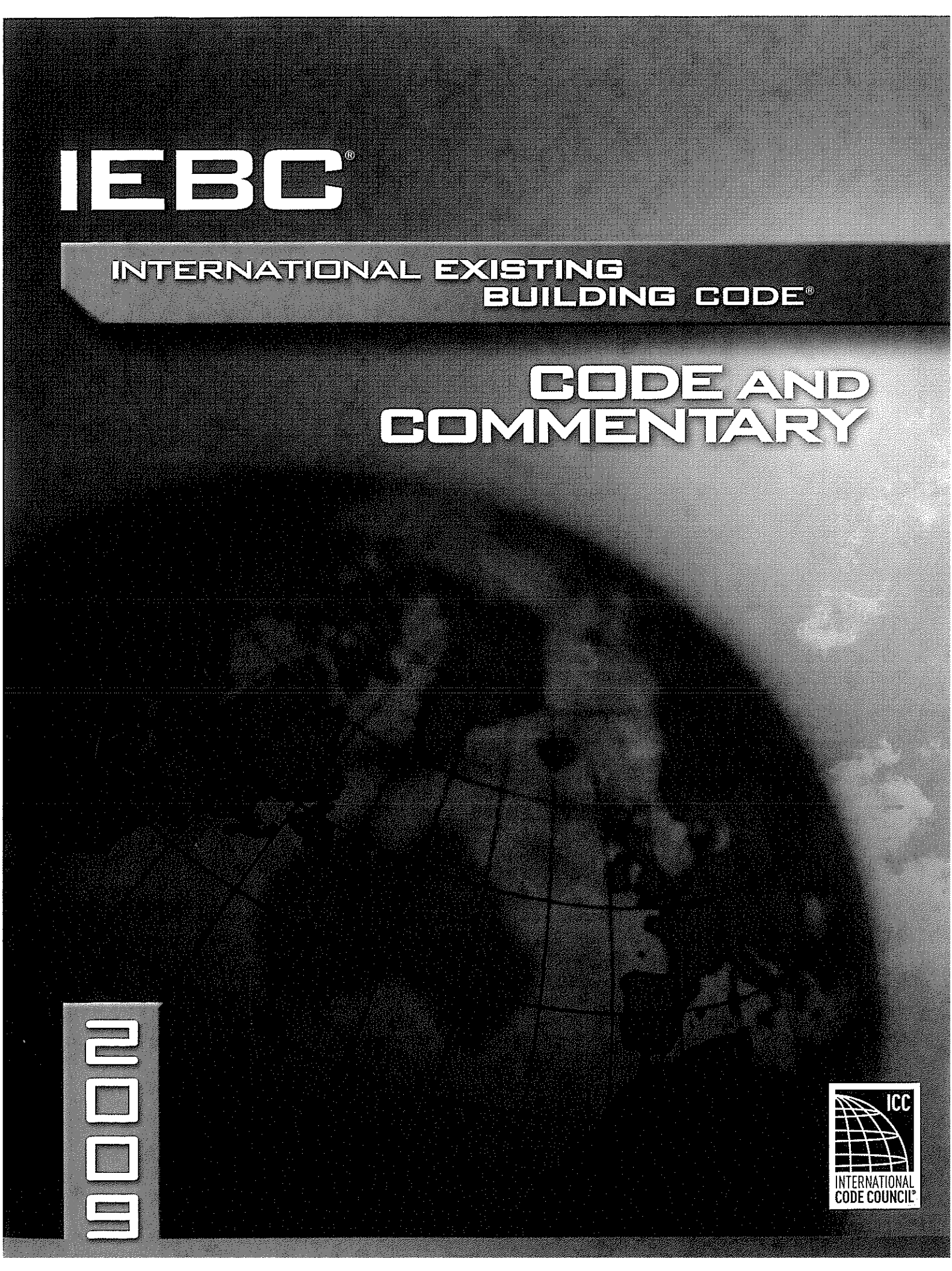
IEBC®

INTERNATIONAL EXISTING BUILDING CODE®

CODE AND COMMENTARY



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Chapter 1: Scope and Administration

General Comments

This chapter contains provisions for the scope and application (Part 1), and the enforcement and administration (Part 2) of subsequent requirements of the code. In addition to establishing the scope of the code, Chapter 1 identifies which buildings and structures come under its purview. Part 1, Scope and Application, includes Sections 101 and 102 that specifically address the scope and application of the code. Section 101 addresses the scope of the code as it applies to existing structures undergoing repairs, alterations, change of occupancy and additions or relocation. Section 102 establishes the applicability of the code and addresses existing structures. Part 2, Administration and Enforcement, includes the balance of the provisions of Chapter 1, which are related to the administration and enforcement of the provisions of the code. Section 103 establishes the department of building safety and the appointment of department personnel. Section 104 outlines the duties and authority of the code official with regard to permits, inspections and right of entry. It also establishes the authority of the code official to approve alternative materials, used materials and modifications. Section 105 states when permits are required and establishes the procedures for the review of applications and the issuance of permits. Section 106 describes the information that must be included on the submittal documents submitted with the application. Section 107 authorizes the code official to issue permits for temporary structures and uses. Section 108 establishes requirements for a fee schedule. Section 109 includes the inspection duties of the code official or an inspection agency that has been approved by the code official. Provisions for the issuance of certificates of occupancy are detailed in Section 110. Section 111 gives the code official the authority to approve utility connections. Section 112 establishes the board of appeals and the criteria for making applications for appeal. Administrative provisions for violations are addressed in Section 113, including provisions for unlawful acts, violation notices, prosecution and penalties. Section 114 describes procedures for stop work orders. Section 115 establishes the criteria for unsafe structures and equipment, and the procedures to be followed by the code official for abatement and for notification to the responsible party. Section 116 describes the emergency measures that address structures in danger of collapse. Section 117 authorizes the code official to have structures demolished that are dangerous, unsafe, insanitary or otherwise unfit for human habitation or occupancy. Each state's building code enabling legislation, which is grounded within the police power of the state, is the source of all authority to enact building codes. In terms of how it is used, police power is the power of the state to legislate for the general welfare of its citizens. This power enables passage of such laws as building codes. If the state legislature has limited this power in any way, the municipality may not exceed these limitations. While the municipality may not further delegate its police power (e.g., by delegating the burden of determining code compliance to the building owner, contractor or architect), it may turn over the administration of the building code to a municipal official, such as a code official, provided that sufficient criteria are given to the code official to establish clearly the basis for decisions as to whether or not a proposed building conforms to the code.

Chapter 1 is largely concerned with maintaining "due process of law" in enforcing the building performance criteria contained in the body of the code. Only through careful observation of the administrative provisions can the code official reasonably hope to demonstrate that "equal protection under the law" has been provided. While it is generally assumed that the administration and enforcement section of a code is geared toward a code official, this is not entirely true. The provisions also establish the rights and privileges of the design professional, contractor and building owner. The position of the code official is merely to review the proposed and completed work, and to determine if the construction conforms to the code requirements. The design professional is responsible for the design of a safe structure. The contractor is responsible for constructing the structure in conformance with the plans.

During the course of construction, the code official reviews the activity to ascertain that the spirit and intent of the law are being met and that the safety, health and welfare of the public will be protected. As a public servant, the code official enforces the code in an unbiased, proper manner. Every individual is guaranteed equal enforcement of the provisions of the code. Furthermore, design professionals, contractors and building owners have the right of due process for any requirement in the code.

Purpose

The code, as with any other code, is intended to be adopted as a legally enforceable document to safeguard health, safety, property and public welfare. A code cannot be effective without adequate provisions for its administration and enforcement. The code official charged with the administration and enforcement of building regulations has a great responsibility and with this responsibility comes authority. No matter how detailed the code may be, the code official must, to some extent, exercise his or her own judgment in determining code compli-

ance. The code official has the responsibility to establish that the homes in which the citizens of the community reside and the buildings in which they work are designed and constructed to be structurally stable, with adequate means of egress, light and ventilation, and to provide a minimum acceptable level of protection to life and property from fire.

A large number of existing buildings and structures do not comply with the current building code requirements for new construction. Although many of these buildings are potentially salvageable, rehabilitation is often cost prohibitive because they may not be able to comply with all the requirements for new construction. At the same time, it is necessary to regulate construction in existing buildings that undergo additions, alterations, renovations, extensive repairs or change of occupancy. Such activity represents an opportunity to ensure that new construction complies with the current building codes and that existing conditions are maintained, at a minimum, to their current level of compliance or are improved as required. To accomplish this objective, and to make the rehabilitation process easier, this chapter allows for a controlled departure from full compliance with the technical codes, without compromising the minimum standards for the fire prevention and life safety features of the rehabilitated building.

PART 1—SCOPE AND APPLICATION

SECTION 101
GENERAL

101.1 Title. These regulations shall be known as the *Existing Building Code* of [NAME OF JURISDICTION], hereinafter referred to as "this code."

❖ The purpose of this section is to identify the adopted regulations by inserting the name of the adopting jurisdiction into the code.

101.2 Scope. The provisions of the *International Existing Building Code* shall apply to the *repair*, *alteration*, *change of occupancy*, *addition* and relocation of *existing buildings*.

❖ This section establishes when the regulations contained in the code must be followed, whether all or in part. Something must happen (modification to an existing building or allowing an existing building or structure to become unsafe) for the code to be applicable. While such activity may not be as significant as for a new building, a fence is considered a structure and, therefore, its erection is within the scope of the code. The code is not a maintenance document requiring periodic inspections that will, in turn, result in an enforcement action, although periodic inspections are addressed by the *International Fire Code*® (IFC®).

101.3 Intent. The intent of this code is to provide flexibility to permit the use of alternative approaches to achieve compliance with minimum requirements to safeguard the public health, safety and welfare insofar as they are affected by the *repair*, *alteration*, *change of occupancy*, *addition* and relocation of *existing buildings*.

❖ The intent of the code is to set forth regulations that establish the minimum acceptable level to safeguard public health, safety and welfare. The intent becomes important in the application of sections such as Sections 102, 104.11 and 113, as well as any enforcement-oriented interpretive action or judgment. Like any code, the written text is subject to interpretation. Interpretations should not be affected by economics or the potential impact on any party. The only considerations should be the protection of public health, safety and welfare.

101.4 Applicability. This code shall apply to the *repair*, *alteration*, *change of occupancy*, *addition* and relocation of all *existing buildings*, regardless of occupancy, subject to the criteria of Sections 101.4.1 and 101.4.2.

❖ All existing structures must comply with the provisions of the code when undergoing repair, alteration, change of occupancy, addition and relocation, subject to the criteria in Sections 101.4.1 and 101.4.2. Sections 101.4.1 and 101.4.2 contain provisions that are significantly different, based on whether or not the building has been previously occupied. Basically, if the building has not been previously occupied, it must comply with the requirements for new construction. This also applies to buildings undergoing alterations or additions.

101.4.1 Buildings not previously occupied. A building or portion of a building that has not been previously occupied or used for its intended purpose in accordance with the laws in existence at the time of its completion shall comply with the provisions of the *International Building Code* or *International Residential Code*, as applicable, for new construction or with any current permit for such occupancy.

❖ This section requires that all buildings that have not been previously occupied must comply with the *International Building Code*® (IBC®) or the *International Residential Code*® (IRC®). It also applies to any building that may have been completed and not occupied and used for its intended purpose. The building remains a new structure in terms of code compliance until such a time as it is occupied in whole or in part.

101.4.2 Buildings previously occupied. The legal occupancy of any building existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code, the *International Fire Code*, or the *International Property Maintenance Code*, or as is deemed

necessary by the *code official* for the general safety and welfare of the occupants and the public.

❖ This section allows for buildings that were legally occupied in part or in whole at the time the code was adopted to continue. There is a maintenance concern that is addressed by the requirement that the building comply with either the IFC or the *International Property Maintenance Code*® (IPMC®). These codes ensure that life safety systems, such as means of egress pathways and fire protection systems, are kept in place and able to protect the life and safety of the inhabitants of these existing structures.

101.5 Compliance methods. The *repair*, *alteration*, *change of occupancy*, *addition* or relocation of all *existing buildings* shall comply with one of the methods listed in Sections 101.5.1 through 101.5.3 as selected by the applicant. Application of a method shall be the sole basis for assessing the compliance of work performed under a single permit unless otherwise approved by the *code official*. Sections 101.5.1 through 101.5.3 shall not be applied in combination with each other. Where this code requires consideration of the seismic-force-resisting system of an *existing building* subject to *repair*, *alteration*, *change of occupancy*, *addition* or relocation of *existing buildings*, the seismic evaluation and design shall be based on Section 101.5.4 regardless of which compliance method is used.

Exception: Subject to the approval of the *code official*, *alterations* complying with the laws in existence at the time the building or the affected portion of the building was built shall be considered in compliance with the provisions of this code unless the building is undergoing more than a limited structural *alteration* as defined in Section 807.4.3. New structural members added as part of the *alteration* shall comply with the *International Building Code*. *Alterations* of *existing buildings* in *flood hazard areas* shall comply with Section 601.3.

❖ This section explains the options available to a designer or owner when dealing with construction related to existing buildings: prescriptive compliance method (see Section 101.5.1), work area compliance method (see Section 101.5.2) and performance compliance method (see Section 101.5.3). This section also provides procedures for the evaluation and design of seismic-force-resisting systems of existing buildings where consideration of seismic forces is required by the code by referencing Section 101.5.4.

There is one alternative to using these three compliance methods that allows for compliance with the laws in existence at the time the structure was originally built, unless the building has sustained substantial structural damage or is undergoing more than a limited structural alteration. Repairs and alterations in flood hazard areas have additional requirements to the laws in existence at the time the structure was originally built.

101.5.1 Prescriptive compliance method. *Repairs*, *alterations*, *additions* and changes of occupancy complying with Chapter 3 of this code in buildings complying with the *International Fire Code* shall be considered in compliance with the provisions of this code.

❖ This section allows compliance in accordance with Chapter 3 of the code. This chapter is a duplication of Chapter 34, of Sections 3401 through 3409, of the IBC. There are also provisions from the other *International Codes*® (I-Codes®) dealing with system installations (electrical, energy, fuel gas, mechanical and plumbing) that have been duplicated in the code as well. These provisions are intended to prescribe specific minimum requirements for construction related to existing buildings, including additions, alterations, repairs, fire escapes, glass replacement, change of occupancy, historic buildings, moved structures and accessibility.

101.5.2 Work area compliance method. *Repairs*, *alterations*, *additions*, changes in occupancy and relocated buildings complying with the applicable requirements of Chapters 4 through 12 of this code shall be considered in compliance with the provisions of this code.

❖ This section allows compliance in accordance with Chapters 4 through 12 of the code. These chapters contain provisions that are based on a proportional approach to compliance where upgrades are triggered by the type and extent of the work.

101.5.3 Performance compliance method. *Repairs*, *alterations*, *additions*, changes in occupancy and relocated buildings complying with Chapter 13 of this code shall be considered in compliance with the provisions of this code.

❖ This section allows compliance in accordance with Chapter 13 of the code. This chapter is a duplication of Chapter 34, Section 3410 of the IBC. This chapter provides for evaluating a building based on fire safety, means of egress and general safety.

101.5.4 Evaluation and design procedures. The seismic evaluation and design shall be based on the procedures specified in the *International Building Code*, ASCE 31 or ASCE 41. The procedures contained in Appendix A of this code shall be permitted to be used as specified in Section 101.5.4.2.

❖ This section lists the documents that contain the provisions to be used for the seismic evaluation of an existing building, as well as the design of any needed repairs. Since the scope of these documents varies considerably, the following are brief descriptions.

***International Building Code*® (IBC®)**

The IBC is a comprehensive model building code with seismic provisions that are based, for the most part, on the National Earthquake Hazards Reduction Program's (NEHRP) *Recommended Provisions for Seismic Regulations for New Buildings and Other Structures*. The requirements are intended to minimize the hazard to life for all buildings, increase the expected performance of higher occupancy buildings as compared to ordinary buildings, and improve the capability of essential facilities to function during and after an

earthquake. In addition to minimum seismic loading criteria, the earthquake design provisions include requirements for special inspection and testing, as well as material-specific design requirements. Achieving the intended performance depends on a number of factors, including the structural framing type, configuration and construction materials, for example.

The significant earthquake load concepts include the following:

1. The ground motions are based on a maximum considered earthquake (MCE), which has an approximate average return period of 2,500 years in most of the United States. The U.S. Geological Survey's (USGS) ground motion maps [Figures 1613.5(1) through 1613.5(14)of the IBC] provide spectral response accelerations at short periods (S_S) and at a one-second period (S_1). These levels of ground motion are also used in ASCE 31 and ASCE 41.

2. Design for the effect of two-thirds of the MCE: Considering the margin of safety of 1.5 inherent in seismic design practice, this achieves collapse prevention under MCE level ground motions. It is also intended that damage from the "design earthquake" ground motion would be repairable. For essential facilities (Occupancy Category IV) it is intended that damage from the "design earthquake" ground motion be relatively minor, and allow continued occupancy and function of the facility. For higher ground motions, the intent is that there be a low probability of structural collapse.

3. Occupancy category and importance factors: The IBC assigns buildings to one of the four occupancy categories that are summarized in Table 101.5.4(1). It is the intent to provide increasingly higher performance as the occupancy category increases from I through IV. This is achieved, in part, by applying an importance factor in determining the design load. The importance factor specified in ASCE 7 load provisions directly impacts the calculation of seismic (as well as wind and snow) loads. The magnitude of the design load varies in proportion to the importance factor and a higher value is assigned to buildings with an occupancy that warrants a higher level of performance.

4. Nonlinear seismic behavior is accounted for through the use of equivalent lateral forces that are reduced by a response modification factor (R). This approximates the internal forces under the design earthquake. The corresponding building displacements, however, must be increased by the deflection amplification factor (C_d) in meeting the drift limits. These factors are based on the type of seismic-force-resisting system that is provided and are located in the referenced ASCE 7 load standard.

5. Detailing and limitations on the seismic-force-resisting system are a function of a structure's seismic design category classification, which considers the seismicity at the site, type of soil present at the site and the nature of the building occupancy. Since several code and *Guidelines for the Seismic Retrofit of Existing Buildings* (GSREB) requirements use the seismic design category as a threshold, and neither document contains the criteria for determining a building's seismic design category, Figure 101.5.4(1) provides step-by-step instructions on how to determine a structure's seismic design category using the IBC seismic criteria.

Two levels of IBC seismic forces are used as the basis for the code requirements for seismic analysis and design. These two levels are either the full seismic force required by the IBC (see Section 101.5.4.1) or the reduced seismic force level, which is 75 percent of the full seismic forces of the IBC (see Section 101.5.4.2).

Table 101.5.4(1)
OCCUPANCY CATEGORIES AND IMPORTANCE FACTORS

OCCUPANCY CATEGORY	NATURE OF OCCUPANCY	SEISMIC IMPORTANCE FACTOR FROM ASCE 7
I	Buildings and other structures that represent a low hazard to human life in the event of failure	1.0
II	Buildings and other structures except those listed in Categories I, III and IV	1.0
III	Buildings and other structures that represent a substantial hazard to human life in the event of failure	1.25
IV	Buildings and other structures designated as essential facilities	1.5

1. Determine the mapped MCE spectral response acceleration at short periods, S_s, and at A 1-second period, S_1, for the site from Figures 1613.5(1) through 1613.5(4).
2. Determine the (soil) site class in accordance with Table 1613.5.2.
3. Determine the site coefficients, F_a and F_v, from Tables 1613.5.3(1) and 1613.5.3(2), respectively.
4. Determine the design spectral response acceleration at short periods, S_{DS}, and at a 1-second period, S_{D1}, as follows:

$$S_{DS} = (2/3)(F_a)(S_s)$$

$$S_{D1} = (2/3)(F_v)(S_1)$$

5. Determine the seismic design category as prescribed by Tables 1613.5.6(1) and 1616.5.6(2). The highest (most restrictive) of the seismic design categories from the two tables is the category assigned to the building.

Figure 101.5.4(1)
DETERMINATION OF SEISMIC DESIGN CATEGORY USING THE *INTERNATIONAL BUILDING CODE*

		TARGET BUILDING PERFORMANCE LEVELS			
		Operational Performance Level (1-A)	Immediate Occupancy Performance Level (1-B)	Life Safety Performance Level (3-C)	Collapse Prevention Performance Level (5-E)
Earthquake Hazard Level	50%/50 year	a	b	c	d
	20%/50 year	e	f	g	h
	BSE-1 (approx. 10%/50 year)	i	j	k	l
	BSE-2 (approx. 2%/50 year)	m	n	o	p

Notes:

1. Each cell in the above matrix represents a discrete rehabilitation objective.
2. The rehabilitation objectives in the matrix above may be used to represent the three specific rehabilitation objectives defined in Sections 1.4.1, 1.4.2 and 1.4.3 as follows:

k + p = Basic safety objective (BSO)
k + p + any of a, e, i, b, f, j or n = enhanced objectives
o alone or n alone or m alone = enhanced objectives
k alone or p alone = limited objectives
c, g, d, h, l = limited objectives

Figure 101.5.4(2)
FEMA 356 REHABILITATION OBJECTIVES

ASCE 41-06, Seismic Rehabilitation of Existing Buildings.

ASCE 41 is an updated version of FEMA 356, *Prestandard and Commentary for the Seismic Rehabilitation of Buildings*. FEMA 356 was essentially an updated version of FEMA 273, *NEHRP Guidelines for the Seismic Rehabilitation of Buildings*.

The significant concepts of ASCE 41 include the following:

1. ASCE 41 is an updated and standardized version of FEMA 356. It is a nationally applicable standard that provides detailed guidance on performing a seismic rehabilitation analysis and design, and includes an integrated commentary.

The significant concepts include the following:

1. Discrete rehabilitation objectives are established based on target building performance levels at various levels of ground motion (earthquake hazard). These are summarized in Figure 101.5.4(2), which is reproduced from the ASCE 41 Commentary. Note that this entire array of rehabilitation objectives is only available under a voluntary upgrade to the seismic-force-resisting system in accordance with Section 707.6. Otherwise, the required performance level is established by the code.
2. Two specific levels of ground motion based on USGS ground motion maps are defined in ASCE 41. Basic Safety Earthquake-2 (BSE-2) is the ground motion based on the MCE and the mapped spectral response accelerations (S_S and S_1) are the same as those used in the IBC, as well as ASCE 31. Basic Safety Earthquake-1 (BSE-1) is the lesser of 10 percent/50 year ground motion or two-thirds of the BSE-2. The latter is similar to the design ground motion level used in the IBC, assuring that BSE-1 ground motions are not larger than the design ground motions used for the design of new construction. BSE-1 and BSE-2 are identified in the left-hand (earthquake hazard level) column of Figure 101.5.4(2). ASCE 41 also provides procedures to establish other ground motions levels that may be of interest in rehabilitations.
3. ASCE 41, Section 1.4.1, establishes a rehabilitation objective that is referred to as the basic safety objective (BSO). The BSO requires the life safety performance level for BSE-1 and the collapse prevention performance level for BSE-2. This dual objective corresponds to entries k and p as illustrated in Figure 101.5.4(3). The BSO approximates the risk to life safety that

has traditionally been accepted in earthquake design and is comparable to the intended performance for new buildings under the IBC.

4. Systematic versus simplified rehabilitation methodologies. Figure 101.5.4(4), reprinted from the ASCE 41 commentary, provides an overview of the rehabilitation process under ASCE 41.

