SBC	180,000	48,000	108,000	63,000	28,000
		IBC	126,000	84,000	107,625	63,000	24,500
100%		SBC	180,000	192,000	108,000	63,000	28,000
		IBC	216,000	144,000	184,500	108,000	42,000

Sprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹		SBC	180,000	192,000	108,000	63,000	28,000
		IBC	216,000	144,000	184,500	108,000	42,000
25%		SBC	240,000	256,000	144,000	84,000	37,333
		IBC	234,000	156,000	199,875	117,000	45,500
50%		SBC	300,000	320,000	180,000	105,000	46,667
		IBC	252,000	168,000	215,250	126,000	49,000
75%		SBC	360,000	384,000	216,000	126,000	56,000
		IBC	270,000	180,000	230,625	135,000	52,500
100%		SBC	180,000	192,000	108,000	63,000	28,000
		IBC	216,000	144,000	184,500	108,000	42,000

¹The SBC requires a minimum fire separation distance of 30 feet for open space increase; the IBC requires a minimum of 20 feet

**Comparison of IBC-SBC Allowable Building Area Based on Percentage of Open Perimeter
Use Group R-2**

	SBC Type of Construction				
	V 1-Hr.	V Unprotected	III (HT)	VI 1-Hr.	VI Unprotected
SBC Multistory Unsprinklered Floor Areas	18,000	12,000	18,000	10,500	7,000
SBC Multistory Sprinklered Floor Areas	36,000	24,000	36,000	21,000	14,000
SBC Allowable Stories - Unsprinklered	5	2	3	3	2
SBC Allowable Stories - Sprinklered	5	5	3	3	2
	IBC Type of Construction				
	3A	3B	4 (HT)	5A	5B
IBC Tabular (Unsprinklered) Areas	24,000	16,000	20,500	12,000	7,000
IBC Allowable Stories	4	4	4	3	2
<i>IBC Maximum Stories for Increase</i>	3	3	3	3	2

Unsprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹						
		25%	SBC	90,000	24,000	54,000
	IBC	72,000	48,000	61,500	36,000	14,000
50%	SBC	120,000	32,000	72,000	42,000	18,667
	IBC	90,000	60,000	76,875	45,000	17,500
75%	SBC	150,000	40,000	90,000	52,500	23,333
	IBC	108,000	72,000	92,250	54,000	21,000
100%	SBC	180,000	48,000	108,000	63,000	28,000
	IBC	126,000	84,000	107,625	63,000	24,500

Sprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹						
		25%	SBC	180,000	192,000	108,000
	IBC	216,000	144,000	184,500	108,000	42,000
50%	SBC	240,000	256,000	144,000	84,000	37,333
	IBC	234,000	156,000	199,875	117,000	45,500
75%	SBC	300,000	320,000	180,000	105,000	46,667
	IBC	252,000	168,000	215,250	126,000	49,000
100%	SBC	360,000	384,000	216,000	126,000	56,000
	IBC	270,000	180,000	230,625	135,000	52,500

¹ The SBC requires a minimum fire separation distance of 30 feet for open space increase; the IBC requires a minimum of 20 feet

**Comparison of IBC-SBC Allowable Building Area Based on Percentage of Open Perimeter
IBC Use Group S-1 vs SBC Group S-1 Moderate Hazard**

	SBC Type of Construction				
	V 1-Hr.	V Unprotected	III (HT)	VI 1-Hr.	VI Unprotected
SBC Unsprinklered Floor Areas	24,000	16,000	24,000	9,000	6,000
SBC Sprinklered Floor Areas	48,000	32,000	48,000	27,000	18,000
SBC Allowable Stories - Unsprinklered	2	2	2	1	1
SBC Allowable Stories - Sprinklered	4	4	6	1	1
	IBC Type of Construction				
	3A	3B	4 (HT)	5A	5B
IBC Tabular (Unsprinklered) Areas	26,000	17,500	25,500	14,000	9,000
IBC Allowable Stories	3	3	4	3	1
<i>IBC Maximum Stories for Increase</i>	3	3	3	3	1

Unsprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹						
		25%	SBC	48,000	32,000	48,000
	IBC	78,000	52,500	76,500	42,000	9,000
50%	SBC	64,000	42,667	64,000	12,000	8,000
	IBC	97,500	65,625	95,625	52,500	11,250
75%	SBC	80,000	53,333	80,000	15,000	10,000
	IBC	117,000	78,750	114,750	63,000	13,500
100%	SBC	96,000	64,000	96,000	18,000	12,000
	IBC	136,500	91,875	133,875	73,500	15,750

Sprinklered Building Aggregate Floor Area (square feet)

Percent Open Perimeter ¹						
		25%	SBC	192,000	128,000	288,000
	IBC	234,000	157,500	229,500	168,000	36,000
50%	SBC	256,000	170,667	384,000	36,000	24,000
	IBC	253,500	170,625	248,625	178,500	38,250
75%	SBC	320,000	213,333	480,000	45,000	30,000
	IBC	273,000	183,750	267,750	189,000	40,500
100%	SBC	384,000	256,000	576,000	54,000	36,000
	IBC	292,500	196,875	286,875	199,500	42,750

¹ The SBC requires a minimum fire separation distance of 30 feet for open space increase; the IBC requires a minimum of 20 feet