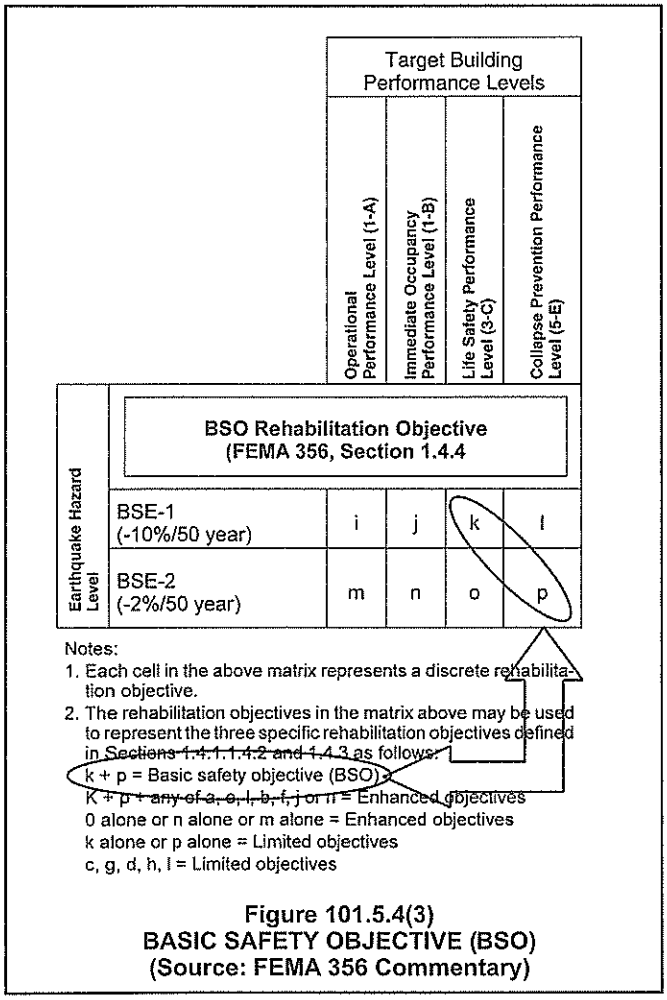


Figure 101.5.4(3)
BASIC SAFETY OBJECTIVE (BSO)
(Source: FEMA 356 Commentary)

ASCE 31, Seismic Evaluation of Existing Buildings.

This document is a consensus standard that was developed as a replacement for FEMA 310. It is an evaluation tool that provides a standardized process for identifying potential seismic deficiencies in existing buildings and includes an integrated commentary. It takes a three-tier approach to evaluation, starting with a screening phase (Tier 1) and proceeding through to a detailed evaluation phase (Tier 3), if required.

The significant concepts include the following:

1. Seismic demand is based on the MCE. The MCE mapped spectral response accelerations (S_S and S_1) are based on ASCE 7 and are the same as those required in the IBC, as well as ASCE 41 ground motion maps.
2. The level of seismicity for a building is defined as low, moderate or high, based on the design short period spectral response acceleration (S_{DS}) and design spectral response acceleration at a one-second period (S_{D1}). These values are identical to the IBC design level ground motions.
3. The level of performance is established as either life safety (LS) or immediate occupancy (IO). Note that in complying with code requirements, Table 101.5.4.1 establishes the performance level that applies based on a building's occupancy classification.
4. ASCE 31 accounts for the nonlinear response to earthquake ground motions by applying pseudo-static lateral forces representing the forces required to impose the expected actual deformations of the structure in its yielded state under the design ground motion.

Appendix A—*Guidelines for the Seismic Retrofit of Existing Buildings* (GSREB)

Seismic retrofit guidelines have been developed and utilized in the western United States for many years. The 1997 edition of the *Uniform Code for Building Conservation* (UCBC) included three appendix chapters (see A1, A2 and A3) dealing with seismic strengthening of specific building types. In 2000, these three chapters were combined with two new chapters (see A4 and A5) and published as a standalone document, the GSREB. The code has incorporated the GSREB in Appendix A. The applicability of each appendix chapter is stated in Section 101.5.4.2, Items 2.1 through 2.5. These chapters provide remedies for the following areas of concern in existing buildings:

A1 Unreinforced Masonry Bearing Wall Buildings: This chapter applies to buildings with one or more unreinforced masonry bearing walls.

A2 Reinforced Concrete and Reinforced Masonry Wall Buildings With Flexible Diaphragms: This chapter has requirements for wall anchorage systems for reinforced concrete or masonry walls that are laterally supported by flexible diaphragms.

A3 Strengthening of Cripple Walls and Sill Plate Anchorage of Light, Wood-frame Residential Buildings: This chapter has requirements for perimeter foundations, sill plate connections and unbraced cripple walls.

A4 Wood-frame Residential Buildings With Soft, Weak or Open-front Walls: This chapter has requirements for wood-frame multiunit residential buildings with soft, weak or open-front walls that are classified as Seismic Design Category C, D or E.

A5 Concrete Buildings: This chapter has requirements for concrete buildings. It is intended for

buildings classified as Seismic Design Category B, C, D or E.

As previously noted, the scope and other thresholds include references to seismic criteria that correspond to the IBC as well (e.g., seismic design category). The GSREB is also based on IBC forces that require the use of a response modification coefficient *(R)* (see commentary, Section 101.5.4.1).

101.5.4.1 Compliance with IBC level seismic forces. Where compliance with the seismic design provisions of the *International Building Code* is required, the procedures shall be in accordance with one of the following:

1. One-hundred percent of the values in the *International Building Code*. Where the existing seismic force-resisting system is a type that can be designated as "Ordinary," values of R, Ω_0, and C_d used for analysis in accordance with Chapter 16 of the *International Building Code* shall be those specified for structural systems classified as "Ordinary" in accordance with Table 12.2-1 of ASCE 7, unless it is demonstrated that the structural system will

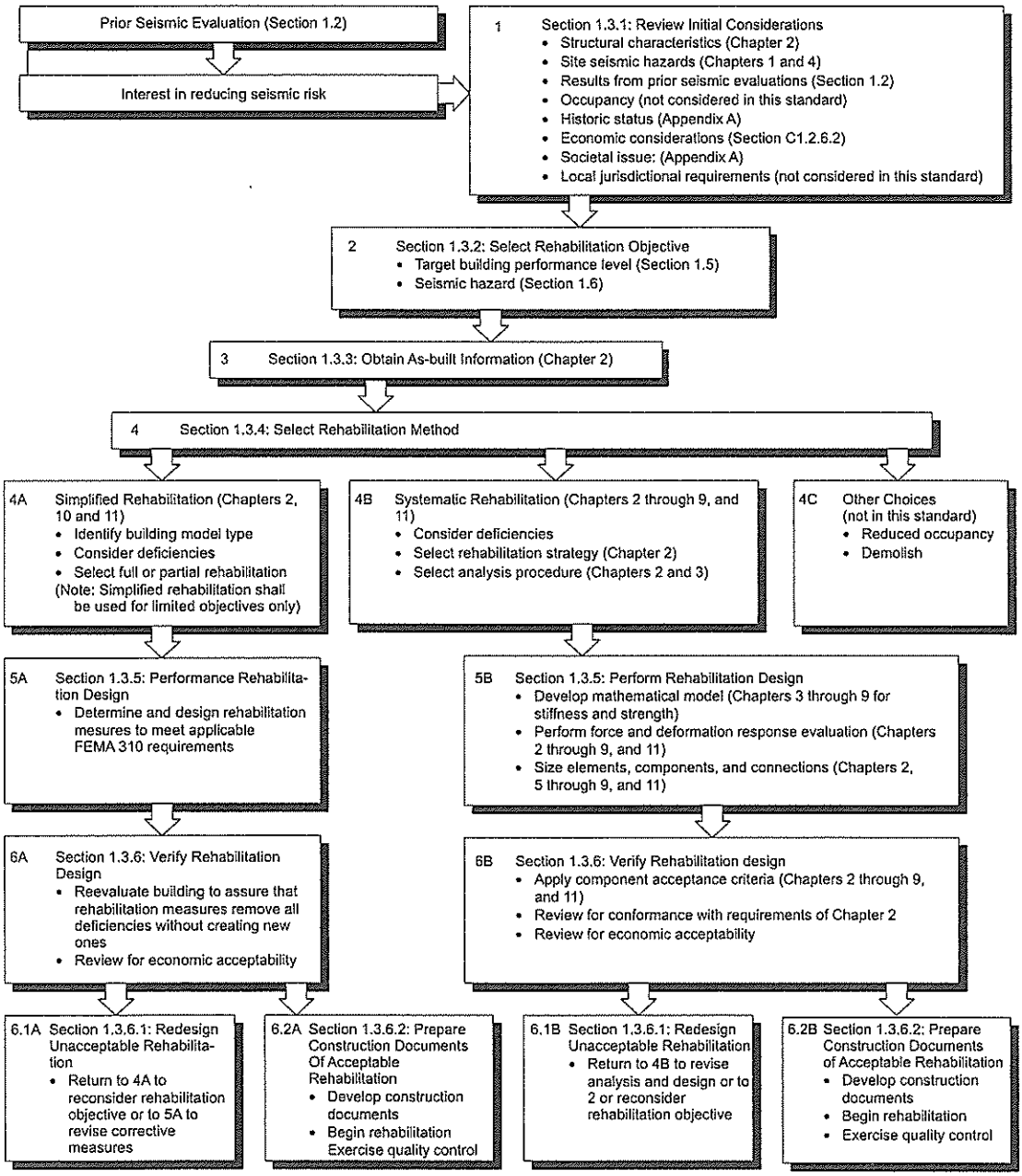


Figure 101.5.4(4)
FEMA 356 REHABILITATION PROCESS
(Source: FEMA 356 Commentary)

provide performance equivalent to that of a "Detailed," "Intermediate" or "Special" system.

2. Compliance with ASCE 41 using both the BSE-1 and BSE-2 earthquake hazard levels and the corresponding performance levels shown in Table 101.5.4.1.

❖ Where the code requires the use of IBC level seismic forces, it intends to provide a level of earthquake performance that is comparable to new construction. The level of performance is typically a function of the building's occupancy classification (see commentary, Section 101.5.4 and Table 101.5.4.1).

One difficulty in applying the seismic requirements intended for new buildings to existing structures is the use of the response modification coefficient *(R)* in calculating the design seismic force. Under the IBC, the value of *R* that is obtained from the ASCE 7 standard is directly linked to the level of detailing required for any seismic-force-resisting system. Systems are characterized as ordinary, intermediate or special based on the extent of ductile detailing that is provided. In areas of moderate or higher seismicity (as reflected by a structure's seismic design category) the use of most ordinary systems, those with limited ductility, are typically restricted or prohibited. In an existing building, the system detailing is in place and the problem is in selecting an *R*-value that is consistent with the construction of that system. For this reason, Item 1 restricts *R*-values to be no greater than those listed for an ordinary system; unless there is clear evidence that a higher level of detailing has been provided.

By contrast, ASCE 31 and ASCE 41 avoid the previously discussed problem with assuming an *R*-value by instead considering the ductility of individual components. In Item 2, the code equates the use of full IBC seismic forces to the performance levels shown in Table 101.5.4.1 where ASCE 41 is used. The dual requirements listed in Table 101.5.4.1 are for BSE-1 and BSE-2 ground motions, which are discussed in the commentary to Section 101.5.4.

TABLE 101.5.4.1
PERFORMANCE CRITERIA FOR IBC LEVEL SEISMIC FORCES

OCCUPANCY CATEGORY (Based on IBC Table 1604.5)	PERFORMANCE LEVEL FOR USE WITH ASCE 41 BSE-1 EARTHQUAKE HAZARD LEVEL	PERFORMANCE LEVEL FOR USE WITH ASCE 41 BSE-2 EARTHQUAKE HAZARD LEVEL
I	Life safety (LS)	Collapse prevention (CP)
II	Life safety (LS)	Collapse prevention (CP)
III	Note a	Note a
IV	Immediate occupancy (IO)	Life safety (LS)

a. Acceptable criteria for Occupancy Category III shall be taken as 80 percent of the acceptance criteria specified for Occupancy Category II performance levels, but need not be less than the acceptance criteria specified for Occupancy Category IV performance levels.

❖ The performance levels listed in this table are comparable to those achieved under the IBC earthquake requirements. Note a requires that Occupancy Category III criteria are 80 percent of those required for Occupancy Category IV. This is analogous to the use of the seismic importance factor for new construction under the IBC. Note b addresses interpolation where ASCE 31 is used. The ASCE 31 checklists are sufficiently conservative for the initial screening phase so that the less restrictive LS performance level will not significantly compromise the overall seismic performance goals for Occupancy Category III buildings.

101.5.4.2 Compliance with reduced IBC level seismic forces. Where seismic evaluation and design is permitted to meet reduced *International Building Code* seismic force levels, the procedures used shall be in accordance with one of the following:

1. The *International Building Code* using 75 percent of the prescribed forces. Values of R, Ω_0 and C_d used for analysis shall be as specified in Section 101.5.4.1 of this code.
2. Structures or portions of structures that comply with the requirements of the applicable chapter in Appendix A as specified in Items 2.1 through 2.5 shall be deemed to comply with this section.
   2.1. The seismic evaluation and design of unreinforced masonry bearing wall buildings in Occupancy Category I or II are permitted to be based on the procedures specified in Appendix Chapter A1.
   2.2. Seismic evaluation and design of the wall anchorage system in reinforced concrete and reinforced masonry wall buildings with flexible diaphragms in Occupancy Category I or II are permitted to be based on the procedures specified in Chapter A2.
   2.3. Seismic evaluation and design of cripple walls and sill plate anchorage in residential buildings of light-frame wood construction in Occupancy Category I or II are permitted to be based on the procedures specified in Chapter A3.
   2.4. Seismic evaluation and design of soft, weak, or open-front wall conditions in multiunit residential buildings of wood construction in Occupancy Category I or II are permitted to be based on the procedures specified in Chapter A4.
   2.5. Seismic evaluation and design of concrete buildings in all occupancy categories are permitted to be based on the procedures specified in Chapter A5.
3. Compliance with ASCE 31 based on the applicable performance level as shown in Table 101.5.4.2. It shall be permitted to use the BSE-1 earthquake hazard level as defined in ASCE 41 and subject to the limitations in Item 4 below.
4. Compliance with ASCE 41 using the BSE-1 Earthquake Hazard Level and the performance level shown in Table 101.5.4.2. The design spectral response acceleration parameters S_{XS} and S_{X1} specified in ASCE 41 shall not be

taken less than 75 percent of the respective design spectral response acceleration parameters S_{DS} and S_{D1} defined by the *International Building Code*.

❖ The lateral-force-resisting systems in most older buildings are difficult, if not impossible, to upgrade to the same level of performance that is required of new construction. Where the code permits the use of this reduced seismic force level, it provides a means of achieving some improvement in earthquake performance of older buildings without making such efforts cost prohibitive. It also permits a building that is relatively close to current earthquake standards to comply outright. Item 1 establishes this level as 75 percent of the earthquake loads that are required in the design of new structures. The same issues with the *R*-value determination discussed in the commentary to Section 101.5.4.1 occurs here, as well.

The same approach is used in Appendix A (GSREB) and it is similar to the approach that has been used under FEMA 178. Therefore, Item 2 clarifies that Appendix A is a permitted alternative (see commentary, Section 101.5.4). Items 3 and 4 equate these reduced seismic forces to the level of performance required by Table 101.5.4.2 for only the BSE-1 in ASCE 31 or ASCE 41, respectively.

TABLE 101.5.4.2
PERFORMANCE CRITERIA FOR REDUCED IBC LEVEL SEISMIC FORCES

OCCUPANCY CATEGORY (Based on IBC Table 1604.5)	PERFORMANCE LEVEL FOR USE WITH ASCE 31	PERFORMANCE LEVEL FOR USE WITH ASCE 41 BSE-1 EARTHQUAKE HAZARD LEVEL
I	Life safety (LS)	Life safety (LS)
II	Life safety (LS)	Life safety (LS)
III	Notes a, b	Note a
IV	Immediate occupancy (IO)	Immediate occupancy (IO)

a. Acceptable criteria for Occupancy Category III shall be taken as 80 percent of the acceptance criteria specified for Occupancy Category II performance levels, but need not be less than the acceptance criteria specified for Occupancy Category IV performance levels.

b. For Occupancy Category III, the ASCE 31 screening phase checklists shall be based on the life safety performance level.

❖ Items 3 and 4 of Section 101.5.4.2 reference the values in Table 101.5.4.2 to use for compliance with reduced IBC level seismic forces. The performance levels listed in this table are to allow for compliance by designing for seismic forces that are less than what is required by the IBC for those instances where the code allows this reduced level of compliance, such as for repairs. These performance levels are consistent with Item 1 of Section 101.5.4.2 that allows using 75 percent of the IBC-prescribed seismic forces.

101.6 Safeguards during construction. All construction work covered in this code, including any related demolition, shall comply with the requirements of Chapter 14.

❖ The fundamental rationale behind this section is to establish that reasonable safety precautions, in accordance with Chapter 14, be provided during all phases of construction and demolition. Chapter 14 also covers the protection of adjacent public and private properties.

101.7 Appendices. The *code official* is authorized to require rehabilitation and retrofit of buildings, structures or individual structural members in accordance with the appendices of this code if such appendices have been individually adopted.

❖ This section describes one of the more unique aspects of the code in that any appendix referenced in the code becomes a part of the code without the jurisdiction having to specifically adopt it. For example, in Chapter 7, voluntary alterations to lateral-force-resisting systems are allowed when conducted in accordance with Appendix A. Therefore, Appendix A, having been specifically referenced, is enforceable without having to be specifically adopted by the local jurisdiction. Any appendices not specifically referenced in the code must be individually adopted to be legally enforced.

101.8 Correction of violations of other codes. *Repairs* or *alterations* mandated by any property, housing, or fire safety maintenance code or mandated by any licensing rule or ordinance adopted pursuant to law shall conform only to the requirements of that code, rule, or ordinance and shall not be required to conform to this code unless the code requiring such *repair* or *alteration* so provides.

❖ This section is intended to keep the requirements of other codes or ordinances intact and separate from the requirements of the code.

SECTION 102
APPLICABILITY

102.1 General. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable. Where in any specific case different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern.

❖ In cases where the code establishes a specific requirement for a certain condition, that requirement is applicable even if it is less restrictive than a general requirement elsewhere in the code. Also, the most restrictive code requirement is to apply where there may be different requirements in the code for a specific installation.

102.2 Other laws. The provisions of this code shall not be deemed to nullify any provisions of local, state, or federal law.

❖ In some cases, other laws enacted by the jurisdiction, or the state or federal government may be applicable to a condition that is also governed by a requirement in the code. In such circumstances, the requirements of the code are in addition to that other law that is still in effect, although the code official may not be responsible for its enforcement.

102.3 Application of references. References to chapter or section numbers or to provisions not specifically identified by number shall be construed to refer to such chapter, section, or provision of this code.

❖ In a situation where the code may make reference to a chapter or section number or to another code provision without specifically identifying its location in the code, assume that the referenced section, chapter or provision is in the code and not in a referenced code or standard.

102.4 Referenced codes and standards. The codes and standards referenced in this code shall be considered part of the requirements of this code to the prescribed extent of each such reference. Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code shall govern.

Exception: Where enforcement of a code provision would violate the conditions of the listing of the equipment or appliance, the conditions of the listing shall govern.

❖ A referenced code, standard or portion thereof is an enforceable extension of the code as if the content of the standard were included in the body of the code. For example, Section 101.5.4 references ASCE 31 in its entirety for the seismic evaluation and design of an existing building. In those cases where the code references only portions of a standard, the use and application of the referenced standard is limited to those portions that are specifically identified. For example, Item 4, Section 303.5 references structural irregularity as defined in ASCE 7. Therefore, it is only these portions of ASCE 7 that are applicable to this specific code requirement with respect to ASCE 7. Lastly, if conflicts between the requirements of the code and a referenced standard occur, the requirements of the code govern regardless of which requirement is more restrictive. The exception deals with possible conflicts between code requirements and the conditions of an equipment listing. If the code conflicts with or deviates from the conditions of the listing, this may or may not mean that the code violated the listing. For example, the listing for an appliance might allow a particular application of an appliance that is expressly prohibited by the code. In this case, the code has not violated the listing, but instead has simply limited the application allowed by the listing. The intent is for the highest level of safety to prevail.

102.5 Partial invalidity. In the event that any part or provision of this code is held to be illegal or void, this shall not have the effect of making void or illegal any of the other parts or provisions.

❖ Only invalid sections of the code (as established by the court of jurisdiction) can be set aside. This is essential to safeguard the application of the code text to situations where a provision is declared illegal or unconstitutional. This section preserves the legislative action that put the legal provisions in place.

PART 2—ADMINISTRATION AND ENFORCEMENT

SECTION 103
DEPARTMENT OF BUILDING SAFETY

103.1 Creation of enforcement agency. The Department of Building Safety is hereby created, and the official in charge thereof shall be known as the *code official*.

❖ This section creates the building department and describes its composition (see Section 109 for a discussion of the inspection duties of the department). Appendix A of the IBC contains qualifications for the employees of the building department involved in the enforcement of the code. If a jurisdiction desires to establish these qualifications for its employees, Appendix A must be specifically referenced in the adopting ordinance.

The executive official in charge of the building department is named the "code official" by this section. In actuality, the person who is in charge of the department may hold a different title, such as building commissioner, building inspector or construction official. For the purpose of the code, that person is referred to as the "code official."

103.2 Appointment. The *code official* shall be appointed by the chief appointing authority of the jurisdiction.

❖ This section establishes the code official as an appointed position of the jurisdiction.

103.3 Deputies. In accordance with the prescribed procedures of this jurisdiction and with the concurrence of the appointing authority, the *code official* shall have the authority to appoint a deputy *code official*, the related technical officers, inspectors, plan examiners, and other employees. Such employees shall have powers as delegated by the *code official*.

❖ This section provides the code official with the authority to appoint other individuals to assist with the administration and enforcement of the code. These individuals have the authority and responsibility as designated by the code official. Such appointments, however, may be exercised only with the authorization of the chief appointing authority.

SECTION 104
DUTIES AND POWERS OF CODE OFFICIAL

104.1 General. The *code official* is hereby authorized and directed to enforce the provisions of this code. The *code official*

shall have the authority to render interpretations of this code and to adopt policies and procedures in order to clarify the application of its provisions. Such interpretations, policies, and procedures shall be in compliance with the intent and purpose of this code. Such policies and procedures shall not have the effect of waiving requirements specifically provided for in this code.

❖ The duty of the code official is to enforce the code, and he or she is the "authority having jurisdiction" for all matters relating to the code and its enforcement. It is the duty of the code official to interpret the code and to determine compliance. Code compliance will not always be easy to determine and will require judgement and expertise, particularly when enforcing the provisions of Sections 104.10 and 104.11. In exercising this authority, however, the code official cannot set aside or ignore any provision of the code.

104.2 Applications and permits. The *code official* shall receive applications, review construction documents, and issue permits for the *repair*, *alteration*, *addition*, demolition, *change of occupancy*, and relocation of buildings; inspect the premises for which such permits have been issued; and enforce compliance with the provisions of this code.

❖ The code enforcement process is normally initiated with an application for a permit. The code official is responsible for processing applications and issuing permits for the modification of buildings in accordance with the code.

104.2.1 Preliminary meeting. When requested by the permit applicant or the *code official*, the *code official* shall meet with the permit applicant prior to the application for a construction permit to discuss plans for the proposed work or *change of occupancy* in order to establish the specific applicability of the provisions of this code.

Exception: *Repairs* and Level 1 *alterations*.

❖ The preliminary meeting is an important aspect of any repair, alteration, change of occupancy, addition or relocation of any building. At this phase in a project, it is considerably less expensive to make changes or corrections. Possible problem issues can be identified and solutions devised ahead of time resulting in fewer correction notices and rework being required. The exception recognizes that a preliminary meeting would not be necessary for a repair or alteration level for one project based on the fact that this level of work is not complicated or involved.

104.2.1.1 Building evaluation. The *code official* is authorized to require an *existing building* to be investigated and evaluated by a registered design professional based on the circumstances agreed upon at the preliminary meeting. The design professional shall notify the *code official* if any potential nonconformance with the provisions of this code is identified.

❖ This section authorizes the code official to have an existing structure investigated and evaluated by a design professional. Existing structures may have some structural problems that are not immediately visible. The ability to call in an experienced design professional to aid in the proper evaluation of an existing structure is invaluable.

104.3 Notices and orders. The *code official* shall issue all necessary notices or orders to ensure compliance with this code.

❖ An important element of code enforcement is the necessary advisement of deficiencies and correction, which is accomplished through written notices and orders. The code official is required to issue orders to abate illegal or unsafe conditions. Section 115.3 contains additional information for these notices.

104.4 Inspections. The *code official* shall make all of the required inspections, or the *code official* shall have the authority to accept reports of inspection by approved agencies or individuals. Reports of such inspections shall be in writing and be certified by a responsible officer of such approved agency or by the responsible individual. The *code official* is authorized to engage such expert opinion as deemed necessary to report upon unusual technical issues that arise, subject to the approval of the appointing authority.

❖ The code official is required to make inspections as necessary to determine compliance with the code or to accept written reports of inspections by an approved agency. The inspection of the work in progress or accomplished to date is another significant element in determining code compliance. While a department does not have the resources to inspect every aspect of all work, the required inspections are those that are dictated by administrative rules and procedures based on many parameters, including available inspection resources. In order to expand the available resources for inspection purposes, the code official may approve an agency that, in his or her opinion, is objective and competent, has adequate equipment to perform any required tests, and employs experienced personnel educated in conducting, supervising and evaluating tests and inspections. When unusual, extraordinary or complex technical issues arise relative to building safety, the code official has the authority to seek the opinion and advice of experts. Since this usually involves the expenditure of funds, the approval of the jurisdiction's chief executive (or similar position) is required. A technical report from an expert requested by the code official can be used to assist in the approval process.

104.5 Identification. The *code official* shall carry proper identification when inspecting structures or premises in the performance of duties under this code.

❖ This section requires the code official (including, by definition, all authorized designees) to carry identification in the course of conducting the duties of the position. This removes any question as to the purpose and authority of the inspector.

104.6 Right of entry. Where it is necessary to make an inspection to enforce the provisions of this code, or where the *code official* has reasonable cause to believe that there exists in a structure or upon a premises a condition which is contrary to or in violation of this code which makes the structure or premises unsafe, *dangerous*, or hazardous, the *code official* is authorized

to enter the structure or premises at reasonable times to inspect or to perform the duties imposed by this code, provided that if such structure or premises be occupied that credentials be presented to the occupant and entry requested. If such structure or premises be unoccupied, the *code official* shall first make a reasonable effort to locate the owner or other person having charge or control of the structure or premises and request entry. If entry is refused, the *code official* shall have recourse to the remedies provided by law to secure entry.

❖ The first part of this section establishes the right of the code official to enter the premises in order to make the permit inspections required by Section 109.3. Permit application forms typically include a statement in the certification signed by the applicant (who is the owner or owner's agent) granting the code official the authority to enter areas covered by the permit in order to enforce code provisions related to the permit. The right to enter other structures or premises is more limited. First, to protect the right of privacy, the owner or occupant must grant the code official permission before an interior inspection of the property can be conducted. Permission is not required for inspections that can be accomplished from within the public right-of-way. Second, such access may be denied by the owner or occupant. Unless the inspector has reasonable cause to believe that a violation of the code exists, access may be unattainable. Third, code officials must present proper identification (see Section 104.5) and request admittance during reasonable hours—usually the normal business hours of the establishment—to be admitted. Fourth, inspections must be aimed at securing or determining compliance with the provisions and intent of the regulations that are specifically within the established scope of the code official's authority.

Searches to gather information for the purpose of enforcing the other codes, ordinances or regulations are considered unreasonable and are prohibited by the Fourth Amendment to the U.S. Constitution. "Reasonable cause" in the context of this section must be distinguished from "probable cause," which is required to gain access to property in criminal cases. The burden of proof establishing reasonable cause may vary among jurisdictions. Usually, an inspector must show that the property is subject to inspection under the provisions of the code; that the interests of the public's health, safety and welfare outweigh the individual's right to maintain privacy and that such an inspection is required solely to determine compliance with the provisions of the code.

Many jurisdictions do not recognize the concept of an administrative warrant and may require the code official to prove probable cause in order to gain access upon refusal. This burden of proof is usually more substantial, often requiring the code official to stipulate in advance why access is needed (usually access is restricted to gathering evidence for seeking an indictment or making an arrest); what specific items or information is sought; its relevance to the case against the individual subject; how knowledge of the relevance of the information or items sought was obtained and how the evidence sought will be used. In all such cases, the right to privacy must always be weighed against the right of the code official to conduct an inspection to verify that public health, safety and welfare are not in jeopardy. Such important and complex constitutional issues should be discussed with the jurisdiction's legal counsel. Jurisdictions should establish procedures for securing the necessary court orders when an inspection is deemed necessary following a refusal.

104.7 Department records. The *code official* shall keep official records of applications received, permits and certificates issued, fees collected, reports of inspections, and notices and orders issued. Such records shall be retained in the official records for the period required for retention of public records.

❖ In keeping with the need for an efficiently conducted business practice, the code official must keep official records pertaining to permit applications, permits, fees collected, inspections, notices and orders issued. Such documentation provides a valuable resource of information if questions arise regarding the department's actions with respect to a building. The code does not require that construction documents be kept after the project is complete. It requires that other documents be kept for the length of time mandated by a jurisdiction's, or its state's, laws or administrative rules for retaining public records.

104.8 Liability. The *code official*, member of the Board of Appeals, or employee charged with the enforcement of this code, while acting for the jurisdiction in good faith and without malice in the discharge of the duties required by this code or other pertinent law or ordinance, shall not thereby be rendered liable personally and is hereby relieved from personal liability for any damage accruing to persons or property as a result of any act or by reason of an act or omission in the discharge of official duties. Any suit instituted against an officer or employee because of an act performed by that officer or employee in the lawful discharge of duties and under the provisions of this code shall be defended by legal representative of the jurisdiction until the final termination of the proceedings. The *code official* or any subordinate shall not be liable for cost in any action, suit, or proceeding that is instituted in pursuance of the provisions of this code.

❖ The code official, other department employees and members of the appeals board are not intended to be held liable for those actions performed in accordance with the code in a reasonable and lawful manner. The responsibility of the code official in this regard is subject to local, state and federal laws that may supersede this provision. This section further establishes that code officials (or subordinates) must not be liable for costs in any legal action instituted in response to the performance of lawful duties. These costs are to be borne by the state, county or municipality. The best way to be certain that the code official's action is a

"lawful duty" is always to cite the applicable code section on which the enforcement action is based.

104.9 Approved materials and equipment. Materials, equipment, and devices approved by the *code official* shall be constructed and installed in accordance with such approval.

❖ The code is a compilation of criteria with which materials, equipment, devices and systems must comply to be suitable for a particular application. The code official has a duty to evaluate such materials, equipment, devices and systems for code compliance and, when compliance is determined, approve the same for use. The materials, equipment, devices and systems must be constructed and installed in compliance with, and all conditions and limitations considered as a basis for, that approval. For example, the manufacturer's instructions and recommendations are to be followed if the approval of the material was based, even in part, on those instructions and recommendations. The approval authority given the code official is a significant responsibility and is a key to code compliance. The approval process is first technical and then administrative and must be approached as such. For example, if data to determine code compliance are required, such data should be in the form of test reports or engineering analysis and not simply taken from a sales brochure.

104.9.1 Used materials and equipment. The use of used materials that meet the requirements of this code for new materials is permitted. Used equipment and devices shall be permitted to be reused subject to the approval of the *code official*.

❖ The code criteria for materials and equipment have changed over the years. Evaluation of testing and materials technology has permitted the development of new criteria that the old materials may not satisfy. As a result, used materials are required to be evaluated in the same manner as new materials. Used materials, equipment and devices must be specifically approved by the code official as being equivalent to that required by the code if they are to be used again in a new installation.

104.10 Modifications. Wherever there are practical difficulties involved in carrying out the provisions of this code, the code official shall have the authority to grant modifications for individual cases upon application of the owner or owner's representative, provided the code official shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code, and that such modification does not lessen health, accessibility, life and fire safety, or structural requirements. The details of action granting modifications shall be recorded and entered in the files of the Department of Building Safety.

❖ The code official may amend or make exceptions to the code as needed where strict compliance is impractical. Only the code official has authority to grant modifications. Consideration of a particular difficulty is to be based on the application of the owner and a demonstration that the intent of the code is accomplished. This section is not intended to permit setting aside or ignoring a code provision; rather, it is intended to provide for the acceptance of equivalent protection. Such modifications do not, however, extend to actions that are necessary to correct violations of the code. In other words, a code violation or the expense of correcting one cannot constitute a practical difficulty.

104.10.1 Flood hazard areas. For *existing buildings* located in *flood hazard areas* for which *repairs*, *alterations* and *additions* constitute *substantial improvement*, the code official shall not grant modifications to provisions related to flood resistance unless a determination is made that:

1. The applicant has presented good and sufficient cause that the unique characteristics of the size, configuration or topography of the site render compliance with the flood-resistant construction provisions inappropriate.
2. Failure to grant the modification would result in exceptional hardship.
3. The granting of the modification will not result in increased flood heights, additional threats to public safety, extraordinary public expense nor create nuisances, cause fraud on or victimization of the public or conflict with existing laws or ordinances.
4. The modification is the minimum necessary to afford relief, considering the flood hazard.
5. A written notice will be provided to the applicant specifying, if applicable, the difference between the design flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation and that construction below the design flood elevation increases risks to life and property.

❖ This section addresses additional requirements for all buildings and structures in designated flood hazard areas. These areas are commonly referred to as "flood plains" and are shown on a community's Flood Insurance Rate Map (FIRM), prepared by the Federal Emergency Management Agency (FEMA), or other adopted flood hazard map. Through the adoption of the code, communities meet a significant portion of the flood plain management regulation requirements necessary to participate in the National Flood Insurance Program (NFIP). To participate in the NFIP, a jurisdiction must adopt, in addition to the flood-resistant requirements found in the code, Appendix G, Flood-Resistant Construction, of the IBC, or a flood plain management ordinance that contains, at a minimum, the provisions contained in Appendix G. In either case, flood plain management requirements must be applied for all existing buildings located in flood hazard areas for buildings undergoing repairs, alterations and additions that constitute substantial improvements. The code official may grant modifications to the provisions of this section for any of the five reasons listed in Section 104.10.1.

104.11 Alternative materials, design and methods of construction, and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design, or method of construction shall be approved where the code official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method, or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability, and safety.

❖ The code is not intended to inhibit innovative ideas or technological advances. A comprehensive regulatory document, such as a building code, cannot envision and then address all future innovations in the industry. As a result, a performance code must be applicable to and provide a basis for the approval of an increasing number of newly developed, innovative materials, systems and methods for which no code text or referenced standards yet exist. The fact that a material, product or method of construction is not addressed in the code is not an indication that such material, product or method is intended to be prohibited. The code official is expected to apply sound technical judgement in accepting materials, systems or methods that, while not anticipated by the drafters of the current code text, can be demonstrated to offer equivalent performance. By virtue of its text, the code regulates new and innovative construction practices while addressing the relative safety of building occupants. The code official is responsible for determining if a requested alternative provides the equivalent level of protection of public health, safety and welfare as required by the code.

104.11.1 Research reports. Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in this code, shall consist of valid research reports from approved sources.

❖ When an alternative material or method is proposed for construction, it is incumbent upon the code official to determine whether this alternative is, in fact, an equivalent to the methods prescribed by the code. Reports providing evidence of this equivalency are required to be supplied by an approved source, meaning a source that the code official finds to be reliable and accurate. The ICC Evaluation Service is an example of an agency that provides research reports for alternative materials and methods.

104.11.2 Tests. Whenever there is insufficient evidence of compliance with the provisions of this code or evidence that a material or method does not conform to the requirements of this code, or in order to substantiate claims for alternative materials or methods, the code official shall have the authority to require tests as evidence of compliance to be made at no expense to the jurisdiction. Test methods shall be as specified in this code or by other recognized test standards. In the absence of recognized and accepted test methods, the code official shall approve the testing procedures. Tests shall be performed by an approved agency. Reports of such tests shall be retained by the code official for the period required for retention.

❖ To provide the basis on which the code official can make a decision regarding an alternative material or method, sufficient technical data, test reports and documentation must be provided for evaluation by the code official. If evidence, satisfactory to the code official, indicates that the alternative material or construction method is equivalent to that required by the code, the code official may approve it. Any such approval cannot have the effect of waiving any requirements of the code. The burden of proof of equivalence lies with the applicant who proposes the use of alternative materials or methods.

The code official must require the submission of any appropriate information and data to assist in the determination of equivalency. This information should be submitted before a permit can be issued. The type of information required includes test data in accordance with referenced standards, evidence of compliance with the referenced standard specifications and design calculations. A research report issued by an authoritative agency is particularly useful in providing the code official with the technical basis for evaluation and approval of new and innovative materials and methods of construction. The use of authoritative research reports can greatly assist the code official by reducing the time-consuming engineering analysis necessary to review these materials and methods. Failure to adequately substantiate a request for the use of an alternative is a valid reason for the code official to deny a request. Any tests submitted in support of an application must have been performed by an agency approved by the code official based on evidence that the agency has the technical expertise, test equipment and quality assurance to properly conduct and report the necessary testing. The test reports submitted to the code official must be retained in accordance with the requirements of Section 104.7.

SECTION 105
PERMITS

105.1 Required. Any owner or authorized agent who intends to *repair*, add to, alter, relocate, demolish, or change the occupancy of a building or to *repair*, install, add, alter, remove, convert, or replace any electrical, gas, mechanical, or plumbing system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the *code official* and obtain the required permit.

❖ This section contains the administrative rules governing the issuance, suspension, revocation or modification of building permits. It also establishes how and by whom the application for a building permit is to be made, how it is to be processed, fees and what information it must contain or have attached to it.

In general, a permit is required for all activities that are regulated by the code or its referenced codes (see Section 101.4) and these activities cannot begin until

the permit is issued, unless the activity is specifically exempted by Section 105.2. Only the owner or a person authorized by the owner can apply for the permit. Note that this section indicates a need for a permit for a change in occupancy, even if no work is contemplated. Although the occupancy of a building or portion thereof may change and the new activity is still classified in the same group, different code provisions may be applicable. The means of egress, structural loads, and light and ventilation provisions are examples of requirements that are occupancy sensitive. The purpose of the permit is to cause the work to be reviewed, approved and inspected to determine compliance with the code.

105.1.1 Annual permit. In lieu of an individual permit for each *alteration* to an already approved electrical, gas, mechanical, or plumbing installation, the *code official* is authorized to issue an annual permit upon application therefor to any person, firm, or corporation regularly employing one or more qualified trade persons in the building, structure, or on the premises owned or operated by the applicant for the permit.

❖ In some instances, such as large buildings or industrial facilities, the repair, replacement or alteration of electrical, gas, mechanical or plumbing systems occurs on a frequent basis and this section allows the code official to issue an annual permit for this work. This relieves both the building department and the owners of such facilities from the burden of filing and processing individual applications for this activity; however, there are restrictions on who is entitled to these permits. They can be issued only for work on a previously approved installation and only to an individual or corporation that employs persons specifically qualified in the trade for which the permit is issued. If tradespeople who perform the work involved are required to be licensed in the jurisdiction, then only those persons would be permitted to perform the work. If trade licensing is not required, then the code official needs to review and approve the qualifications of the persons who will be performing the work. The annual permit can apply only to the individual property that is owned or operated by the applicant.

105.1.2 Annual permit records. The person to whom an annual permit is issued shall keep a detailed record of *alterations* made under such annual permit. The *code official* shall have access to such records at all times, or such records shall be filed with the *code official* as designated.

❖ The work performed in accordance with an annual permit must be inspected by the code official, so it is necessary to know the location of such work and when it was performed. This can be accomplished by having records of the work available to the code official either at the premises or in his or her office, as determined by the official.

105.2 Work exempt from permit. Exemptions from permit requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this jurisdiction. Permits shall not be required for the following:

Building:

1. Sidewalks and driveways not more than 30 inches (762 mm) above grade and not over any basement or story below and that are not part of an accessible route.
2. Painting, papering, tiling, carpeting, cabinets, counter tops, and similar finish work.
3. Temporary motion picture, television, and theater stage sets and scenery.
4. Shade cloth structures constructed for nursery or agricultural purposes, and not including service systems.
5. Window awnings supported by an exterior wall of Group R-3 or Group U occupancies.
6. Movable cases, counters, and partitions not over 69 inches (1753 mm) in height.

Electrical:

Repairs and maintenance: Minor *repair* work, including the replacement of lamps or the connection of approved portable electrical equipment to approved permanently installed receptacles.

Radio and television transmitting stations: The provisions of this code shall not apply to electrical equipment used for radio and television transmissions, but do apply to equipment and wiring for power supply, the installations of towers, and antennas.

Temporary testing systems: A permit shall not be required for the installation of any temporary system required for the testing or servicing of electrical equipment or apparatus.

Gas:

1. Portable heating appliance.
2. Replacement of any minor part that does not alter approval of equipment or make such equipment unsafe.

Mechanical:

1. Portable heating appliance.
2. Portable ventilation equipment.
3. Portable cooling unit.
4. Steam, hot, or chilled water piping within any heating or cooling equipment regulated by this code.
5. Replacement of any part that does not alter its approval or make it unsafe.
6. Portable evaporative cooler.
7. Self-contained refrigeration system containing 10 pounds (4.54 kg) or less of refrigerant and actuated by motors of 1 horsepower (746 W) or less.

Plumbing:

1. The stopping of leaks in drains, water, soil, waste, or vent pipe; provided, however, that if any concealed trap, drainpipe, water, soil, waste, or vent pipe becomes defective and it becomes necessary to remove and replace the same with new material, such work shall be considered as new work, and a permit shall be obtained and inspection made as provided in this code.
2. The clearing of stoppages or the repairing of leaks in pipes, valves, or fixtures, and the removal and reinstallation of water closets, provided such *repairs* do not involve or require the replacement or rearrangement of valves, pipes, or fixtures.

❖ Section 105.1 essentially requires a permit for any activity involving work on a building and its systems and other structures. This section lists those activities that are permitted to take place without first obtaining a permit from the building department. Note that in some cases, such as Items 4 and 5, the work is exempt only for certain occupancies. It is further the intent of the code that even though work may be exempted for permit purposes, it must still comply with the code and the owner is responsible for proper and safe construction for all work being done. Work exempted by the codes adopted by reference in Section 101.4 is also included here.

105.2.1 Emergency repairs. Where equipment replacements and *repairs* must be performed in an emergency situation, the permit application shall be submitted within the next working business day to the *code official*.

❖ This section recognizes that, in some cases, emergency replacement and repair work must be done as quickly as possible and it is not practical to take the time necessary to apply for and obtain approval. A permit for the work must be obtained the next day that the building department is open for business. Any work performed before the permit is issued must be done in accordance with the code and corrected if not approved by the code official.

105.2.2 Repairs. Application or notice to the *code official* is not required for ordinary *repairs* to structures and items listed in Section 105.2. Such *repairs* shall not include the cutting away of any wall, partition, or portion thereof, the removal or cutting of any structural beam or load-bearing support, or the removal or change of any required means of egress or rearrangement of parts of a structure affecting the egress requirements; nor shall ordinary *repairs* include *addition* to, *alteration* of, replacement, or relocation of any standpipe, water supply, sewer, drainage, drain leader, gas, soil, waste, vent, or similar piping, electric wiring, or mechanical or other work affecting public health or general safety.

❖ This section distinguishes between what might be termed by some as repairs, but are in fact alterations, hence causing the code to be applicable and ordinary repairs, which are maintenance activities, to not require a permit.

105.2.3 Public service agencies. A permit shall not be required for the installation, *alteration*, or *repair* of generation, transmission, distribution, or metering or other related equipment that is under the ownership and control of public service agencies by established right.

❖ Utilities that supply electricity, gas, water, telephone, television cable, etc., are not required to obtain permits for work involving the transmission lines and metering equipment that they own and control to their point of delivery. They are typically regulated by other laws that give them specific rights and authority in this area. Any equipment or appliances installed or serviced by such agencies that are not owned by them and under their full control is not exempt from a permit.

105.3 Application for permit. To obtain a permit, the applicant shall first file an application therefor in writing on a form furnished by the Department of Building Safety for that purpose. Such application shall:

1. Identify and describe the work in accordance with Chapter 3 to be covered by the permit for which application is made.
2. Describe the land on which the proposed work is to be done by legal description, street address, or similar description that will readily identify and definitely locate the proposed building or work.
3. Indicate the use and occupancy for which the proposed work is intended.
4. Be accompanied by construction documents and other information as required in Section 106.3.
5. State the valuation of the proposed work.
6. Be signed by the applicant or the applicant's authorized agent.
7. Give such other data and information as required by the *code official*.

❖ This section requires that a written application for a permit be filed on forms provided by the building department and details the information required on the application. Permit forms will typically have sufficient space to write a very brief description of the work to be accomplished, which is sufficient only for small jobs. For larger projects, the description will be augmented by construction documents as indicated in Item 4. As required by Section 105.1, the applicant must be the owner of the property or an authorized agent of the owner, such as an engineer, architect, contractor, tenant or other. The applicant must sign the application, and permit forms typically include a statement that if the applicant is not the owner, he or she has permission from the owner to make the application.

105.3.1 Action on application. The *code official* shall examine or cause to be examined applications for permits and amendments thereto within a reasonable time after filing. If the application or the construction documents do not conform to the requirements of pertinent laws, the *code official* shall reject such application in writing, stating the reasons therefor. If the

code official is satisfied that the proposed work conforms to the requirements of this code and laws and ordinances applicable thereto, the *code official* shall issue a permit therefor as soon as practicable.

❖ This section requires the code official to act with reasonable speed on a permit application. In some instances, this time period is set by state or local law. The code official must refuse to issue a permit when the application and accompanying documents do not conform to the code. In order to ensure effective communication and due process of law, the reasons for denial of an application for a permit are required to be in writing. Once the code official determines that the work described conforms with the code and other applicable laws, the permit must be issued upon payment of the fees required by Section 108.

105.3.2 Time limitation of application. An application for a permit for any proposed work shall be deemed to have been abandoned 180 days after the date of filing, unless such application has been pursued in good faith or a permit has been issued; except that the *code official* is authorized to grant one or more extensions of time for additional periods not exceeding 90 days each. The extension shall be requested in writing and justifiable cause demonstrated.

❖ Typically, an application for a permit is submitted and goes through a review process that ends with the issuance of a permit. If a permit has not been issued 180 days after the date of filing, however, the application is considered abandoned, unless the applicant was diligent in efforts to obtain the permit. The code official has the authority to extend this time limitation (in increments of 90 days), provided there is reasonable cause. This would cover delays beyond the applicant's control, such as prerequisite permits or approvals from other authorities within the jurisdiction or state. The intent of this section is to limit the time between the review process and the issuance of a permit.

105.4 Validity of permit. The issuance or granting of a permit shall not be construed to be a permit for, or an approval of, any violation of any of the provisions of this code or of any other ordinance of the jurisdiction. Permits presuming to give authority to violate or cancel the provisions of this code or other ordinances of the jurisdiction shall not be valid. The issuance of a permit based on construction documents and other data shall not prevent the *code official* from requiring the correction of errors in the construction documents and other data. The *code official* is also authorized to prevent occupancy or use of a structure where in violation of this code or of any other ordinances of this jurisdiction.

❖ This section states the fundamental premise that the permit is only a license to proceed with the work. It is not a license to violate, cancel or set aside any provisions of the code. This is significant because it means that, despite any errors or oversights in the approval process, the permit applicant, not the code official, is responsible for code compliance. Also, the permit can be suspended or revoked in accordance with Section 105.6.

105.5 Expiration. Every permit issued shall become invalid unless the work on the site authorized by such permit is commenced within 180 days after its issuance, or if the work authorized on the site by such permit is suspended or abandoned for a period of 180 days after the time the work is commenced. The *code official* is authorized to grant, in writing, one or more extensions of time for periods not more than 180 days each. The extension shall be requested in writing and justifiable cause demonstrated.

❖ The permit becomes invalid under two distinct situations—both based on a 180-day period. The first situation is when no work has ever started 180 days from the issuance of the permit. The second situation is when the authorized work has stopped for 180 days. The person who was issued the permit should be notified, in writing, that the permit is invalid and what steps must be taken to reinstate it and restart the work. The code official has the authority to extend this time limitation (in increments of 180 days), provided the extension is requested in writing and there is reasonable cause, typically events beyond the permit holder's control.

105.6 Suspension or revocation. The *code official* is authorized to suspend or revoke a permit issued under the provisions of this code wherever the permit is issued in error or on the basis of incorrect, inaccurate, or incomplete information or in violation of any ordinance or regulation or any of the provisions of this code.

❖ A permit, is in reality, a license to proceed with the work. The code official, however, can suspend or revoke permits shown to be based, all or in part, on any false statement or misrepresentation of fact. A permit can also be suspended or revoked if it was issued in error, such as an omitted prerequisite approval or code violation indicated on the construction documents. An applicant may subsequently apply for a reinstatement of the permit with the appropriate corrections or modifications made to the application and construction documents.

105.7 Placement of permit. The building permit or copy shall be kept on the site of the work until the completion of the project.

❖ The permit, or copy thereof, is to be kept on the job site until the work is complete and made available to the code official or representative to conveniently make required entries thereon.

SECTION 106
CONSTRUCTION DOCUMENTS

106.1 General. Submittal documents consisting of construction documents, special inspection and structural observation programs, investigation and evaluation reports, and other data shall be submitted in two or more sets with each application for a permit. The construction documents shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. Where

special conditions exist, the *code official* is authorized to require additional construction documents to be prepared by a registered design professional.

Exception: The *code official* is authorized to waive the submission of construction documents and other data not required to be prepared by a registered design professional if it is found that the nature of the work applied for is such that reviewing of construction documents is not necessary to obtain compliance with this code.

❖ This section establishes the requirement to provide the code official with submittal documents, including construction drawings, specifications and other documents that describe the structure or system for which a permit is sought. It describes the information that must be included in the documents, who must prepare them and procedures for approving them.

A detailed description of the work for which the application is made must be submitted. When the work can be briefly described on the application form and the services of a registered design professional are not required, the code official may utilize judgment in determining the need for detailed documents. An example of work that may not involve the submission of detailed construction documents is the replacement of an existing 60-amp electrical service with a 200-amp service. These provisions are intended to reflect the minimum scope of information needed to determine code compliance. The code official should establish a consistent policy of the number of sets required by the jurisdiction and make this information readily available to applicants.

This section also requires the code official to determine that any state professional registration laws be complied with as they apply to the preparation of construction documents.

106.2 Construction documents. Construction documents shall be in accordance with Sections 106.2.1 through 106.2.5.

❖ This section describes, in detail, the minimum requirements for the construction documents portion of the submittal documents. Sections 106.2.1 through 106.2.5 contain the minimum information to be provided on the construction documents. The following subsections specify the detailed information that must be shown on the submitted construction documents. When specifically allowed by the code official, documents can be submitted in electronic form.

106.2.1 Construction documents. Construction documents shall be dimensioned and drawn upon suitable material. Electronic media documents are permitted to be submitted when approved by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the *code official*. The work areas shall be shown.

❖ The construction documents are required to be of a quality and detail such that the code official can determine that the work conforms to the code and other applicable laws and regulations. General statements on the documents, such as "All work must comply with the *International Existing Building Code*," are not an acceptable substitute for showing the required information.

106.2.2 Fire protection system(s) shop drawings. Shop drawings for the fire protection system(s) shall be submitted to indicate conformance with this code and the construction documents and shall be approved prior to the start of system installation. Shop drawings shall contain all information as required by the referenced installation standards in Chapter 9 of the *International Building Code*.

❖ Since the fire protection contractor(s) may not have been selected at the time a permit was issued for the construction of a building, detailed shop drawings for fire protection systems are not available. Because they provide the information necessary to determine code compliance, as specified in the appropriate referenced standard in Chapter 9 of the IBC, they must be submitted and approved by the code official before the contractor can begin installing the system. For example, the professional responsible for the design of an automatic sprinkler system should determine that the water supply is adequate, but will not be able to prepare a final set of hydraulic calculations if the specific materials and pipe sizes, lengths and arrangements have not been identified. Once the installing contractor is selected, specific hydraulic calculations can be prepared. Factors such as classification of the hazard, amount of water supply available and the density or concentration to be achieved by the system are to be included with the submission of the shop drawings. Specific data sheets identifying sprinklers, pipe dimensions, power requirements for smoke detectors, etc., should also be included with the submission.

106.2.3 Means of egress. The construction documents for *Alterations*–Level 2, *Alterations*–Level 3, *additions* and changes of occupancy shall show in sufficient detail the location, construction, size and character of all portions of the means of egress in compliance with the provisions of this code. The construction documents shall designate the number of occupants to be accommodated in every *work area* of every floor and in all affected rooms and spaces.

❖ The complete means of egress system is required to be indicated on the plans to permit the code official to initiate a review and identify pertinent code requirements for each component. Additionally, requiring such information to be reflected in the construction documents requires the designer not only to become familiar with the code, but also to be aware of egress principles, concepts and purposes. The need to ensure that the means of egress leads to a public way is also a consideration during the plan review. Such an evaluation cannot be made without the inclusion of a site plan, as required by Section 106.2.5.

Information essential for determining the required capacity of the egress components (see Section 1005 of the IBC) and the number of egress components required from a space (see Sections 1015.1 and 1020.1 of the IBC) must be provided. The designer must be

aware of the occupancy of a space and properly identify that, along with its resultant occupant load, on the construction documents. In occupancies in Groups I-1, R-2 and R-3, the occupant load can be readily determined with little difference in the number so that the designation of the occupant load on the construction documents is not required.

106.2.4 Exterior wall envelope. Construction documents for all work affecting the exterior wall envelope shall describe the exterior wall envelope in sufficient detail to determine compliance with this code. The construction documents shall provide details of the exterior wall envelope as required, including windows, doors, flashing, intersections with dissimilar materials, corners, end details, control joints, intersections at roof, eaves, or parapets, means of drainage, water-resistive membrane, and details around openings.

The construction documents shall include manufacturer's installation instructions that provide supporting documentation that the proposed penetration and opening details described in the construction documents maintain the wind and weather resistance of the exterior wall envelope. The supporting documentation shall fully describe the exterior wall system which was tested, where applicable, as well as the test procedure used.

❖ This section specifically identifies details of exterior wall construction that are critical to the weather resistance of the wall and requires those details to be provided on the construction documents. Where the weather resistance of the exterior wall assembly is based on tests, the submitted documentation is to describe the details of the wall envelope and the test procedure that was used. This provides the code official with enough information necessary to determine code compliance.

106.2.5 Site plan. The construction documents submitted with the application for permit shall be accompanied by a site plan showing to scale the size and location of new construction and existing structures on the site, distances from lot lines, the established street grades, and the proposed finished grades; and it shall be drawn in accordance with an accurate boundary line survey. In the case of demolition, the site plan shall show construction to be demolished and the location and size of existing structures and construction that are to remain on the site or plot. The *code official* is authorized to waive or modify the requirement for a site plan when the application for permit is for *alteration*, *repair* or *change of occupancy*.

❖ Certain code requirements are dependent on the structure's location on the lot and the topography of the site. As a result, a scaled site plan containing the data listed in this section is required to permit review for compliance. The code official can waive the requirement for a site plan when it is not required to determine code compliance, such as work involving only interior alterations or repairs.

106.3 Examination of documents. The *code official* shall examine or cause to be examined the submittal documents and shall ascertain by such examinations whether the construction or occupancy indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances.

❖ The requirements of this section are related to those found in Section 105.3.1 regarding the action of the code official in response to a permit application. The code official can delegate the review of the submittal documents to subordinates as provided for in Section 103.3.

106.3.1 Approval of construction documents. When the *code official* issues a permit, the construction documents shall be approved in writing or by stamp as "Reviewed for Code Compliance." One set of construction documents so reviewed shall be retained by the *code official*. The other set shall be returned to the applicant, shall be kept at the site of work, and shall be open to inspection by the *code official* or a duly authorized representative.

❖ The code official must stamp or otherwise endorse as "Reviewed for Code Compliance" the construction documents on which the permit is based. One set of approved construction documents must be kept on the construction site to serve as the basis for all subsequent inspections. To avoid confusion, the construction documents on the site must be the documents that were approved and stamped. This is because inspections are to be performed with regard to the approved documents, not the code itself. Additionally, the contractor cannot determine compliance with the approved construction documents unless they are readily available. Unless the approved construction documents are available, the inspection should be postponed and work on the project halted.

106.3.2 Previous approval. This code shall not require changes in the construction documents, construction or designated occupancy of a structure for which a lawful permit has been issued and the construction of which has been pursued in good faith within 180 days after the effective date of this code and has not been abandoned.

❖ If a permit is issued and construction proceeds at a normal pace and a new edition of the code is adopted by the legislative body, requiring that the building be constructed to conform to the new code is unreasonable. This section provides for the continuity of permits issued under previous codes, as long as such permits are being "actively prosecuted" subsequent to the effective date of the ordinance adopting this edition of the code.

106.3.3 Phased approval. The *code official* is authorized to issue a permit for the construction of foundations or any other part of a building before the construction documents for the whole building or structure have been submitted, provided that adequate information and detailed statements have been filed complying with pertinent requirements of this code. The holder of such permit for the foundation or other parts of a building shall proceed at the holder's own risk with the building

operation and without assurance that a permit for the entire structure will be granted.

❖ The code official has the authority to issue a partial permit to allow for the practice of "fast tracking" a job. Any construction under a partial permit is "at the holder's own risk" and "without assurance that a permit for the entire structure will be granted." The code official is under no obligation to accept work or issue a complete permit in violation of the code, ordinances or statutes, simply because a partial permit had been issued. Fast tracking places an unusual administrative and technical burden on the code official. The purpose is to proceed with construction while the design continues for other aspects of the work. Coordinating and correlating the code aspects into the project in phases requires attention to detail and project tracking so that all code issues are addressed. The coordination of these submittals is the responsibility of the registered design professional in responsible charge.

106.3.4 Deferred submittals. For the purposes of this section, deferred submittals are defined as those portions of the design that are not submitted at the time of the application and that are to be submitted to the *code official* within a specified period.

Deferral of any submittal items shall have the prior approval of the *code official*. The registered design professional in responsible charge shall list the deferred submittals on the construction documents for review by the *code official*.

Submittal documents for deferred submittal items shall be submitted to the registered design professional in responsible charge who shall review them and forward them to the *code official* with a notation indicating that the deferred submittal documents have been reviewed and that they have been found to be in general conformance to the design of the building. The deferred submittal items shall not be installed until their deferred submittal documents have been approved by the *code official*.

❖ Often, especially on larger projects, details of certain building parts are not available at the time of permit issuance because they have not yet been designed; for example, exterior cladding, prefabricated items such as trusses and stairs, and the components of fire protection systems. The design professional in responsible charge must identify on the submittal documents the items to be included in any deferred submittals. Documents required for the approval of deferred items must be reviewed by the design professional in responsible charge for compatibility with the design of the building, forwarded to the code official with a notation that this is the case and approved by the code official before installation of the items. Sufficient time must be allowed for the approval process. Note that deferred submittals differ from the phased permits described in Section 106.3.3 in that they occur after the permit for the building is issued and are not for work covered by separate permits.

106.4 Amended construction documents. Work shall be installed in accordance with the reviewed construction documents, and any changes made during construction that are not in compliance with the approved construction documents shall be resubmitted for approval as an amended set of construction documents.

❖ Any amendments to the approved construction documents must be filed before constructing the amended item. In the broadest sense, amendments include all addenda, change orders, revised drawings and marked-up shop drawings. Code officials should maintain a policy that all amendments be submitted for review. Otherwise, a significant amendment may not be submitted because of misinterpretation, resulting in an activity that is not approved and that causes a needless delay in obtaining approval of the finished work.

106.5 Retention of construction documents. One set of approved construction documents shall be retained by the *code official* for a period of not less than the period required for retention of public records.

❖ A set of the approved construction documents must be kept by the code official as may be required by state or local laws, but for a period of not less than 180 days after the work is complete. Questions regarding an item shown on the approved documents may arise in the period immediately following completion of the work and the documents should be available for review. See Section 104.7 for requirements to retain other records that are generated as a result of the work.

106.6 Design professional in responsible charge. When it is required that documents be prepared by a registered design professional, the *code official* shall be authorized to require the owner to engage and designate on the building permit application a registered design professional who shall act as the registered design professional in responsible charge. If the circumstances require, the owner shall designate a substitute registered design professional in responsible charge who shall perform the duties required of the original registered design professional in responsible charge. The *code official* shall be notified in writing by the owner if the registered design professional in responsible charge is changed or is unable to continue to perform the duties. The registered design professional in responsible charge shall be responsible for reviewing and coordinating submittal documents prepared by others, including phased and deferred submittal items, for compatibility with the design of the building. Where structural observation is required, the inspection program shall name the individual or firms who are to perform structural observation and describe the stages of construction at which structural observation is to occur.

❖ At the time of permit application and at various intervals during a project, the code requires detailed technical information to be submitted to the code official. This will vary depending on the complexity of the project, but typically includes the construction documents with supporting information, applications utilizing the phased approval procedure in Section 106.3.3, and reports from engineers, inspectors and testing agencies as required in Chapter 17 of the IBC. Since these documents and reports are prepared by numerous individuals, firms and agencies, it is necessary to have a

single person charged with the responsibility for coordinating their submittal to the code official. This person is the point of contact for the code official for all information relating to the project. Otherwise, the code official could waste time and effort attempting to locate the source of accurate information when trying to resolve an issue, such as a discrepancy in plans submitted by different designers.

The requirement that the owner engage a person to act as the design professional in responsible charge is applicable to projects where the construction documents are required by law to be prepared by a registered design professional (see Section 106.1) and when required by the code official. The person employed by the owner to act as the design professional in responsible charge must be identified on the permit application, but the owner can change the designated person at any time during the course of the review process or work, provided the code official is so notified in writing.

SECTION 107
TEMPORARY STRUCTURES AND USES

107.1 General. The *code official* is authorized to issue a permit for temporary uses. Such permits shall be limited as to time of service but shall not be permitted for more than 180 days. The *code official* is authorized to grant extensions for demonstrated cause.

❖ In the course of construction or other activities, structures that have a limited service life are often necessary. This section contains the administrative provisions that permit such temporary structures without full compliance with the code requirements for permanently occupied structures.

This section allows the code official to issue permits for temporary structures or uses. The applicant must specify the time period desired for the temporary structure or use, but the approval period cannot exceed 180 days. Structures or uses that are "temporary" but are anticipated to be in existence for more than 180 days are required to conform to code requirements for permanent structures and uses. The code official is authorized to grant time extensions if the applicant can provide a valid reason for the extension. A typical example would be circumstances that have occurred beyond the applicant's control. This provision is not intended to be used to circumvent the 180-day limitation.

107.2 Conformance. Temporary uses shall conform to the structural strength, fire safety, means of egress, accessibility, light, ventilation and sanitary requirements of this code as necessary to ensure the public health, safety and general welfare.

❖ This section prescribes those categories of the code that must be complied with, despite the fact that the structure will be removed or the use discontinued at some time in the future. These criteria are essential for measuring the safety of any use, temporary or permanent. Therefore, the application of these criteria to a temporary structure cannot be waived.

"Structural strength" refers to the ability of the temporary structure to resist anticipated live, environmental and dead loads (see Chapter 16 of the IBC). It also applies to anticipated live and dead loads imposed by a temporary use in an existing structure.

"Fire safety" provisions are those required by Chapters 8, 9 and 10 of the IBC invoked by virtue of the structure's size, use or location on the property.

"Means of egress" refers to full compliance with Chapter 10 of the IBC.

"Accessibility" refers to full compliance with Chapter 11 of the IBC for making buildings accessible to physically disabled persons, a requirement that is repeated in Section 1103.1 of the IBC.

"Light, ventilation and sanitary" requirements are those imposed by Chapter 12 of the IBC or applicable sections of the *International Plumbing Code*® (IPC®) or *International Mechanical Code*® (IMC®).

107.3 Temporary power. The *code official* is authorized to give permission to temporarily supply and use power in part of an electric installation before such installation has been fully completed and the final certificate of completion has been issued. The part covered by the temporary certificate shall comply with the requirements specified for temporary lighting, heat or power in NFPA 70.

❖ Commonly, the electrical service on most construction sites is installed and energized long before all of the wiring is completed. This procedure allows the power supply to be increased as construction demands; however, temporary permission is not intended to waive the requirements set forth in the NFPA 70. Construction power from the permanent wiring of the building does not require the installation of temporary ground-fault circuit-interrupter (GFCI) protection or the assured equipment grounding program, because the building wiring installed as required by the code should be as safe for construction use as it would be for use after the completion of the building.

107.4 Termination of approval. The *code official* is authorized to terminate such permit for a temporary use and to order the temporary use to be discontinued.

❖ This section provides the code official with the necessary authority to terminate the permit for a temporary use. The code official can order that a temporary structure be removed or a temporary use be discontinued if conditions of the permit have been violated or the structure or use poses an imminent hazard to the public, in which case the provisions of Section 116 become applicable. This text is important because it allows the code official to act quickly when time is of the essence in order to protect public health, safety and welfare.

SECTION 108
FEES

108.1 Payment of fees. A permit shall not be valid until the fees prescribed by law have been paid. Nor shall an amendment to a permit be released until the additional fee, if any, has been paid.

❖ The code anticipates that jurisdictions will establish their own fee schedules. It is the intent that the fees collected by the department for building permit issuance, plan review and inspection be adequate to cover the costs to the department in these areas.

This section requires that all fees be paid prior to permit issuance or release of an amendment to a permit. Since department operations are intended to be supported by fees paid by the user of department activities, it is important that these fees are received before incurring any expense. This philosophy has resulted in a common practice of having fees paid prior to plan review and inspection.

108.2 Schedule of permit fees. On buildings, electrical, gas, mechanical, and plumbing systems or *alterations* requiring a permit, a fee for each permit shall be paid as required in accordance with the schedule as established by the applicable governing authority.

❖ The jurisdiction inserts its desired fee schedule at this location. The fees are established by law, such as in an ordinance adopting the code (see page ix of the code for a sample), a separate ordinance or legally promulgated regulation, as required by state or local law. Fee schedules are often based on a valuation of the work to be performed. This concept is based on the proposition that the valuation of a project is related to the amount of work to be expended in the plan review, inspections and administering the permit, plus an excess to cover the department overhead.

108.3 Building permit valuations. The applicant for a permit shall provide an estimated permit value at time of application. Permit valuations shall include total value of work including materials and labor for which the permit is being issued, such as electrical, gas, mechanical, plumbing equipment, and permanent systems. If, in the opinion of the *code official*, the valuation is underestimated on the application, the permit shall be denied unless the applicant can show detailed estimates to meet the approval of the *code official*. Final building permit valuation shall be set by the *code official*.

❖ As indicated in Section 108.2, jurisdictions usually base their fees on the value of the work being performed. This section, therefore, requires the applicant to provide this figure, which is to include the total value of the work, including materials and labor, for which the permit is sought. If the code official believes that the value provided by the applicant is underestimated, the permit is to be denied unless the applicant can substantiate the value by providing detailed estimates of the work to the satisfaction of the code official. For the construction of new buildings, the building valuation data referred to in Section 108.2 can be used by the code official as a yardstick against which to compare the applicant's estimate.

108.4 Work commencing before permit issuance. Any person who commences any work before obtaining the necessary permits shall be subject to an additional fee established by the *code official* that shall be in addition to the required permit fees.

❖ The code official will incur certain costs (ie., inspection time and administrative) when investigating and citing a person who has commenced work without having obtained a permit. The code official is, therefore, entitled to recover these costs by establishing a fee imposed on the responsible party, in addition to that collected when the required permit is issued. Note that this is not a penalty, as described in Section 113.4, for which the person can also be liable.

108.5 Related fees. The payment of the fee for the construction, *alteration*, removal, or demolition of work done in connection to or concurrently with the work authorized by a building permit shall not relieve the applicant or holder of the permit from the payment of other fees that are prescribed by law.

❖ The fees for a building permit may be in addition to other fees required by the jurisdiction or others for related items such as sewer connections, water service taps, driveways and signs. It cannot be construed that the building permit fee includes these other items.

108.6 Refunds. The *code official* is authorized to establish a refund policy.

❖ This section allows for a refund of fees, which may be full or partial, typically resulting from the revocation, abandonment or discontinuance of a construction project for which a permit has been issued and fees have been collected. The refund of fees should be related to the cost of enforcement services not provided because of the termination of the project. The code official, when authorizing a fee refund, is authorizing the disbursement of public funds. Therefore, the request for a refund must be in writing and for good cause.

SECTION 109
INSPECTIONS

109.1 General. Construction or work for which a permit is required shall be subject to inspection by the *code official*, and such construction or work shall remain accessible and exposed for inspection purposes until approved. Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid. It shall be the duty of the permit applicant to cause the work to remain accessible and exposed for inspection purposes. Neither the *code official* nor the jurisdiction shall be liable for expense entailed in the

removal or replacement of any material required to allow inspection.

❖ The inspection function is one of the more important aspects of building department operations. This section authorizes the code official to inspect the work for which a permit has been issued and requires that the work to be inspected remain accessible to the code official until inspected and approved. Any expense incurred in removing or replacing material that conceals an item to be inspected is not the responsibility of the code official or the jurisdiction. As with the issuance of permits (see Section 105.4), approval as a result of an inspection is not a license to violate the code and an approval in violation of the code does not relieve the applicant from complying with the code and is not valid.

109.2 Preliminary inspection. Before issuing a permit, the *code official* is authorized to examine or cause to be examined buildings and sites for which an application has been filed.

❖ The code official is granted authority to inspect the site before permit issuance. This may be necessary to verify existing conditions that impact on the plan review and permit approval. This section provides the code official with the right of entry authority that otherwise does not occur until after the permit is issued (see Section 104.6).

109.3 Required inspections. The *code official*, upon notification, shall make the inspections set forth in Sections 109.3.1 through 109.3.9.

❖ The code official is required to verify that the work is completed in accordance with the approved construction documents. It is the responsibility of the permit holder to notify the code official when the item is ready for inspection. The inspections that are necessary to provide such verification are listed in the following sections, with the caveat in Section 109.3.8 that special inspections, in addition to those listed here, may be required depending on the work involved.

109.3.1 Footing or foundation inspection. Footing and foundation inspections shall be made after excavations for footings are complete and any required reinforcing steel is in place. For concrete foundations, any required forms shall be in place prior to inspection. Materials for the foundation shall be on the job, except where concrete is ready-mixed in accordance with ASTM C 94, the concrete need not be on the job.

❖ It is necessary for the code official to inspect the soil upon which the footing or foundation is to be placed. This inspection also includes any reinforcing steel, concrete forms and materials to be used in the foundation, except for ready-mixed concrete that is prepared off site.

109.3.2 Concrete slab or under-floor inspection. Concrete slab and under-floor inspections shall be made after in-slab or under-floor reinforcing steel and building service equipment, conduit, piping accessories, and other ancillary equipment items are in place but before any concrete is placed or floor sheathing installed, including the sub floor.

❖ The code official must be able to inspect the soil and any required under-slab drainage, waterproofing or dampproofing material, as well as reinforcing steel, conduit, piping and other service equipment embedded in or installed below a slab prior to placing the concrete. Similarly, items installed below a floor system other than concrete must be inspected before they are concealed by the floor sheathing or subfloor.

109.3.3 Lowest floor elevation. For *additions* and *substantial improvements* to *existing buildings* in *flood hazard areas*, upon placement of the lowest floor, including basement, and prior to further vertical construction, the elevation documentation required in the *International Building Code* shall be submitted to the *code official*.

❖ Where a structure is located in a flood hazard area, as established in Section 1612.3 of the IBC, the code official must be provided with certification that either the lowest floor elevation (for structures located in flood hazard areas not subject to high-velocity wave action) or the elevation of the lowest horizontal structural member (for structures located in flood hazard areas subject to high-velocity wave action) is in compliance with Section 1612 of the IBC. This certification must be submitted prior to any construction proceeding above this level.

109.3.4 Frame inspection. Framing inspections shall be made after the roof deck or sheathing, all framing, fire blocking, and bracing are in place and pipes, chimneys, and vents to be concealed are complete and the rough electrical, plumbing, heating wires, pipes, and ducts are approved.

❖ This section requires that the code official be able to inspect the framing members, such as studs, joists, rafters and girders, and other items such as vents and chimneys, that will be concealed by wall construction. Rough electrical work, plumbing, heating wires, pipes and ducts must have already been approved in accordance with the applicable codes prior to this inspection.

109.3.5 Lath or gypsum board inspection. Lath and gypsum board inspections shall be made after lathing and gypsum board, interior and exterior, is in place but before any plastering is applied or before gypsum board joints and fasteners are taped and finished.

Exception: Gypsum board that is not part of a fire-resistance-rated assembly or a shear assembly.

❖ In order to verify that lath and gypsum board is properly attached to framing members, it is necessary for the code official to be able to inspect before the plaster or joint finish material is applied. This is required only for gypsum board that is part of either a fire-resistant assembly or a shear wall.

109.3.6 Fire and smoke-resistant penetrations. Protection of joints and penetrations in fire-resistance-rated assemblies,

smoke barriers and smoke partitions shall not be concealed from view until inspected and approved.

❖ The code official must have an opportunity to inspect joint protection and penetration protection as required by Sections 712 and 713 of the IBC for fire- and smoke-resistance-rated assemblies before it is concealed from view.

109.3.7 Other inspections. In addition to the inspections specified above, the *code official* is authorized to make or require other inspections of any construction work to ascertain compliance with the provisions of this code and other laws that are enforced by the Department of Building Safety.

❖ Any item regulated by the code is subject to inspection by the code official to determine compliance with the applicable code provision and no list can include all items in a given building. This section, therefore, gives the code official the authority to inspect any regulated items.

109.3.8 Special inspections. Special inspections shall be required in accordance with the *International Building Code*.

❖ Special inspections are to be provided by the owner for the types of work required in Section 1704 of the IBC. The code official is to approve special inspectors and verify that the required special inspections have been conducted.

109.3.9 Final inspection. The final inspection shall be made after all work required by the building permit is completed.

❖ Upon completion of the work for which the permit has been issued and before the issuance of the certificate of occupancy required by Section 110.3, a final inspection is to be made. All violations of the approved construction documents and permit are to be noted and the holder of the permit is to be notified of the discrepancies.

109.4 Inspection agencies. The *code official* is authorized to accept reports of approved inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.

❖ As an alternative to the code official conducting the inspection, he or she is permitted to accept inspections of and reports by approved inspection agencies. Appropriate criteria on which to base approval of inspection agencies can be found in Section 1703 of the IBC.

109.5 Inspection requests. It shall be the duty of the holder of the building permit or their duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for any inspections of such work that are required by this code.

❖ It is the responsibility of the permit holder or other authorized person, such as the contractor performing the work, to arrange for the required inspections when completed work is ready and to allow for sufficient time for the code official to schedule a visit to the site to prevent work from being concealed prior to being inspected. Access to the work to be inspected must be provided, including any special means such as a ladder.

109.6 Approval required. Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the *code official*. The *code official*, upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed or shall notify the permit holder or an agent of the permit holder wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the *code official*.

❖ This section establishes that work cannot progress beyond the point of a required inspection without the code official's approval. Upon making the inspection, the code official must either approve the completed work or notify the permit holder or other responsible party of that which does not comply with the code. Approvals and notices of noncompliance must be in writing, as required by Section 104.4, to avoid any misunderstanding as to what is required. Any item not approved cannot be concealed until it has been corrected and approved by the code official.

SECTION 110
CERTIFICATE OF OCCUPANCY

110.1 Altered area use and occupancy classification change. No altered area of a building and no relocated building shall be used or occupied, and no change in the existing occupancy classification of a building or portion thereof shall be made until the code official has issued a certificate of occupancy therefor as provided herein. Issuance of a certificate of occupancy shall not be construed as an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction.

❖ This section establishes that a building or structure that has been repaired, altered, relocated or has experienced a change of occupancy cannot be occupied until a certificate of occupancy is issued by the code official, which reflects the conclusion of the work allowed by the building permit. Also, no change in occupancy of an existing building is permitted without first obtaining a certificate of occupancy for the new use.

The tool that the code official uses to control the uses and occupancies of various buildings and structures within the jurisdiction is the certificate of occupancy. It is unlawful to use or occupy a building or structure unless a certificate of occupancy has been issued for that use. Its issuance does not relieve the building owner from the responsibility for correcting any code violation that may exist.

110.2 Certificate issued. After the *code official* inspects the building and finds no violations of the provisions of this code or other laws that are enforced by the Department of Building Safety, the *code official* shall issue a certificate of occupancy that shall contain the following:

1. The building permit number.
2. The address of the structure.

3. The name and address of the owner.
4. A description of that portion of the structure for which the certificate is issued.
5. A statement that the described portion of the structure has been inspected for compliance with the requirements of this code for the occupancy and division of occupancy and the use for which the proposed occupancy is classified.
6. The name of the *code official*.
7. The edition of the code under which the permit was issued.
8. The use and occupancy in accordance with the provisions of the *International Building Code*.
9. The type of construction as defined in the *International Building Code*.
10. The design occupant load and any impact the *alteration* has on the design occupant load of the area not within the scope of the work.
11. If fire protection systems are provided, whether the fire protection systems are required.
12. Any special stipulations and conditions of the building permit.

❖ The code official is required to issue a certificate of occupancy after a successful final inspection has been completed and all deficiencies and violations have been resolved. This section lists the information that must be included on the certificate. This information is useful to both the code official and owner because it indicates the criteria under which the structure was evaluated and approved at the time the certificate was issued. This is especially important when later applying Chapter 13 to existing structures.

110.3 Temporary occupancy. The *code official* is authorized to issue a temporary certificate of occupancy before the completion of the entire work covered by the permit, provided that such portion or portions shall be occupied safely. The *code official* shall set a time period during which the temporary certificate of occupancy is valid.

❖ The code official is permitted to issue a temporary certificate of occupancy for all or a portion of a building prior to the completion of all work. Such certification is to be issued only when the building or portion in question can be safely occupied prior to full completion. The certification is intended to acknowledge that some building features may not be completed even though the building is safe for occupancy, or that a portion of the building can be safely occupied while work continues in another area. This provision precludes the occupancy of a building or structure that does not contain all of the required fire protection systems and means of egress. Temporary certificates should be issued only when incidental construction remains, such as site work and interior work, that is not regulated by the code and exterior decoration not necessary to the integrity of the building envelope. The code official should view the issuance of a temporary certificate of occupancy as substantial an act as the issuance of the final certificate. Indeed, the issuance of a temporary certificate of occupancy offers a greater potential for conflict because once the building or structure is occupied, it is very difficult to remove the occupants through legal means. The certificate must specify the time period for which it is valid.

110.4 Revocation. The *code official* is authorized to, in writing, suspend or revoke a certificate of occupancy or completion issued under the provisions of this code wherever the certificate is issued in error or on the basis of incorrect information supplied, or where it is determined that the building or structure or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.

❖ The code official is authorized to, in writing, suspend or revoke a certificate of occupancy or completion issued under the provisions of the code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure, or portion thereof, is in violation of any ordinance or regulation or any of the provisions of the code.

This section is needed to give the code official the authority to revoke a certificate of occupancy for the reasons indicated in the code text. The code official may also suspend the certificate of occupancy until all of the code violations are corrected.

SECTION 111
SERVICE UTILITIES

111.1 Connection of service utilities. No person shall make connections from a utility, source of energy, fuel, or power to any building or system that is regulated by this code for which a permit is required, until approved by the *code official*.

❖ This section establishes the authority of the code official to approve utility connections to a building for items such as water, sewer, electricity, gas and steam; and to require their disconnection when hazardous conditions or emergencies exist.

The approval of the code official is required before a connection can be made from a utility to a building system that is regulated by the applicable code, including those referenced in Section 101.4. This includes utilities supplying water, sewer, electricity, gas and steam services. For the protection of building occupants, including workers, such systems must have had final inspection approvals, except as allowed by Section 111.2 for temporary connections.

111.2 Temporary connection. The *code official* shall have the authority to authorize the temporary connection of the building or system to the utility source of energy, fuel, or power.

❖ The code official is permitted to issue temporary authorization to make connections to the public utility system prior to the completion of all work. This acknowledges that, because of seasonal limitations, time constraints, or the need for testing or partial oper-

ation of equipment, some building systems may be safely connected even though the building is not suitable for final occupancy. The temporary connection and utilization of connected equipment should be approved when the requesting permit holder has demonstrated to the code official's satisfaction that public health, safety and welfare will not be endangered.

111.3 Authority to disconnect service utilities. The *code official* shall have the authority to authorize disconnection of utility service to the building, structure or system regulated by this code and the referenced codes and standards in case of emergency where necessary to eliminate an immediate hazard to life or property or when such utility connection has been made without the approval required by Section 111.1 or 111.2. The code official shall notify the serving utility and, wherever possible, the owner and occupant of the building, structure or service system of the decision to disconnect prior to taking such action. If not notified prior to disconnecting, the owner or occupant of the building, structure or service system shall be notified in writing, as soon as practical thereafter.

❖ When an immediate hazard to life or property exists, the code official has the authority to order the disconnection of the utility services. This can also occur when the utility service has been connected without the necessary approvals required by the code. Whenever possible, the building owner and the building occupant or occupants should be notified prior to the disconnection of the services. Then, at the first practical opportunity, the code official is to formally notify the building owner, in writing, of the disconnection activities. As with all administrative functions, all aspects of due process must be followed.

SECTION 112
BOARD OF APPEALS

112.1 General. In order to hear and decide appeals of orders, decisions, or determinations made by the code official relative to the application and interpretation of this code, there shall be and is hereby created a board of appeals. The board of appeals shall be appointed by the governing body and shall hold office at its pleasure. The board shall adopt rules of procedure for conducting its business.

❖ This section provides an aggrieved party with a material interest in the decision of the code official a process to appeal such a decision before a board of appeals. This provides a forum, other than the court of jurisdiction, in which to review the code official's actions.

This section literally allows any person to appeal a decision of the code official. In practice, this section has been interpreted to permit appeals only by those aggrieved parties with a material or definitive interest in the decision of the code official. An aggrieved party may not appeal a code requirement per se. The intent of the appeal process is not to waive or set aside a code requirement; rather, it is intended to provide a means of reviewing a code official's decision on an interpretation or application of the code or to review the equivalency of protection to the code requirements. The members of the appeals board are appointed by the "governing body" of the jurisdiction, typically a council or administrator, such as a mayor or city manager, and remain members until removed from office. The board must establish procedures for electing a chairperson, scheduling, conducting meetings and administration. Note that Appendix B of the IBC contains complete, detailed requirements for creating an appeals board, including the number of members, qualifications and administrative procedures. Jurisdictions desiring to utilize these requirements must include Appendix B of the IBC in their adopting ordinance.

112.2 Limitations on authority. An application for appeal shall be based on a claim that the true intent of this code or the rules legally adopted thereunder have been incorrectly interpreted, the provisions of this code do not fully apply, or an equally good or better form of construction is proposed. The board shall have no authority to waive requirements of this code.

❖ This section establishes the grounds for an appeal, which claims that the code official has misinterpreted or misapplied a code provision. The board is not allowed to set aside any of the technical requirements of the code; however, it is allowed to consider alternative methods of compliance with the technical requirements (see Section 104.11).

112.3 Qualifications. The board of appeals shall consist of members who are qualified by experience and training to pass on matters pertaining to building construction and are not employees of the jurisdiction.

❖ It is important that the decisions of the appeals board are based purely on the technical merits involved in an appeal. It is not the place for policy or political deliberations. The members of the appeals board are, therefore, expected to have experience in building construction matters.

SECTION 113
VIOLATIONS

113.1 Unlawful acts. It shall be unlawful for any person, firm, or corporation to *repair*, alter, extend, add, move, remove, demolish, or change the occupancy of any building or equipment regulated by this code or cause same to be done in conflict with or in violation of any of the provisions of this code.

❖ Violations of the code are prohibited, and form the basis for all citations and correction notices.

113.2 Notice of violation. The *code official* is authorized to serve a notice of violation or order on the person responsible for the *repair*, *alteration*, extension, *addition*, moving, removal, demolition, or change in the occupancy of a building in violation of the provisions of this code or in violation of a permit or certificate issued under the provisions of this code. Such order shall direct the discontinuance of the illegal action or condition and the abatement of the violation.

❖ The code official is required to notify the person responsible for the erection or use of a building found to

be in violation of the code. The section that is allegedly being violated must be cited so that the responsible party can respond to the notice.

113.3 Prosecution of violation. If the notice of violation is not complied with promptly, the *code official* is authorized to request the legal counsel of the jurisdiction to institute the appropriate proceeding at law or in equity to restrain, correct, or abate such violation or to require the removal or termination of the unlawful occupancy of the building or structure in violation of the provisions of this code or of the order or direction made pursuant thereto.

❖ The code official must pursue, through the use of legal counsel of the jurisdiction, legal means to correct the violation. This is not optional.

Any extensions of time so that the violations may be corrected voluntarily must be for a reasonable, bona fide cause or the code official may be subject to criticism for "arbitrary and capricious" actions. In general, it is better to have a standard time limitation for the correction of violations. Departures from this standard must be for a clear and reasonable purpose, usually stated in writing by the violator.

113.4 Violation penalties. Any person who violates a provision of this code or fails to comply with any of the requirements thereof or who *repairs* or alters or changes the occupancy of a building or structure in violation of the approved construction documents or directive of the *code official* or of a permit or certificate issued under the provisions of this code shall be subject to penalties as prescribed by law.

❖ Penalties for violating provisions of the code are typically contained in state law, particularly if the code is adopted at that level and the building department must follow those procedures. If there is no such procedure already in effect, one must be established with the aid of legal counsel.

SECTION 114
STOP WORK ORDER

114.1 Authority. Whenever the *code official* finds any work regulated by this code being performed in a manner contrary to the provisions of this code or in a *dangerous* or unsafe manner, the *code official* is authorized to issue a stop work order.

❖ This section provides for the suspension of work for which a permit was issued, pending the removal or correction of a severe violation or unsafe condition identified by the code official.

Normally, correction notices, issued in accordance with Section 109.6, are used to inform the permit holder of code violations. Stop work orders are issued when enforcement can be accomplished no other way or when a dangerous condition exists.

114.2 Issuance. The stop work order shall be in writing and shall be given to the owner of the property involved or to the owner's agent, or to the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order and the conditions under which the cited work will be permitted to resume.

❖ Upon receipt of a violation notice from the code official, all construction activities identified in the notice must immediately cease, except as expressly permitted to correct the violation.

114.3 Unlawful continuance. Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be subject to penalties as prescribed by law.

❖ This section states that the work in violation must terminate and that all work, except that which is necessary to correct the violation or unsafe condition, must cease as well. As determined by the municipality or state, a penalty may be assessed for failure to comply with this section.

SECTION 115
UNSAFE BUILDINGS AND EQUIPMENT

115.1 Conditions. Buildings, structures or equipment that are or hereafter become unsafe, shall be taken down, removed or made safe as the code official deems necessary and as provided for in this code.

❖ This section describes the responsibility of the code official to investigate reports of unsafe structures and equipment, and provides criteria for such determination.

"Unsafe structures" are defined as buildings or structures that are insanitary, deficient in light and ventilation or adequate exit facilities, constitute a fire hazard or are otherwise dangerous to human life.

All unsafe buildings must either be demolished or made safe and secure as deemed appropriate by the code official.

115.2 Record. The *code official* shall cause a report to be filed on an unsafe condition. The report shall state the occupancy of the structure and the nature of the unsafe condition.

❖ The code official must file a report on each investigation of unsafe conditions, stating the occupancy of the structure and the nature of the unsafe condition. This report provides the basis for the notice described in Section 115.3.

115.3 Notice. If an unsafe condition is found, the *code official* shall serve on the owner, agent, or person in control of the structure a written notice that describes the condition deemed unsafe and specifies the required *repairs* or improvements to be made to abate the unsafe condition, or that requires the unsafe building to be demolished within a stipulated time. Such notice shall require the person thus notified to declare immediately to the *code official* acceptance or rejection of the terms of the order.

❖ When a building or structure is deemed unsafe, the code official is required to notify the owner or agent of the building as the first step in correcting the problem. Such notice must describe the necessary repairs and

improvements to correct the deficiency or must require the unsafe building or structure to be demolished in a specified time in order to provide for public health, safety and welfare. Additionally, such notice requires the immediate response of the owner or agent. If the owner or agent is not available, public notice of such declaration should suffice for the purposes of complying with this section (see Section 115.4). The code official may also determine that immediate work is necessary to correct an unsafe condition and seek a lien against the building or structure to compensate the municipality for the cost of remedial action.

115.4 Method of service. Such notice shall be deemed properly served if a copy thereof is delivered to the owner personally; sent by certified or registered mail addressed to the owner at the last known address with the return receipt requested; or delivered in any other manner as prescribed by local law. If the certified or registered letter is returned showing that the letter was not delivered, a copy thereof shall be posted in a conspicuous place in or about the structure affected by such notice. Service of such notice in the foregoing manner upon the owner's agent or upon the person responsible for the structure shall constitute service of notice upon the owner.

❖ The notice must be delivered personally to the owner. If the owner or agent cannot be located, additional procedures are established, including posting the unsafe notice on the premises in question. Such action may be considered the equivalent of personal notice; however, it may or may not be deemed by the courts as representing a "good faith" effort to notify. Therefore, in addition to complying with this section, public notice through the use of newspapers and other postings in a prominent location at the government center should be used.

115.5 Restoration. The building or equipment determined to be unsafe by the *code official* is permitted to be restored to a safe condition. To the extent that *repairs*, *alterations*, or *additions* are made or a *change of occupancy* occurs during the restoration of the building, such *repairs*, *alterations*, *additions*, or *change of occupancy* shall comply with the requirements of this code.

❖ This section provides that unsafe structures may be restored to a safe condition. This means that the cause of the unsafe structure notice can be abated without the structure being required to comply fully with the provisions for new construction. Any work done to eliminate the unsafe condition, as well as any change in occupancy that may occur, must comply with the code.

SECTION 116
EMERGENCY MEASURES

116.1 Imminent danger. When, in the opinion of the *code official*, there is imminent danger of failure or collapse of a building that endangers life, or when any building or part of a building has fallen and life is endangered by the occupation of the building, or when there is actual or potential danger to the building occupants or those in the proximity of any structure because of explosives, explosive fumes or vapors, or the presence of toxic fumes, gases, or materials, or operation of defective or *dangerous* equipment, the *code official* is hereby authorized and empowered to order and require the occupants to vacate the premises forthwith. The *code official* shall cause to be posted at each entrance to such structure a notice reading as follows: "This Structure Is Unsafe and Its Occupancy Has Been Prohibited by the *Code Official*." It shall be unlawful for any person to enter such structure except for the purpose of securing the structure, making the required *repairs*, removing the hazardous condition, or of demolishing the same.

❖ If the code official has determined that failure or collapse of a building or structure is imminent, failure has occurred that results in a continued threat to the remaining structure or adjacent properties or any other unsafe condition as described in this section exists in a structure, the code official is authorized to require the occupants to vacate the premises and to post such buildings or structures as unsafe and unoccupiable. Unless authorized by the code official to make repairs, secure or demolish the structure, it is illegal for anyone to enter the building or structure. This will minimize the potential for injury.

116.2 Temporary safeguards. Notwithstanding other provisions of this code, whenever, in the opinion of the *code official*, there is imminent danger due to an unsafe condition, the *code official* shall order the necessary work to be done, including the boarding up of openings, to render such structure temporarily safe whether or not the legal procedure herein described has been instituted; and shall cause such other action to be taken as the *code official* deems necessary to meet such emergency.

❖ This section recognizes the need for immediate and effective action in order to protect the public. This section empowers the code official to cause the necessary work to be done to minimize the imminent danger temporarily without regard for due process. This section has to be viewed critically insofar as the danger of structural failure to which the code official has responded must be "imminent"; that is, readily apparent and immediate.

116.3 Closing streets. When necessary for public safety, the *code official* shall temporarily close structures and close or order the authority having jurisdiction to close sidewalks, streets, public ways, and places adjacent to unsafe structures, and prohibit the same from being utilized.

❖ The code official is authorized to temporarily close sidewalks, streets and adjacent structures as needed to protect the public from the unsafe building or structure when an imminent danger exists. Since the code official may not have the direct authority to close sidewalks, streets and other public ways, the agency having such jurisdiction (e.g., the police or highway department) must be notified.

116.4 Emergency repairs. For the purposes of this section, the code official shall employ the necessary labor and materials to perform the required work as expeditiously as possible.

❖ The cost of emergency work may have to be paid initially by the jurisdiction. The important principle here is that the code official must act immediately to protect the public when warranted, leaving the details of costs and owner notification for later.

116.5 Costs of emergency repairs. Costs incurred in the performance of emergency work shall be paid by the jurisdiction. The legal counsel of the jurisdiction shall institute appropriate action against the owner of the premises where the unsafe structure is or was located for the recovery of such costs.

❖ The cost of emergency repairs is to be paid by the jurisdiction, with subsequent legal action against the owner to recover such costs. This does not preclude, however, reaching an alternative agreement with the owner.

116.6 Hearing. Any person ordered to take emergency measures shall comply with such order forthwith. Any affected person shall thereafter, upon petition directed to the appeals board, be afforded a hearing as described in this code.

❖ Anyone ordered to take an emergency measure or to vacate a structure because of an emergency condition must do so immediately.

Thereafter, any affected party has the right to appeal the action to the appeals board to determine whether the order should be continued, modified or revoked.

It is imperative that appeals to an emergency order occur after the hazard has been abated, rather than before, to minimize the risk to the occupants, employees, clients and public.

SECTION 117
DEMOLITION

117.1 General. The *code official* shall order the owner of any premises upon which is located any structure that in the *code official's* judgment is so old, dilapidated, or has become so out of *repair* as to be *dangerous*, unsafe, insanitary, or otherwise unfit for human habitation or occupancy, and such that it is unreasonable to *repair* the structure, to demolish and remove such structure; or if such structure is capable of being made safe by *repairs*, to *repair* and make safe and sanitary or to demolish and remove at the owner's option; or where there has been a cessation of normal construction of any structure for a period of more than two years, to demolish and remove such structure.

❖ This section describes the conditions where the code official has the authority to order the owner to remove the structure. Conditions where the code official may give the owner the option of repairing the structure are also in this section. The code official should carefully document the condition of the structure prior to issuing a demolition order to provide an adequate basis for ordering the owner to remove the structure.

117.2 Notices and orders. All notices and orders shall comply with Section 113.

❖ Before the code official can pursue action to demolish a building in accordance with Section 117.1 or 117.3, it is imperative that all owners and any other persons with a recorded encumbrance on the property be given proper notice of the demolition plans. See Section 113 for notice and order requirements.

117.3 Failure to comply. If the owner of a premises fails to comply with a demolition order within the time prescribed, the *code official* shall cause the structure to be demolished and removed, either through an available public agency or by contract or arrangement with private persons, and the cost of such demolition and removal shall be charged against the real estate upon which the structure is located and shall be a lien upon such real estate.

❖ When the owner fails to comply with a demolition order, the code official is authorized to take action to have the building razed and removed. The costs are to be charged as a lien against the real estate. To reduce complaints regarding the validity of demolition costs, the code official should obtain competitive bids from several demolition contractors before authorizing any contractor to raze the structure.

117.4 Salvage materials. When any structure has been ordered demolished and removed, the governing body or other designated officer under said contract or arrangement aforesaid shall have the right to sell the salvage and valuable materials at the highest price obtainable. The net proceeds of such sale, after deducting the expenses of such demolition and removal, shall be promptly remitted with a report of such sale or transaction, including the items of expense and the amounts deducted, for the person who is entitled thereto, subject to any order of a court. If such a surplus does not remain to be turned over, the report shall so state.

❖ The governing body may sell any valuables or salvageable materials for the highest price obtainable. The costs of demolition are then to be deducted from any proceeds from the sale of salvage. If a surplus of funds remains, it is to be remitted to the owner with an itemized expense and income account. If no surplus remains, this must also be reported.

Bibliography

The following resource materials are referenced in this chapter or are relevant to the subject matter addressed in this chapter.

ASCE 7-05, *Minimum Design Loads for Buildings and Other Structures*. Reston, VA: American Society of Civil Engineers, 2005.

ASCE 31-03, *Seismic Evaluation of Existing Buildings*. Reston, VA: American Society of Civil Engineers, 2003.

ASCE 41-06, *Seismic Rehabilitation of Existing Buildings*. Reston, VA: American Society of Civil Engineers, 2006.

FEMA 178, *NEHRP Handbook for the Seismic Evaluation of Buildings*. Washington, DC: Federal Emergency Management Agency, 2001.

FEMA 273, *NEHRP Guidelines for the Seismic Rehabilitation of Existing Buildings*. Washington, DC: Federal Emergency Management Agency, 2001.

FEMA 310, *Handbook for Seismic Evaluation of Buildings—A Prestandard*. Washington, DC: Federal Emergency Management Agency, 2001.

FEMA 356-00, *Prestandard and Commentary for the Seismic Rehabilitation of Buildings Guidelines for the Seismic Retrofit of Existing Buildings*. Washington, DC: Federal Emergency Management Agency, 2000.

IBC-09, *International Building Code*. Washington, DC: International Code Council, 2009.

IFC-09, *International Fire Code*. Washington, DC: International Code Council, 2009.

IMC-09, *International Mechanical Code*. Washington, DC: International Code Council, 2009.

IPC-09, *International Plumbing Code*. Washington, DC: International Code Council, 2009.

IPMC-09, *International Property Maintenance Code*. Washington, DC: International Code Council, 2009.

IRC-09, *International Residential Code*. Washington, DC: International Code Council, 2009.

Legal Aspects of Code Administration. Washington, DC: International Code Council, 2003.

NEHRP, *Recommended Provisions fo Seismic Regulations for New Buildings and Other Structures*. Washington, DC: National Earthquake Hazards Reduction Program.

NFPA 70-08, *National Electrical Code*. Quincy, MA: National Fire Protection Association, 2008.

Rhyne, Charles S. *Survey of the Law and Building Codes*. Washington DC: The American Institute of Architects and the National Association of Home Builders, 1960.

UCBC, *Uniform Code for Building Conservation*. Washington, DC: International Code Council, 2009.

Chapter 2: Definitions

General Comments

All terms defined in the code are listed alphabetically in Chapter 2. The user should be familiar with the terms in this chapter because 1) definitions are essential to the correct interpretation of the code, and 2) the user might not be aware that a particular term encountered in the text has the special definition found herein.

Section 201.1 contains the scope of the chapter. Section 201.2 establishes the interchangeability of the terms in the code. Section 201.3 establishes the use of terms defined in other codes. Section 201.4 establishes the use of undefined terms, and Section 202 lists terms and their definitions according to the code.

Purpose

Codes, by their very nature, are technical documents. As such, literally every word, term and punctuation mark can add to or change the meaning of the intended result. This is even more so with a performance-based code where the desired result often takes on more importance than the specific words. Furthermore, the code, with its broad scope of applicability, includes terms inherent in a variety of construction disciplines. These terms often have multiple meanings depending on the context or discipline being used at the time. For these reasons, it is necessary to maintain a consensus on the specific meaning of terms contained in the code. Chapter 2 performs this function by stating clearly what specific terms mean for the purpose of the code.

SECTION 201 GENERAL

❖ This section contains language and provisions that are supplemental to the use of Chapter 2. It gives guidance to the use of the defined words relevant to tense, gender and plurality. Finally, this section provides direction on how to apply terms that are not defined in the code.

201.1 Scope. Unless otherwise expressly stated, the following words and terms shall, for the purposes of this code, have the meanings shown in this chapter.

❖ Unless otherwise expressly stated, the following words and terms shall, for the purposes of the code, have the meanings shown in this chapter.

201.2 Interchangeability. Words used in the present tense include the future; words stated in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

❖ While the definitions contained or referenced in Chapter 2 are to be taken literally, gender and tense are interchangeable; thus, any grammatical inconsistencies with the code text will not hinder the understanding or enforcement of the requirements.

201.3 Terms defined in other codes. Where terms are not defined in this code and are defined in the other *International Codes,* such terms shall have the meanings ascribed to them in those codes.

❖ When a word or term appears in the code and that word or term is not defined in this chapter, other references may be used to find its definition, such as the *International Building Code*® (IBC®), *International Residential Code*® (IRC®), *International Fire Code*® (IFC®), *International Plumbing Code*® (IPC®), *International Mechanical Code*® (IMC®), *International Fuel Gas Code*® (IFGC®), *International Code Council Performance Code*® *for Buildings and Facilities*® (ICC PC®), *International Private Sewage Disposal Code*® (IPSDC®), *International Property Maintenance Code*® (IPMC®), *International Energy Conservation Code*® (IECC®), *International Wildland-Urban Interface Code*™ (IWUIC™) and *International Zoning Code*® (IZC®). These codes contain additional definitions (some parallel and duplicative) which may be used in the enforcement of the code or in the enforcement of the other codes by reference.

201.4 Terms not defined. Where terms are not defined through the methods authorized by this chapter, such terms shall have ordinarily accepted meanings such as the context implies.

❖ Words or terms not defined within the *International Code*® (I-Codes®) series are intended to be applied based on their "ordinarily accepted meanings." The intent of this statement is that a dictionary definition may suffice, provided it is in context. Sometimes the construction terms used in the code are not specifically defined in the code or even in a dictionary. In such a case, the definitions contained in the referenced standards (see Chapter 15) and published textbooks on the subject in question are good resources.

SECTION 202
GENERAL DEFINITIONS

❖ This section contains definitions of terms that are used throughout the code. It is important to emphasize that these terms are used throughout the code and that these terms are applicable everywhere the term is used in the code. Definitions of terms can help in the understanding and application of the code requirements.

ADDITION. An extension or increase in floor area, number of stories, or height of a building or structure.

❖ This term is used to describe the condition when the floor area or height of an existing building or structure is increased. This term is only applicable to existing buildings, never new ones.

ALTERATION. Any construction or renovation to an existing structure other than a *repair* or *addition*. Alterations are classified as Level 1, Level 2, and Level 3.

❖ The code utilizes this term to reflect construction operations intended for an existing building, but not within the scope of an addition or repair (see the definitions of "Addition" and "Repair").

CHANGE OF OCCUPANCY. A change in the purpose or level of activity within a building that involves a change in application of the requirements of this code.

❖ When a change of occupancy occurs, the code provisions for new construction then apply to an existing structure having a new occupancy. Changing the occupancy classification in an existing structure may change the level of inherent hazards that the code was initially intended to address. For example, a change from a mercantile occupancy to a business occupancy renders all Group B provisions applicable to all portions of the structure where the occupancy was changed. Change of occupancy is specifically addressed in Chapter 9 of the code.

CODE OFFICIAL. The officer or other designated authority charged with the administration and enforcement of this code.

❖ Regardless of title, the individual designated by the jurisdiction as the person who administers and enforces the code is the code official. In addition, the code official may appoint various other individuals to assist in the activities of the Department of Building Safety. In many jurisdictions, the authority of the code official is extended to plans examiners and inspectors to some degree. Section 104 sets forth the duties and responsibilities of the code official.

DANGEROUS. Any building, structure or portion thereof that meets any of the conditions described below shall be deemed *dangerous*:

1. The building or structure has collapsed, partially collapsed, moved off its foundation or lacks the support of ground necessary to support it.
2. There exists a significant risk of collapse, detachment or dislodgment of any portion, member, appurtenance or ornamentation of the building or structure under service loads.

❖ This definition describes what is considered to be dangerous in building construction. There is a list of two specific criteria that will cause a structure to be classified as dangerous. These criteria take into consideration the collapse or likelihood of collapse of a structure, or a portion or element of a structure. This would also include any building element that could become detached and potentially result in the failure of one or more of the building's inherent systems.

EQUIPMENT OR FIXTURE. Any plumbing, heating, electrical, ventilating, air conditioning, refrigerating, and fire protection equipment, and elevators, dumb waiters, escalators, boilers, pressure vessels and other mechanical facilities or installations that are related to building services. Equipment or fixture shall not include manufacturing, production, or process equipment, but shall include connections from building service to process equipment.

❖ This definition outlines the type of building systems and devices that are considered to be categorized as equipment or fixtures. It is important to note that while the list is quite extensive the definition does not specifically exclude the terms "manufacturing," "production" or "process equipment."

EXISTING BUILDING. A building erected prior to the date of adoption of the appropriate code, or one for which a legal building permit has been issued.

❖ This term is used to identify those structures or buildings that were constructed before the current edition of the code was adopted by the jurisdiction. Often erected under the provisions of an earlier edition of the code, the buildings are exempt from compliance with current code provisions, unless otherwise stated or a hazardous condition is present, or when alterations or changes in building height and areas are made.

[B] FLOOD HAZARD AREA. The greater of the following two areas:

1. The area within a flood plain subject to a 1-percent or greater chance of flooding in any year.
2. The area designated as a *flood hazard area* on a community's flood hazard map, or otherwise legally designated.

❖ The Federal Emergency Management Agency (FEMA) prepares Flood Insurance Rate Maps (FIRMs) that delineate the land area that is subject to inundation by the 1-percent annual chance flood. Some states and local jurisdictions develop and adopt maps of flood hazard areas that are more extensive than the areas shown on FEMA's maps. For the purpose of the code, the flood hazard area within which the requirements are to be applied is the greater of the two delineated areas.

HISTORIC BUILDING. Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource within a National

Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Register of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places.

❖ This definition specifies the criteria for consideration as a historic building. Chapter 11 contains the provisions for buildings that qualify as historic buildings.

LOAD BEARING ELEMENT. Any column, girder, beam, joist, truss, rafter, wall, floor or roof sheathing that supports any vertical load in *addition* to its own weight or any lateral load.

❖ This term relates to the all of the load-bearing elements in a structure. It is important to identify all such load-bearing elements to ensure that they can continue to accomplish their designed function of being able to transfer any vertical load and any lateral load in addition to their own weight effectively to the earth.

NONCOMBUSTIBLE MATERIAL. A material that, under the conditions anticipated, will not ignite or burn when subjected to fire or heat. Materials that pass ASTM E 136 are considered noncombustible materials.

❖ A material that will not ignite or burn when subjected to fire or heat or that successfully passes the ASTM E 136 test is considered to be noncombustible. The test determines whether a building material will act to aid combustion or add appreciable heat to a fire. A material may have a limited amount of combustible content but not contribute appreciably to a fire; thus, it may still qualify as noncombustible.

PRIMARY FUNCTION. A *primary function* is a major activity for which the facility is intended. Areas that contain a *primary function* include, but are not limited to, the customer services lobby of a bank, the dining area of a cafeteria, the meeting rooms in a conference center, as well as offices and other work areas in which the activities of the public accommodation or other private entity using the facility are carried out. Mechanical rooms, boiler rooms, supply storage rooms, employee lounges or locker rooms, janitorial closets, entrances, corridors and restrooms are not areas containing a *primary function*.

❖ Primary function areas contain the major activities for the building or space. Determination of what constitutes a primary function space can be somewhat subjective. There can be multiple areas containing a primary function in a single building. Primary function areas are not limited to public use areas. For example, both a bank lobby and the bank's employee areas, such as the teller areas and walk-in safe, are primary function areas. Areas that are not primary function spaces are support and circulation spaces. Determination of the primary function areas for a building will also determine when the route to that area and associated toilet rooms and drinking fountains must be evaluated for accessibility. If these items are not accessible, additional alternatives may be necessary (see commentary, Section 605.2).

REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE. A registered design professional engaged by the owner to review and coordinate certain aspects of the project, as determined by the *code official*, for compatibility with the design of the building or structure, including submittal documents prepared by others, deferred submittal documents and phased submittal documents.

❖ A register design professional in responsible charge is a person that is typically in charge of the review and coordination of submittal documents prepared by others, deferred submittal documents and phased submittal documents for compatibility with the design of the building or structure. Refer to Section 106.3.4 for specific language dealing with this term.

REHABILITATION. Any work, as described by the categories of work defined herein, undertaken in an *existing building*.

❖ This process of returning a property to a state of utility through repair or alteration makes it possible to effect a positive contemporary use while preserving those portions and features of the property that are significant to its historic, architectural and cultural values.

REHABILITATION, SEISMIC. Work conducted to improve the seismic lateral force resistance of an *existing building*.

❖ This definition relates specifically to the efforts designed to help improve and perhaps re-establish seismic-lateral-force resistance of a property to an appropriate level.

REPAIR. The restoration to good or sound condition of any part of an *existing building* for the purpose of its maintenance.

❖ As indicated in Section 105.2.2, the repair of an item typically does not require a permit. This definition makes it clear that repair is limited to work on the item, and does not include complete or substantial replacement or other new work.

SEISMIC LOADING. The forces prescribed herein, related to the response of the structure to earthquake motions, to be used in the analysis and design of the structure and its components.

❖ This definition refers to the forces to be used in the seismic design of structures. This would apply to both structural and nonstructural components.

[B] SUBSTANTIAL DAMAGE. For the purpose of determining compliance with the flood provisions of this code, damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

❖ The term is used in the definition of "Substantial improvement." Substantial damage is a special case of substantial improvement, and if the cost of restoring damage equals or exceeds 50 percent of the market value of the structure, then compliance of the existing building is required. It is notable that a substantial damage determination is to be made regardless of what causes the damage. Buildings have sustained

substantial damage due to flood, fire, wind, earthquake, deterioration and other causes.

SUBSTANTIAL IMPROVEMENT. For the purpose of determining compliance with the flood provisions of this code, any *repair*, *alteration*, *addition*, or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the structure, before the improvement or *repair* is started. If the structure has sustained *substantial damage*, any repairs are considered *substantial improvement* regardless of the actual *repair* work performed. The term does not, however, include either:

1. Any project for improvement of a building required to correct existing health, sanitary, or safety code violations identified by the *code official* and that is the minimum necessary to assure safe living conditions, or
2. Any *alteration* of a historic structure, provided that the *alteration* will not preclude the structure's continued designation as a historic structure.

❖ One of the long-range objectives of the National Flood Insurance Program (NFIP) is to reduce the exposure of older buildings that were built in flood hazard areas before local jurisdictions adopted flood hazard area maps and regulations. Section 105.3 directs the applicant to state the valuation of the proposed work as part of the information submitted to obtain a permit. To make a determination as to whether a proposed repair, reconstruction, rehabilitation, addition or improvement constitutes substantial improvement or damage, the cost of the proposed work is to be compared to the market value of the building or structure before the work is started. In order to determine market value, the code official may require the applicant to provide such information, as allowed under Section 105.3. For additional guidance, refer to FEMA 213 and FEMA 311.

SUBSTANTIAL STRUCTURAL DAMAGE. A condition where:

1. In any story, the vertical elements of the lateral-force-resisting system have suffered damage such that the lateral load-carrying capacity of the structure in any horizontal direction has been reduced by more than 20 percent from its predamaged condition; or
2. The capacity of any vertical gravity load-carrying component, or any group of such components, that supports more than 30 percent of the total area of the structure's floor(s) and roof(s) has been reduced more than 20 percent from its predamaged condition and the remaining capacity of such affected elements, with respect to all dead and live loads, is less than 75 percent of that required by the *International Building Code* for new buildings of similar structure, purpose and location.

❖ This definition gives the specific parameters for evaluating when a building has sustained substantial structural damage. There are two separate criteria provided in the definition, either one of which will qualify a structure as being substantially damaged.

TECHNICALLY INFEASIBLE. An *alteration* of a building or a facility that has little likelihood of being accomplished because the existing structural conditions require the removal or *alteration* of a load-bearing member that is an essential part of the structural frame or because other existing physical or site constraints prohibit modification or *addition* of elements, spaces, or features that are in full and strict compliance with the minimum requirements for new construction and that are necessary to provide accessibility.

❖ This term is defined in order to provide a basis for the application of accessibility provisions to existing buildings. Bringing any given existing site or building that is altered into full compliance with all accessibility requirements applicable to new construction may require extraordinary effort because of existing physical characteristics. The code utilizes the concept of technical infeasibility to provide a basis for exceptions from strict compliance with the provisions for new construction in an existing building.

UNSAFE. Buildings, structures or equipment that are unsanitary, or that are deficient due to inadequate means of egress facilities, inadequate light and ventilation, or that constitute a fire hazard, or in which the structure or individual structural members meet the definition of "*Dangerous*," or that are otherwise *dangerous* to human life or the public welfare, or that involve illegal or improper occupancy or inadequate maintenance shall be deemed unsafe. A vacant structure that is not secured against entry shall be deemed unsafe.

❖ The term "unsafe" is defined in order to provide a basis for the code official to cause a condition that is hazardous to the health and welfare of individuals to be corrected, either by repair or demolition (see Section 115). Some unsafe buildings may be the result of unsafe or illegal occupancies. For example, prima facie evidence of an unsafe structure is an unsecured (open doors or windows) vacant structure. Because of the attractive nuisance they represent, all unsafe buildings must be either demolished or made safe and secure as deemed appropriate by the code official.

WORK AREA. That portion or portions of a building consisting of all reconfigured spaces as indicated on the construction documents. Work area excludes other portions of the building where incidental work entailed by the intended work must be performed and portions of the building where work not initially intended by the owner is specifically required by this code.

❖ This section specifically defines the area of all reconfigured spaces where work is expected to be occurring within the scope of a project. These areas are to be shown clearly on the construction documents. Incidental work areas are not required to be shown as work areas.

Bibliography

The following resource materials are referenced in this chapter or are relevant to the subject matter addressed in this chapter.

ASTM E 136-04, *Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C*. West Conshohocken, PA: ASTM International, 2004.

FEMA 213, *NEHRP Handbook for the Seismic Evaluation of Buildings*. Washington, DC: Federal Emergency Management Agency, 2001.

FEMA 311, *Guidance on Estimating Substantial Damage*. Washington, DC: Federal Emergency Management Agency, 1998.

IBC-09, *International Building Code*. Washington, DC: International Code Council, 2009.

ICC PC-09, *International Performance Code*. Washington, DC: International Code Council, 2009.

IECC-09, *International Energy Conservation Code*. Washington, DC: International Code Council, 2009.

IFC-09, *International Fire Code*. Washington, DC: International Code Council, 2009.

IFGC-09, *International Fuel Gas Code*. Washington, DC: International Code Council, 2009.

IMC-09, *International Mechanical Code*. Washington, DC: International Code Council, 2009.

IPC-09, *International Plumbing Code*. Washington, DC: International Code Council, 2009.

IPMC-09, *International Property Maintenance Code*. Washington, DC: International Code Council, 2009.

IPSDC-09, *International Private Sewage Disposal Code*. Washington, DC: International Code Council, 2009.

IRC-09, *International Residential Code*. Washington, DC: International Code Council, 2009.

IWUIC-09, *International Wildland-Urban Interface Code*. Washington, DC: International Code Council, 2009.

IZC-09, *International Zoning Code*. Washington, DC: International Code Council, 2009.

NFPA 70-08, *National Electrical Code*. Quincy, MA: National Fire Protection Association, 2008.

Chapter 3: Prescriptive Compliance Method

Purpose

This chapter provides one of the four options of compliance available in the code for buildings and structures undergoing repair, alteration, addition or change of occupancy. This chapter duplicates the provisions that are predominantly established in Chapter 34 of the *International Building Code*® (IBC®) Sections 3401 through 3411. There are also provisions from the other *International Codes*® (I-Codes®) dealing with system installations (electrical, energy, fuel gas, mechanical and plumbing), which have been duplicated in the code, as well. As a duplication of provisions, the on-going code development maintenance will be accomplished by the code committee responsible for the code from which the provisions are being extracted and duplicated.

[B] SECTION 301 GENERAL

301.1 Scope. The provisions of this chapter shall control the *alteration*, *repair*, *addition* and *change of occupancy* of existing structures, including historic and moved structures as referenced in Section 101.5.1.

Exception: Existing bleachers, grandstands and folding and telescopic seating shall comply with ICC 300-02.

❖ This section states the scope of this chapter and references alternative methods of code compliance for alteration, repair, addition and change of occupancy of existing structures. This section also defines the responsibilities for maintenance, repairs, compliance with other codes and periodic testing. The exception sends the code user to the *ICC Standard on Bleachers, Grandstands, and Folding and Telescopic Seating* (ICC 300) for alterations, repairs and additions to bleachers, grandstands, and folding and telescopic seating.

301.1.1 Compliance with other methods. Alterations, repairs, *additions* and changes of occupancy to existing structures shall comply with the provisions of this chapter or with one of the methods provided in Section 101.5.

❖ This section references Section 101.5 for the options available to deal with alterations, repairs, additions and changes of occupancy to existing structures. The following briefly describes the options available, other than compliance with this chapter:

1. Subject to the approval of the code official, repairs and alterations can comply with the requirements of the code at the time the building was built.
2. Repairs, alterations, additions and changes of occupancy can comply with the proportional approach where upgrades are triggered by the type and extent of the work. These requirements are found in Chapters 4 through 12 of the code.
3. Repairs, alterations, additions and changes of occupancy can comply with the compliance alternatives that are found in Chapter 13 of the code. These provisions are duplicated from Section 3412 of the IBC.

Please note that these options are separate and distinct and must not be combined in any way.

301.2 Building materials. Building materials shall comply with the requirements of this section.

❖ This section contains conditions under which existing materials may remain in service and requirements for materials used for the repair or alteration of existing buildings.

301.2.1 Existing materials. Materials already in use in a building in compliance with requirements or approvals in effect at the time of their erection or installation shall be permitted to remain in use unless determined by the *code official* to be *dangerous* to life, health or safety. Where such conditions are determined to be *dangerous* to life, health or safety, they shall be mitigated or made safe.

❖ If a material or system had been approved before the code took effect, it can continue to be used as long as it can be shown that the material or system is not detrimental to the health or safety of the building occupants or the public. In other words, the code is not retroactive.

301.2.2 New and replacement materials. Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. Like materials shall be permitted for repairs and alterations, provided no hazard to life, health or property is created. Hazardous materials shall not be used where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location.

❖ There are two options for materials used in repairs to an existing building. Generally, the materials used for repairs should be those that are presently required or permitted for new construction in accordance with the I-Codes. It is also acceptable to use materials consistent with those that are already present, except where those materials pose a hazard. This allowance follows the general concept that any repair should not make a building

more hazardous than it was prior to the repair. It is generally possible to repair a structure, its components and its systems with materials consistent with those materials that were used previously. However, where materials that are now deemed hazardous are involved in the repair work, they may no longer be used. For example, the code identifies asbestos and lead-based paint as two common hazardous materials that cannot be used in the repair process. Certain materials previously considered acceptable for building construction are now a threat to the health of the occupants.

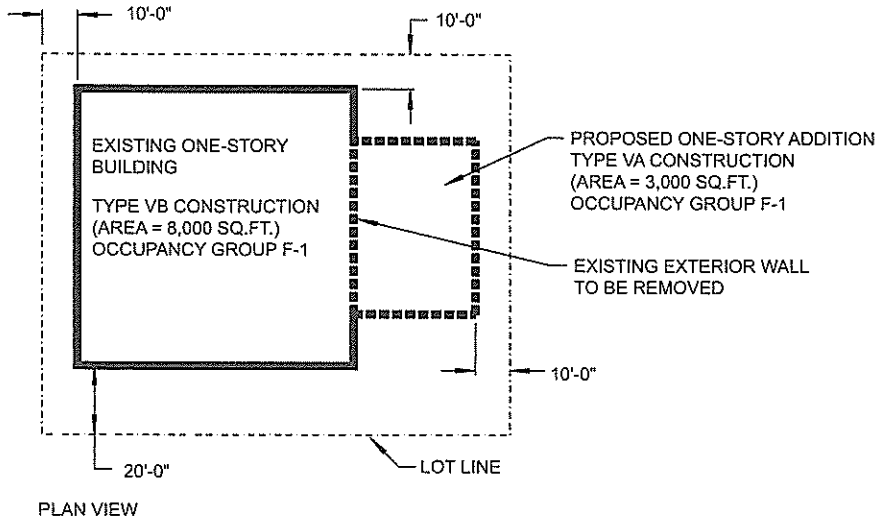
[B] SECTION 302 ADDITIONS

302.1 General. *Additions* to any building or structure shall comply with the requirements of the *International Building Code* for new construction. Alterations to the *existing building* or structure shall be made to ensure that the *existing building* or structure together with the *addition* are no less conforming to the provisions of the *International Building Code* than the *existing building* or structure was prior to the *addition*. An *existing building* together with its *additions* shall comply with the height and area provisions of Chapter 5 of the *International Building Code*.

❖ The purpose of this section is to establish the guidelines for additions to existing buildings and structures.

An addition is an increase in the building area or building height of an existing building. When a new building is erected immediately adjacent to an existing building, and they are separated by a fire wall, it is considered a separate building, not an addition to the existing structure. The new building must be designed to comply with the technical provisions of Chapters 1 through 33 of the IBC; not with the provisions of this chapter. The existing building must be evaluated considering the elimination of the adjacent open space now occupied by the new building. An existing structure that is of a type of construction that does not comply with the height and area limitations of Table 503 of the IBC may not be added to unless the type of construction is upgraded, or the allowable building height and area are increased through the addition of a sprinkler system throughout both the existing building and the addition. A building with a proposed addition is to be evaluated based on the type of construction of the existing building or the addition, whichever is the lower type. When reviewing for compliance with Table 503 of the IBC, Section 602.1.1 of the IBC is also applicable. Figure 302.1 shows an example of this situation. If a sprinkler system is not planned for both the existing building and the addition, the proposed addition does not meet the requirements of Table 503 of the IBC. The area limitation for the existing construction Type VB, Group F-1 is 8,500 square feet (789.7 m^2) and the total proposed area is 11,000 square feet (1022 m^2).

The area evaluation is based on Type VB construction, even though the proposed addition is Type VA construction, because the allowable area in Table 503 of the IBC for Type VB construction is less than the allowable area for Type VA construction. One option to satisfy the requirements is to upgrade the type of construction of the existing building to Type VA, which has an allowable area of 14,000 square feet (1301 m^2). Another solution is to install an automatic sprinkler system that complies with NFPA 13 throughout the building. The revised allowable area of the building would be: 8,500 square feet + (3 × 8,500 square feet) = 34,000 square feet (3,158.7 m^2) in accordance with the sprinkler area increase, which is more than the proposed building area of 11,000 square feet (1022 m^2).



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2.

Figure 302.1
EXISTING BUILDING WITH ADDITION

302.2 Flood hazard areas. For buildings and structures in flood hazard areas established in Section 1612.3 of the *International Building Code*, any *addition* that constitutes *substantial improvement* of the existing structure, as defined in Section 202, shall comply with the flood design requirements for new construction, and all aspects of the existing structure shall be brought into compliance with the requirements for new construction for flood design.

For buildings and structures in flood hazard areas established in Section 1612.3 of the *International Building Code*, any *additions* that do not constitute *substantial improvement* or *substantial damage* of the existing structure, as defined in Section 202, are not required to comply with the flood design requirements for new construction.

❖ Reduction in the exposure to flood hazards, including the exposure of older buildings, is one of the purposes for regulating flood plain development. Buildings or structures that are located in flood hazard areas are to be brought into compliance with the flood-resistance provisions of Section 1612 of the IBC when the value of improvements, including additions, exceeds a certain value. See Chapter 2 for the definition of "Substantial improvement."

Section 105.3 requires the applicant to state the valuation of proposed work, which is to include the total value of work, including materials and labor. If the proposed work will be performed on buildings in flood hazard areas, a determination must be made as to whether the proposed work constitutes a substantial improvement. If applicable, the value of work must include estimates of the value of the property owner's labor and the value of donated labor and materials.

To make a determination about whether a proposed addition constitutes a substantial improvement, the cost of the proposed work is to be compared to the market value of the building or structure before the work is started. In order to determine market value, the code official may require the applicant to provide an appraisal or use other methods acceptable to the Federal Emergency Management Agency (FEMA). For additional guidance see FEMA P-758, *Substantial Improvement / Substantial Damage Desk Reference*.

302.3 Existing structural elements carrying gravity load. Any existing gravity load-carrying structural element for which an *addition* and its related alterations cause an increase in design gravity load of more than 5 percent shall be strengthened, supplemented, replaced or otherwise altered as needed to carry the increased load required by the *International Building Code* for new structures. Any existing gravity load-carrying structural element whose gravity load-carrying capacity is decreased shall be considered an altered element subject to the requirements of Section 303.3. Any existing element that will form part of the lateral load path for any part of the *addition* shall be considered an existing lateral load-carrying structural element subject to the requirements of Section 302.4.

❖ Wherever an addition to an existing building is made, the affected members of the original structure must be assessed to determine their ability to resist any increased forces. Because an addition typically adds new loads to the existing building, the architect or engineer responsible for the design of the project must analyze the existing gravity load-carrying elements to determine whether there are any structural components having loads increased by more than 5 percent that require reinforcement. Where an existing building was initially designed to support a future expansion, the code official should seek verification that the proposed addition will result in the affected building complying with the current code requirements. Any new construction must comply with current code requirements.

302.3.1 Design live load. Where the *addition* does not result in increased design live load, existing gravity load-carrying structural elements shall be permitted to be evaluated and designed for live loads approved prior to the *addition*. If the approved live load is less than that required by Section 1607 of the *International Building Code*, the area designed for the nonconforming live load shall be posted with placards of approved design indicating the approved live load. Where the *addition* does result in increased design live load, the live load required by Section 1607 of the *International Building Code* shall be used.

❖ It is not uncommon for the design live load requirements to change from the time a building is originally designed to when an addition is proposed. The live loads used in the original design may have been adequate for the building's initial use and may have been in compliance with all the code requirements that were in effect at that time. Many years and many code changes can alter the status of the structural design criteria and code requirements, which does not mean the existing structural system is inadequate and cannot be used. It just means that when the live loads that were used for the design of the existing building are lower than those required by current standards, the design live loads used for the original design must be posted.

302.4 Existing structural elements carrying lateral load. Where the *addition* is structurally independent of the existing structure, existing lateral load-carrying structural elements shall be permitted to remain unaltered. Where the *addition* is not structurally independent of the existing structure, the existing structure and its *addition* acting together as a single structure shall be shown to meet the requirements of Sections 1609 and 1613 of the *International Building Code*.

Exception: Any existing lateral load-carrying structural element whose demand-capacity ratio with the *addition* considered is no more than 10 percent greater than its demand-capacity ratio with the *addition* ignored shall be permitted to remain unaltered. For purposes of calculating demand-capacity ratios, the demand shall consider applicable load combinations with design lateral loads or forces in accordance with Sections 1609 and 1613 of the *International Building Code*. For purposes of this exception, comparisons of demand-capacity ratios and calculation of

design lateral loads, forces and capacities shall account for the cumulative effects of *additions* and alterations since original construction.

❖ The requirements of this section do not affect an existing structure where the addition is structurally independent, in which case, the addition is required to comply with the seismic requirements for new structures. An existing building or structure where the addition will not be structurally independent that is added on to must be carefully evaluated for its ability to withstand earthquake and wind loading. The seismic resistance of an existing building or structure cannot be lessened or pose any undue increase in the fire and life safety hazards of the building or structure. Because the addition and the existing structure resist lateral loads as a single structure, designing the entire structure to resist the total lateral seismic and wind load is necessary.

The exception permits an addition that is not structurally independent without alteration to the seismic-force-resisting system of the existing structure, provided the demand-capacity ratio is increased no more than 10-percent in any structural element. The demand is determined using the load combinations including wind and seismic effects. By considering the demand-capacity ratio, any decrease in lateral resistance is accounted for as well.

302.4.1 Seismic. Seismic requirements for additions shall be in accordance with this section. Where the existing seismic force-resisting system is a type that can be designated ordinary, values of R, Ω_0 and C_d for the existing seismic force-resisting system shall be those specified by the *International Building Code* for an ordinary system unless it is demonstrated that the existing system will provide performance equivalent to that of a detailed, intermediate or special system.

❖ This section of the code gives more specific guidance with respect to the impact of an addition on the seismic resistance of an existing structure. This section provides guidance to engineers on selecting system-related design coefficients for existing seismic force-resisting systems. The intent is that existing systems should be considered "ordinary" by default. This only applies to systems for which there is a choice of "ordinary," "special," "intermediate" or "detailed" for the permitted seismic-force-resisting systems. Some seismic systems, for example light-frame shear walls, are not categorized as "ordinary," intermediate or special. Those systems are acceptable, and the system coefficients specified for those systems in ASCE 7 are appropriate. For seismic systems that may be intermediate or special the code requires a demonstration of equivalence to demonstrate compliance.

[B] SECTION 303 ALTERATIONS

303.1 General. Except as provided by Section 301.2 or this section, alterations to any building or structure shall comply *with the requirements of the International Building Code for new construction. Alterations shall be such that the existing building* or structure is no less conforming to the provisions of the *International Building Code* than the *existing building* or structure was prior to the *alteration.*

Exceptions:

1. An existing stairway shall not be required to comply with the requirements of Section 1009 of the *International Building Code* where the existing space and construction does not allow a reduction in pitch or slope.
2. Handrails otherwise required to comply with Section 1009.12 of the *International Building Code* shall not be required to comply with the requirements of Section 1012.6 of the *International Building Code* regarding full extension of the handrails where such extensions would be hazardous due to plan configuration.

❖ Alterations include renovations, which implies that something is changed in the structure. For example, the removal, rearrangement or replacement of partition walls in an office building is an alteration because, in part, of the possible impact on the means of egress, fire resistance or other life safety features of the building. Conversely, the replacement of damaged trim pieces on a door frame is considered a repair, not an alteration. Alterations are to conform to the requirements for a new structure. For example, consider the corridor of an office building that is to be extended 18 feet (5486 mm), as shown in Figure 303.1. The existing office building has no sprinkler system (and none is proposed), so the corridor extension walls and doors are to be fire-resistance rated in accordance with Section 1018 of the IBC. This is applicable even if, for some reason, the walls and doors of the existing corridor system are not fire-resistance-rated construction. This section also indicates that unaltered portions of a structure are not required to comply with code provisions for new construction. However, also see Section 310, which requires areas outside of the alteration area to be revised in order to provide an accessible route.

The exceptions address issues that arise with stairways. While not specifically addressed, ramps may have similar concerns. According to Exception 1, if an existing stairway was built with a steeper rise/run ratio than permitted in the current code, the stairway can be replaced with the existing configuration. Enlarging the opening to achieve the current rise/run ratio and headroom would be considered technically infeasible. The principal is that not allowing for this option could result in stairways that were not maintained because they could not be brought up to current codes.

Exception 2 deals with an allowance to reduce handrail extensions when providing those extensions could become a protruding object for circulation or an obstruction for the means of egress. Section 1012.6 of the IBC requires the handrail extensions to continue in

the direction of the stairway run. An example would be where stairways had landings that were part of a corridor.

303.2 Flood hazard areas. For buildings and structures in flood hazard areas established in Section 1612.3 of the *International Building Code*, any *alteration* that constitutes *substantial improvement* of the existing structure, as defined in Section 202, shall comply with the flood design requirements for new construction, and all aspects of the existing structure shall be brought into compliance with the requirements for new construction for flood design.

For buildings and structures in flood hazard areas established in Section 1612.3 of the *International Building Code*, any alterations that do not constitute *substantial improvement* or *substantial damage* of the existing structure, as defined in Section 202, are not required to comply with the flood design requirements for new construction.

❖ Reduction in exposure to flood hazards, including exposure of older buildings, is one of the purposes for regulating flood plain development. Buildings or structures that are located in flood hazard areas are to be brought into compliance with the flood-resistance provisions of Section 1612 of the IBC when the value of improvements, including alterations, exceeds a certain value. See Chapter 2 for the definition of "Substantial improvement."

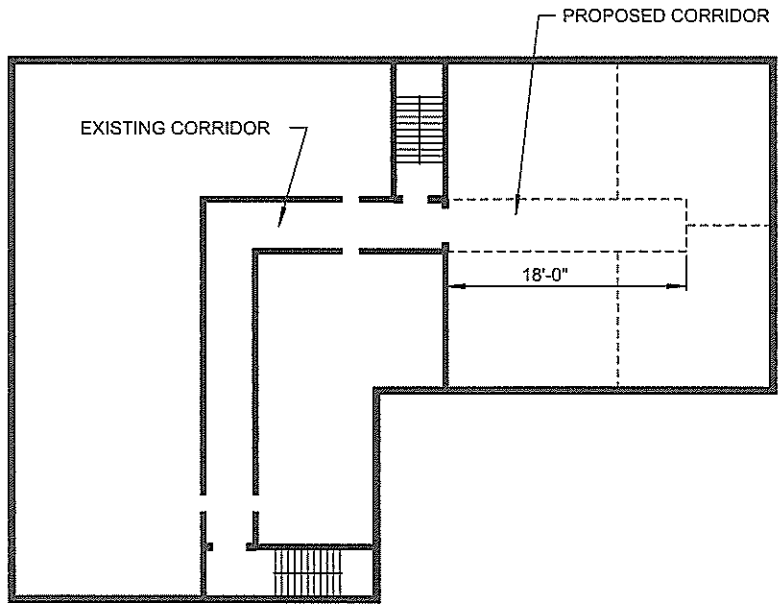
Section 105.3 requires the applicant to state the valuation of the proposed work, which is to include the total value of the work, including materials and labor. If the proposed work will be performed on buildings in flood hazard areas, a determination must be made as to whether the proposed work constitutes a substantial improvement. If applicable, the value of the work must include estimates of the value of the property owner's labor and the value of donated labor and materials.

To make a determination about whether a proposed alteration constitutes a substantial improvement, the cost of the proposed work is to be compared to the market value of the building or structure before the work is started. In order to determine market value, the code official may require the applicant to provide an appraisal or use other methods acceptable to FEMA. For additional guidance, see FEMA P-758.

303.3 Existing structural elements carrying gravity load. Any existing gravity load-carrying structural element for which an *alteration* causes an increase in design gravity load of more than 5 percent shall be strengthened, supplemented, replaced or otherwise altered as needed to carry the increased gravity load required by the *International Building Code* for new structures. Any existing gravity load-carrying structural element whose gravity load-carrying capacity is decreased as part of the *alteration* shall be shown to have the capacity to resist the applicable design gravity loads required by the *International Building Code* for new structures.

❖ Wherever an alteration to an existing building is made, the affected members must be assessed to determine their ability to resist the increased forces. Structural element forces may be increased by up to 5 percent, without the need to strengthen or replace that element.

303.3.1 Design live load. Where the *alteration* does not result in increased design live load, existing gravity load-carrying structural elements shall be permitted to be evaluated and



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

Figure 303.1
PROPOSED CORRIDOR EXTENSION

designed for live loads approved prior to the *alteration*. If the approved live load is less than that required by Section 1607 of the *International Building Code*, the area designed for the nonconforming live load shall be posted with placards of approved design indicating the approved live load. Where the *alteration* does result in increased design live load, the live load required by Section 1607 of the *International Building Code* shall be used.

❖ Where an existing building is undergoing alterations requiring changes to the structural loading, the applicable minimum design loads are those required by the code at the time of the original construction. It is not uncommon for the design live load requirements to change from the time a building is originally designed to when it undergoes a renovation. The live loads used in the original design may have been adequate for the building's initial use and may have been in compliance with all the code requirements that were in effect at that time. Many years and many code changes can impact the structural design parameters and code requirements, which does not mean the existing structural system is inadequate and cannot be used when the building is renovated. It just means that when the live loads that were used for the design of the existing building are lower than those required by current standards, the design live loads used for the original design must be posted. If the design live loads of the alteration are greater than those used for the existing building then Section 1607 of the IBC would apply just as for new construction.

303.4 Existing structural elements carrying lateral load. Except as permitted by Section 303.5, with the *alteration* increases design lateral loads in accordance with Section 1609 or 1613 of the *International Building Code*, or where the *alteration* results in a structural irregularity as defined in ASCE 7, or where the alteration decreases the capacity of any existing lateral load-carrying structural element, the structure of the altered building or structure shall be shown to meet the requirements of Sections 1609 and 1613 of the *International Building Code*.

Exception: Any existing lateral load-carrying structural element whose demand-capacity ratio with the *alteration* considered is no more than 10 percent greater than its demand-capacity ratio with the *alteration* ignored shall be permitted to remain unaltered. For purposes of calculating demand-capacity ratios, the demand shall consider applicable load combinations with design lateral loads or forces in accordance with Sections 1609 and 1613 of the *International Building Code*. For purposes of this exception, comparisons of demand-capacity ratios and calculation of design lateral loads, forces and capacities shall account for the cumulative effects of *additions* and alterations since original construction.

❖ An existing building or structure that is altered must be carefully evaluated for its ability to withstand earthquake and wind loads. The lateral resistance of an existing building or structure cannot be lessened or pose any undue increase in the fire and life safety hazards of the building or structure. This section of the code gives guidance with respect to the impact of an alteration on the lateral resistance of the structure. Alterations that affect existing structural elements to a lesser extent are permitted without requiring the existing structure to comply with the provisions for new structures, as long as the alteration itself complies. The exception allows alterations that increase the demand-capacity ratio on existing lateral load-carrying elements by no more than 10 percent or decrease the lateral resistance of existing structural elements by no more than 10 percent.

303.4.1 Seismic. Seismic requirements for alterations shall be in accordance with this section. Where the existing seismic force-resisting system is a type that can be designated ordinary, values of R, Ω_0 and C_d for the existing seismic force-resisting system shall be those specified by this code for an ordinary system unless it is demonstrated that the existing system will provide performance equivalent to that of a detailed, intermediate or special system.

❖ This section provides guidance to engineers on selecting seismic design coefficients for existing buildings. The intent is that existing systems should be considered ordinary by default, but that only applies to systems for which there is a choice of ordinary, special, intermediate, or detailed (see commentary, Section 302.4.1).

303.5 Voluntary seismic improvements. Alterations to existing structural elements or *additions* of new structural elements that are not otherwise required by this chapter and are initiated for the purpose of improving the performance of the seismic-force-resisting system of an existing structure or the performance of seismic bracing or anchorage of existing nonstructural elements shall be permitted, provided that an engineering analysis is submitted demonstrating all of the following:

1. The altered structure and the altered nonstructural elements are no less conforming to the provisions of the *International Building Code* with respect to earthquake design than they were prior to the *alteration*.
2. New structural elements are detailed and connected to the existing structural elements as required by Chapter 16 of the *International Building Code*.
3. New or relocated nonstructural elements are detailed and connected to existing or new structural elements as required by Chapter 16 of the *International Building Code*.
4. The alterations do not create a structural irregularity as defined in ASCE 7 or make an existing structural irregularity more severe.

❖ This provision addresses the issue of upgrading existing structures voluntarily for improved seismic performance. It does not apply to situations where other code sections trigger full compliance with the code. Otherwise, it allows an owner to initiate an improvement to the seismic-force-resisting system to the extent that it is viable to do so and provided the required engineering analysis is furnished. The intent is to en-

courage building owners to initiate upgrades to seismic systems that are considered prudent without making them cost prohibitive.

303.6 Means of egress capacity factors. Alterations to any *existing building* or structure shall not be subject to the egress width factors in Section 1005.1 of the *International Building Code* for new construction in determining the minimum egress widths or the minimum number of exits in an *existing building* or structure. The minimum egress widths for the components of the means of egress shall be based on the means of egress width factors in the building code under which the building was constructed, and shall be considered as complying means of egress for any *alteration* if, in the opinion of the *code official*, they do not constitute a distinct hazard to life.

❖ In existing buildings, the corridors, doors, stairways, etc., can continue to use the capacity numbers that were in place when the building was built rather than be required to expand the width of these elements based on the numbers for new construction found in Section 1005.1 of the IBC.

[B] SECTION 304 REPAIRS

304.1 General. Buildings and structures, and parts thereof, shall be repaired in conformance to this section and to Section 301.2. Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered part of the *repair* and shall not be subject to the requirements for alterations in this chapter. Routine maintenance required by Section 301.2, ordinary repairs exempt from permit in accordance with Section 105.2, and abatement of wear due to normal service conditions shall not be subject to the requirements for repairs in this section.

❖ The scope of this section differentiates repairs from alterations and clarifies that routine maintenance and any repairs that would not require permits would not fit within the scope of these requirements.

In general, the section provides a logical method for evaluating damage and identifying cases where upgrade is warranted.

The provisions would require structural improvements meeting "the code for new structures," in certain cases, in the event of damage due to fire, structural overload, settlement, natural hazard or any other cause, no matter how extensive or disproportionate the damage. This section identifies conditions of damage that should warrant improvements to the structural system for purposes of increasing safety.

304.1.1 Dangerous conditions. Regardless of the extent of structural or nonstructural damage, the *code official* shall have the authority to require the elimination of conditions deemed *dangerous*.

❖ Conditions that pose a serious safety risk must always be addressed; see the definition of "Dangerous" in Section 202. This section provides the code official considerable latitude with respect to mitigating dangerous conditions.

304.2 Substantial structural damage to vertical elements of the lateral-force-resisting system. A building that has sustained *substantial structural damage* to the vertical elements of its lateral-force-resisting system shall be evaluated and repaired in accordance with the applicable provisions of Sections 304.2.1 through 304.2.3.

❖ This section provides requirements that apply where the damage threshold that is based on the extent of the damage to the vertical elements of the lateral-force-resisting system in any story is exceeded. Substantial structural damage to the lateral system triggers the evaluation of the entire building for wind and seismic loads (see Section 304.2.1). The emphasis is placed on vertical elements, such as walls and columns, rather than horizontal elements, because it is the vertical elements of the lateral-force-resisting system that primarily determine the structure's response, particularly to earthquakes.

304.2.1 Evaluation. The building shall be evaluated by a registered design professional, and the evaluation findings shall be submitted to the *code official*. The evaluation shall establish whether the damaged building, if repaired to its pre-damage state, would comply with the provisions of the *International Building Code* for wind and earthquake loads. Evaluation for earthquake loads shall be required if the *substantial structural damage* was caused by or related to earthquake effects or if the building is in Seismic Design Category C, D, E or F.

Wind loads for this evaluation shall be those prescribed in Section 1609 of the *International Building Code*. Earthquake loads for this evaluation, if required, shall be permitted to be 75 percent of those prescribed in Section 1613 of the *International Building Code*. Values of R, Ω_0 and C_d for the existing seismic force-resisting system shall be those specified by this code for an ordinary system unless it is demonstrated that the existing system will provide performance equivalent to that of an intermediate or special system.

❖ The extent of repairs is based on an evaluation prepared by a registered design professional. Generally, the code's approach is that complete structural upgrades should be relatively rare. In this section, a structural upgrade is only triggered upon substantial structural damage to the lateral system, and only when the evaluation shows that the predamage building was substandard.

This provision refers to Sections 1609 and 1613 of the IBC for wind and earthquake loads, respectively. It permits reduced earthquake loading for both the evaluation and any required seismic rehabilitation to recognize that existing buildings cannot be expected to perform as well as newer buildings. This concept of using reduced earthquake loading is consistent with FEMA standards, as well as the legacy building codes.

This section provides additional guidance on the selection of design parameters for seismic-force-resisting systems. In most cases, an existing building will not possess the detailing necessary to qualify for special or even intermediate systems. If the detailing is unknown, design parameters for ordinary systems must

be used. Rather than require strict compliance with the "proportioning and detailing requirements" of intermediate or special systems, general equivalence is preferable because, for many existing buildings, there are no applicable provisions to check against. Use of the term "equivalent performance" preserves some engineering and regulatory discretion appropriate to work with existing buildings.

304.2.2 Extent of repair for compliant buildings. If the evaluation establishes compliance of the pre-damage building in accordance with Section 304.2.1, then repairs shall be permitted that restore the building to its pre-damage state using materials and strengths that existed prior to the damage.

❖ Where the evaluation establishes that the predamaged structure meets the structural provisions of the IBC as provided for in Section 304.2.1, then the repairs may be limited to a restoration of the structural components.

304.2.3 Extent of repair for noncompliant buildings. If the evaluation does not establish compliance of the pre-damage building in accordance with Section 304.2.1, then the building shall be rehabilitated to comply with applicable provisions of the *International Building Code* for load combinations, including wind or seismic loads. The wind loads for the *repair* shall be as required by the building code in effect at the time of original construction, unless the damage was caused by wind, in which case the wind loads shall be as required by the building code in effect at the time of original construction or as required by the *International Building Code,* whichever are greater. Earthquake loads for this rehabilitation design shall be those required for the design of the pre-damage building, but not less than 75 percent of those prescribed in Section 1613 of the *International Building Code*. New structural members and connections required by this rehabilitation design shall comply with the detailing provisions of the *International Building Code* for new buildings of similar structure, purpose and location.

❖ If the evaluation of the building, in accordance with Section 304.2.1, shows that, in the hypothetically repaired condition, the building would not comply with the established requirements, then the building must be rehabilitated as described in this section. The general requirement is to comply with the IBC load combinations. These load combinations establish the required strength of structural members.

The effects of wind and seismic loads warrant special consideration. In determining the level of compliance for repairs to buildings that have sustained substantial structural damage it is important to determine if wind forces have caused that damage. If so, it is considered prudent to require the repairs of wind damage to use wind loading that is the higher of the building code in effect at the time of the original construction or the IBC. If not, the wind loading in effect at the time of the original construction is the basis for design. Seismic forces for the rehabilitation can be those required by the building code in effect at the time of the building's construction, but this may not be less than the reduced IBC seismic force level, as described in Section 304.2.1.

304.3 Substantial structural damage to gravity load-carrying components. Gravity load-carrying components that have sustained *substantial structural damage* shall be rehabilitated to comply with the applicable provisions of the *International Building Code* for dead and live loads. Snow loads shall be considered if the *substantial structural damage* was caused by or related to snow load effects. Existing gravity load-carrying structural elements shall be permitted to be designed for live loads approved prior to the damage. Nondamaged gravity load-carrying components that receive dead, live or snow loads from rehabilitated components shall also be rehabilitated or shown to have the capacity to carry the design loads of the rehabilitation design. New structural members and connections required by this rehabilitation design shall comply with the detailing provisions of the *International Building Code* for new buildings of similar structure, purpose and location.

❖ Substantial structural damage to gravity load-carrying elements, such as columns or bearing walls, must be repaired so that these members are adequate to resist the dead and live loads in accordance with current code requirements, as must other elements of the load path. Snow loads must also be included where the substantial damage is associated with the effects of snow load.

304.3.1 Lateral force-resisting elements. Regardless of the level of damage to vertical elements of the lateral force-resisting system, if *substantial structural damage* to gravity load-carrying components was caused primarily by wind or earthquake effects, then the building shall be evaluated in accordance with Section 304.2.1 and, if noncompliant, rehabilitated in accordance with Section 304.2.3.

❖ In determining the extent of repairs to these gravity load-carrying elements that are not part of the lateral-force-resisting system, it is important to determine if wind or earthquakes have caused the structural damage. If the substantial structural damage is due to wind or earthquake, the lateral system must be checked even if no damage is apparent. Where this is the case, then the structure must be evaluated in accordance with Section 304.2.1.

304.4 Less than substantial structural damage. For damage less than *substantial structural damage*, repairs shall be allowed that restore the building to its pre-damage state using materials and strengths that existed prior to the damage. New structural members and connections used for this *repair* shall comply with the detailing provisions of the *International Building Code* for new buildings of similar structure, purpose and location.

❖ For damage that is not deemed to be substantial structural damage, repairs are allowed that restore the building to its predamaged state using materials and strengths that existed prior to the damage. New structural members and connections used for this repair must comply with the detailing provisions for new buildings of similar materials, purpose and location.

304.5 Flood hazard areas. For buildings and structures in flood hazard areas established in Section 1612.3 of the *International Building Code*, any *repair* that constitutes *substantial*

improvement of the existing structure, as defined in Section 202, shall comply with the flood design requirements for new construction, and all aspects of the existing structure shall be brought into compliance with the requirements for new construction for flood design.

For buildings and structures in flood hazard areas established in Section 1612.3 of the *International Building Code*, any repairs that do not constitute *substantial improvement* or *substantial damage* of the existing structure, as defined in Section 202, are not required to comply with the flood design requirements for new construction.

❖ Reduction in the exposure to flood hazards, including the exposure of older buildings, is one of the purposes for regulating flood plain development. Buildings or structures that are located in flood hazard areas are to be brought into compliance with the flood-resistance provisions of Section 1612 of the IBC when the cost of repairs necessary to restore the damage to its predamage condition (even if less work is actually proposed) exceeds a certain value. See Chapter 2 for the definition of "Substantial improvement" and "Substantial damage."

Section 105.3 requires the applicant to state the valuation of the proposed work, which is to include the total value of the work, including materials and labor. If the proposed work will be performed on buildings in flood hazard areas, a determination must be made as to whether the proposed work constitutes a substantial improvement or the repair of substantial damage. If applicable, the value of the work must include estimates of the value of the property owner's labor and the value of donated labor and materials.

To make a determination about whether the proposed repairs constitute a repair of substantial damage, the cost of the proposed work is to be compared to the market value of the building or structure before the work is started. In order to determine market value, the code official may require the applicant to provide an appraisal or use other methods acceptable to FEMA. For additional guidance, see FEMA P-758 and FEMA 311, *Guidance on Estimating Substantial Damage Using the NFIP Substantial Damage Estimator.*

[B] SECTION 305 FIRE ESCAPES

305.1 Where permitted. Fire escapes shall be permitted only as provided for in Sections 305.1.1 through 305.1.4.

❖ Sections 305.1.1 through 305.5 address the current requirements for the use of exterior fire escapes. Their use and features, as defined in this section, should not be confused with the requirements for exterior exit stairways as defined in Section 1026 of the IBC.

The use of exterior fire escapes as a means of egress was popular in building designs of the past. They were used for economy of construction and to "save" usable space in the buildings they served. Being located outside the building, they were also considered safer than the unenclosed interior exit stairways of the time. Over the years, exterior fire escapes lost their appeal for many reasons:

1. Fire escapes were never an integral part of the building's design; they were a necessary appendage hung from or attached to the building wall.
2. Fire escapes were most commonly constructed of cast-iron or steel, both of which required a high degree of maintenance to protect the corrodible materials from the effects of weather.
3. Because fire escapes are "open structures," they are subject to icing during the winter months. This makes them dangerous to use and, in extreme cases, they can become completely unusable.
4. People with a fear of heights can find exterior fire escapes difficult and sometimes impossible to use.
5. Fire escapes were an unpleasant sight and an unwanted element in the architectural design.

The use of exterior fire escapes is all but obsolete except for existing buildings with a clear deficiency in the means of egress that cannot be reasonably rectified in other ways.

This section indicates that fire escapes are permitted only on existing buildings. New fire escapes may be installed on existing buildings only where exterior stairs cannot be used. Section 305.2 addresses the location of fire escapes and Section 305.3 addresses the construction of fire escapes.

305.1.1 New buildings. Fire escapes shall not constitute any part of the required means of egress in new buildings.

❖ Because of the inherent hazards and lack of dependability, open exterior fire escapes are not permitted as part of the required means of egress in new construction.

305.1.2 Existing fire escapes. Existing fire escapes shall continue to be accepted as a component in the means of egress in existing buildings only.

❖ Exterior fire escapes in existing buildings are acceptable as a component of the required means of egress because, in most cases, it would be physically impractical and economically prohibitive to retrofit older buildings with interior or exterior exit stairways that comply with all the code requirements for new construction.

305.1.3 New fire escapes. New fire escapes for existing buildings shall be permitted only where exterior stairs cannot be utilized due to lot lines limiting stair size or due to the sidewalks, alleys or roads at grade level. New fire escapes shall not incorporate ladders or access by windows.

❖ Continuing corrosion of existing exterior fire escapes, as well as other factors that may affect the safety of the structures, often makes the replacement of these fire escapes necessary. The code official may determine that the means of egress in an existing building is un-

safe, requiring some corrective action, which may be the installation of a new exterior fire escape. This section permits new exterior fire escapes for existing buildings where exterior stairs conforming to the requirements of Section 1026 of the IBC cannot be used because of lot lines that limit stair size or encroachments on sidewalks, alleys or roads at grade level.

Because it was the accepted practice of the time, access to exterior fire escapes was quite often through windows located in corridors or individual dwelling units or offices. This practice is not permitted when replacement exterior fire escapes are used. The building must be altered to provide proper exit access to the fire escape.

The code does not permit the use of ladders as a component in the means of egress except as allowed in the IBC for control rooms or elevated facility observation rooms for Group I-3 occupancies; therefore, ladders can neither be used as a component part of an exterior fire escape, nor to access an exterior fire escape.

305.1.4 Limitations. Fire escapes shall comply with this section and shall not constitute more than 50 percent of the required number of exits nor more than 50 percent of the required exit capacity.

❖ For reasons of overall life safety, exterior fire escapes may be used as a component of the means of egress only when the total number used does not exceed one-half the required number of exits and more than one-half the total required exit capacity.

305.2 Location. Where located on the front of the building and where projecting beyond the building line, the lowest landing shall not be less than 7 feet (2134 mm) or more than 12 feet (3658 mm) above grade, and shall be equipped with a counterbalanced stairway to the street. In alleyways and thoroughfares less than 30 feet (9144 mm) wide, the clearance under the lowest landing shall not be less than 12 feet (3658 mm).

❖ In the past, exterior fire escapes were allowed to project beyond the property line and extend over sidewalks, alleyways and roads. Where such conditions are still accepted by the code (see Sections 305.1.2 and 305.1.3), the clearance to the lowest landing from grade level must be at least 7 feet (2134 mm), and not more than 12 feet (3658 mm) for exterior fire escapes located in front of the building. In alleyways and thoroughfares less than 30 feet (9144 mm) wide, the clearance under the lowest landing must be at least 12 feet (3658 mm). To facilitate these clearance requirements, exterior fire escapes are usually equipped with a counterbalanced stairway that retracts to a horizontal position when the fire escape is not in use.

305.3 Construction. The fire escape shall be designed to support a live load of 100 pounds per square foot (4788 Pa) and shall be constructed of steel or other approved noncombustible materials. Fire escapes constructed of wood not less than nominal 2 inches (51 mm) thick are permitted on buildings of Type V construction. Walkways and railings located over or supported by combustible roofs in buildings of Type III and IV construction are permitted to be of wood not less than nominal 2 inches (51 mm) thick.

❖ Traditionally and typically, exterior fire escapes are constructed of cast iron or steel, although the code does permit exterior fire escapes to be constructed of other noncombustible materials. The use of nominal 2-inch (51 mm) wood is permitted in Type V construction. Nominal 2-inch (51 mm) wood may also be used in Types III and IV construction when the exterior fire escape is supported by wood construction permitted by Table 601 of the IBC.

305.4 Dimensions. Stairs shall be at least 22 inches (559 mm) wide with risers not more than, and treads not less than, 8 inches (203 mm) and landings at the foot of stairs not less than 40 inches (1016 mm) wide by 36 inches (914 mm) long, located not more than 8 inches (203 mm) below the door.

❖ The normal dimensions for interior and exterior exit stairways within the IBC used in the means of egress do not apply to exterior fire escapes. The dimensional standard for exterior fire escapes has been in place for many years; thus, many exterior fire escapes in use were designed to comply with this standard. Many of these fire escapes are installed in places where it would be difficult, and often impossible, to retrofit a new fire escape if a new set of dimensional standards were employed. For this reason, it is judged appropriate to maintain the current standard. The minimum tread, riser, stair width and landing size dimensions for fire escape construction remain unchanged from the past.

305.5 Opening protectives. Doors and windows along the fire escape shall be protected with $^3/_4$-hour opening protectives.

❖ Safe exit access and safe exits are required for occupants using an exterior fire escape as a means of egress. Door and window openings in exterior walls adjacent to and along the path of travel of the exterior fire escape must be protected from the interior of the building with not less than $^3/_4$-hour opening protectives.

[B] SECTION 306
GLASS REPLACEMENT

306.1 Conformance. The installation or replacement of glass shall be as required for new installations.

❖ The technical provisions for glass and glazing are detailed in Chapter 24 of the IBC. All technical requirements of the code for glass and glazing that apply to new construction also apply to all additions or alterations to existing buildings. There are no exceptions to this requirement. When glazing in an existing building is replaced or relocated within the same building, it must comply with current standards.

SECTION 307
CHANGE OF OCCUPANCY

[B] 307.1 Conformance. No change shall be made in the use or occupancy of any building that would place the building in a different division of the same group of occupancy or in a different group of occupancies, unless such building is made to comply with the requirements of this code for such division or group of occupancy. Subject to the approval of the building official, the use or occupancy of existing buildings shall be permitted to be changed and the building is allowed to be occupied for purposes in other groups without conforming to all the requirements of this code for those groups, provided the new or proposed use is less hazardous, based on life and fire risk, than the existing use.

❖ A change of occupancy in an existing structure may change the level of inherent hazards that the code was initially intended to address.

Regardless of whether the change is to an occupancy considered to be more or less hazardous, this section applies the provisions of the code for new construction to an existing structure having a new occupancy. This is done so that the applicable code requirements adequately address the specific hazards of the new occupancy. For example, a change from an existing mercantile occupancy to a business occupancy renders all Group B provisions applicable to all portions of the structure where the occupancy has changed.

This section is one of the most frequently used provisions in the code for application to existing structures, since the occupancy in a building or structure is subject to change during the life of the building.

[B] 307.2 Certificate of occupancy. A certificate of occupancy shall be issued where it has been determined that the requirements for the new occupancy classification have been met.

❖ An existing building that has been classified into a new occupancy group must receive a certificate of occupancy before tenancy. The code requirements for one occupancy group are not always the same as those for the new occupancy group. The new occupancy must be inspected to verify that all the applicable code requirements have been meet.

[B] 307.3 Stairways. Existing stairways in an existing structure shall not be required to comply with the requirements of a new stairway as outlined in Section 1009 of the *International Building Code* where the existing space and construction will not allow a reduction in pitch or slope.

❖ A stairway in an existing building does not have to be modified to comply with the dimensional provisions in Section 1009.4 of the IBC for new stair construction. This provision is for the design of a particular stair and is aimed at addressing that stair only. This section is not intended to eliminate any of the other technical provisions that might apply to an occupancy group, such as means of egress, accessibility, exit capacity, etc.

For example, when a building is altered or there is a change of tenant, which results in a change in occupancy, the existing stair is permitted to remain as it was prior to the alteration or change of occupancy. The means of egress capacity, however, must comply with the requirements for the new occupancy. The capacity may not be lessened to match the existing stair if it is not sufficient to provide the capacity required by the new occupancy. An additional stair or another approved means of egress must be provided to comply with the means of egress requirements for the new occupancy as indicated in Chapter 10 of the IBC.

[B] 307.4 Structural. When a *change of occupancy* results in a structure being reclassified to a higher occupancy category, the structure shall conform to the seismic requirements for a new structure of the higher occupancy category. Where the existing seismic force-resisting system is a type that can be designated ordinary, values of R, Ω_0 and C_d for the existing seismic force-resisting system shall be those specified by the *International Building Code* for an ordinary system unless it is demonstrated that the existing system will provide performance equivalent to that of a detailed, intermediate or special system.

Exceptions:

1. Specific seismic detailing requirements of Section 1613 of the *International Building Code* for a new structure shall not be required to be met where it can be shown that the level of performance and seismic safety is equivalent to that of a new structure. Such analysis shall consider the regularity, over strength, redundancy and ductility of the structure within the context of the existing and retrofit (if any) detailing provided.
2. When a change of use results in a structure being reclassified from Occupancy Category I or II to Occupancy Category III and the structure is located where the seismic coefficient, S_{DS}, is less than 0.33, compliance with the seismic requirements of Section 1613 of the *International Building Code* is not required.

❖ An existing building that undergoes a change of use and occupancy that places the building in a higher occupancy category must be evaluated for its seismic resistance. For this provision, the code is not referring to the occupancy groups in Chapter 3 of the IBC, but is addressing the occupancy categories listed in Table 1604.5 of the IBC that must be used to determine whether an existing building should be reclassified to a higher occupancy category. It is important that an existing building that previously contained ordinary uses and occupancies be able to meet current code requirements relative to seismic loading if it will be used as an "essential facility."

One difficulty in applying the seismic requirements intended for new buildings to existing structures is the use of the response modification coefficient, R in calculating the design seismic force. In accordance with the IBC, the value of R that is obtained from the ASCE 7 standard is directly linked to the level of detailing required for any seismic-force-resisting system. Systems are characterized as ordinary, intermediate or

special based on the extent of ductile detailing that is provided. In areas of moderate or higher seismicity (as reflected by a structure's seismic design category), the use of most ordinary systems, those with limited ductility, are typically restricted or prohibited. In an existing building, the system detailing is in place and the problem is in selecting an *R*-value that is consistent with the construction of that system. For this reason, this section restricts *R*- values to be no greater than those listed for an ordinary system; unless there is clear evidence that a higher level of detailing has been provided.

Without Exception 1, it would be impossible in many instances to make an existing structure comply with the seismic requirements for a new structure. Exception 1 provides guidance for the code official and designer of areas that need to be investigated when compliance with the seismic requirements set forth in the code cannot be accomplished.

Exception 2 has it origins in ASCE 7. The purpose is to permit a change from Occupancy Category I or II to an Occupancy Category III for structures subjected to low earthquake accelerations without meeting the requirements for a new structure.

[EC] 307.5 Energy. Buildings undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with the *International Energy Conservation Code*.

❖ When a building undergoes a change of occupancy, energy-using systems (envelope, mechanical, service water heating, electrical distribution or illumination) must be evaluated to determine the effect the change of occupancy has on system performance and energy use.

For example, if a mercantile building were converted to a restaurant, additional ventilation would be required for the public based on the increased occupant load. If an existing system serves an occupancy that is different from the occupancy it served when the code went into effect, the mechanical system must comply with the applicable code requirements for a mechanical system serving the newer occupancy. Depending on the nature of the previous occupancy, changing a building's occupancy classification could result in a change to the mechanical, service water heating, electrical distribution or illumination systems, or any combination of these.

Buildings undergoing a change of occupancy must meet the applicable requirements of the code when peak demand is increased. For example, if a hotel is converted to multiple-family residential use and the conversion results in an increase in the building's peak connected load (space conditioning, lighting or service water heating), the entire building must be brought into compliance.

When the occupancy changes in a portion of an existing building (residential or commercial) and the new occupancy results in an increase in the peak demand for either the fossil fuel or electrical energy supply, the portion of the building associated with the new occupancy must meet the code.

When a permittee claims that a change of occupancy will not increase the peak design rate of energy use for the building, it is the applicant's responsibility to demonstrate that the peak load of the converted building will not exceed the peak load of the original building under the current utility rate tariff structure. Without supporting documentation, the peak load must be assumed to increase with a change of occupancy.

307.6 Electrical. It shall be unlawful to make a change in the occupancy of a structure that will subject the structure to the special provisions of the *International Building Code* related to electrical installations applicable to the new occupancy without approval. The *code official* shall certify that the structure meets the intent of the provisions of law governing building construction for the proposed new occupancy and that such *change of occupancy* does not result in any hazard to the public health, safety or welfare.

❖ When a building undergoes a change of occupancy, the electrical systems must be evaluated to determine what effect the change of occupancy has on them. For example, if a mercantile building is converted to a restaurant, additional electrical capacity and modifications may be required. If an existing system serves an occupancy that is different from the occupancy it served when the code went into effect, the electrical system must comply with the applicable code requirements for a system serving the newer occupancy. Depending on the nature of the previous occupancy, changing a building's occupancy classification could result in a change to the electrical system.

[FG] 307.7 Fuel gas. It shall be unlawful to make a change in the occupancy of a structure that will subject the structure to the special provisions of the *International Fuel Gas Code* applicable to the new occupancy without approval. The *code official* shall certify that the structure meets the intent of the provisions of law governing building construction for the proposed new occupancy and that such *change of occupancy* does not result in any hazard to the public health, safety or welfare.

❖ When a building undergoes a change of occupancy, the fuel gas systems must be evaluated to determine what effect the change of occupancy has on them. For example, if a mercantile building is converted to a restaurant, additional fuel gas piping system capacity and modifications may be required. If an existing system serves an occupancy that is different from the occupancy it served when the code went into effect, the fuel gas system must comply with the applicable code requirements for a system serving the newer occupancy. Depending on the nature of the previous occupancy, changing a building's occupancy classification could result in a change to the fuel gas system.

[M] 307.8 Mechanical. It shall be unlawful to make a change in the occupancy of a structure that will subject the structure to the special provisions of the *International Mechanical Code* applicable to the new occupancy without approval. The code

official shall certify that the structure meets the intent of the provisions of law governing building construction for the proposed new occupancy and that such *change of occupancy* does not result in any hazard to the public health, safety or welfare.

❖ When a building undergoes a change of occupancy, the mechanical systems must be evaluated to determine what effect the change of occupancy has on them. For example, if a mercantile building is converted to a restaurant, additional mechanical system capacity and modifications may be required. If an existing system serves an occupancy that is different from the occupancy it served when the code went into effect, the mechanical system must comply with the applicable code requirements for a system serving the newer occupancy. Depending on the nature of the previous occupancy, changing a building's occupancy classification could result in a change to the mechanical system.

[P] 307.9 Plumbing. It shall be unlawful to make a change in the occupancy of a structure that will subject the structure to the special provisions of the *International Plumbing Code* applicable to the new occupancy without approval. The *code official* shall certify that the structure meets the intent of the provisions of law governing building construction for the proposed new occupancy and that such *change of occupancy* does not result in any hazard to the public health, safety or welfare.

❖ When a building undergoes a change of occupancy, the plumbing systems must be evaluated to determine what effect the change of occupancy has on them. For example, if a mercantile building is converted to a restaurant, additional plumbing system capacity and modifications may be required. If an existing system serves an occupancy that is different from the occupancy it served when the code went into effect, the plumbing system must comply with the applicable code requirements for a system serving the newer occupancy. Depending on the nature of the previous occupancy, changing a building's occupancy classification could result in a change to the plumbing system.

[B] SECTION 308 HISTORIC BUILDINGS

308.1 Historic buildings. The provisions of this code relating to the construction, *repair*, *alteration*, *addition*, restoration and movement of structures, and *change of occupancy* shall not be mandatory for historic buildings where such buildings are judged by the building official to not constitute a distinct life safety hazard.

❖ This section provides an exception from code requirements when the building in question has historic value. The most important criterion for the application of this section is that the building must be essentially accredited as being of historic significance by a qualified party or agency. Usually, this is done by a state or local authority after careful review of the historical value of the building. Most, if not all, states have such authorities, as do many local jurisdictions. The agencies with such authority can be located at the state or local government level or through the local chapter of the American Institute of Architects (AIA). Other considerations include the structural condition of the building (i.e., is the building structurally sound), its proposed use, its impact on life safety and how the intent of the code, if not the letter, will be achieved.

308.2 Flood hazard areas. Within flood hazard areas established in accordance with Section 1612.3 of the *International Building Code*, where the work proposed constitutes *substantial improvement* as defined in Section 1612.2 of the *International Building Code*, the building shall be brought into compliance with Section 1612 of the *International Building Code*.

Exception: Historic buildings that are:

1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places;
2. Determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district; or
3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.

❖ This section is simply a reminder to the user of the code that, when substantial improvements are made to historic structures, there could be some ramifications regarding flood hazards that need to be considered, notwithstanding the allowance stated in Section 308.1. In other words, when there are substantial improvements to a building in a flood hazard area, as defined in Section 1612.2 of the IBC, the code official is not given the same discretion, as given in Section 308.1, to waive code requirements for the alteration or restoration of a historic building.

[B] SECTION 309 MOVED STRUCTURES

309.1 Conformance. Structures moved into or within the jurisdiction shall comply with the provisions of this code for new structures.

❖ Moved structures generally are required to comply with the provisions applicable to new construction. The moved structure may comply with the alternative provisions of Chapter 12 instead of the code requirements for new structures, which may be particularly useful if the moved structure is older than the effective date of the adoption of the building codes within the jurisdiction. The fire separation distance of the moved structure must comply with requirements for new structures even if the compliance alternative provisions of Chapter 12 are used to meet the code requirements.

[B] SECTION 310
ACCESSIBILITY FOR EXISTING BUILDINGS

310.1 Scope. The provisions of Sections 310.1 through 310.9 apply to maintenance, *change of occupancy*, *additions* and alterations to existing buildings, including those identified as historic buildings.

> **Exception:** Type B dwelling or sleeping units required by Section 1107 of the *International Building Code* are not required to be provided in existing buildings and facilities being altered or undergoing a *change of occupancy*.

❖ The purpose of Section 310 is to establish minimum criteria for accessibility when dealing with existing buildings and facilities. Access to buildings and structures for people with physical disabilities has been a subject that the building codes have regulated since the early 1970s. They have consistently relied on a consensus national standard, CABO/ANSI A117.1, as the technical basis for accessibility. The title of CABO/ANSI A117.1 has been revised to ICC A117.1 to reflect that the International Code Council® (ICC®) is the secretariat for this standard. Accessibility is not a new subject to the construction regulatory community. There has been a great deal of emphasis and awareness recently placed on the subject of accessibility through the passage of two federal laws. The Americans with Disabilities Act (ADA) and the Fair Housing Amendment Act (FHAA) are federal regulations that affect building construction as it relates to accessibility.

ICC recognizes the value of consistency between federal laws and the codes. Through efforts to incorporate the work of the *Americans with Disabilities Act Accessibility Guidelines* (ADAAG) Review Federal Advisory Committee and the Board for the Coordination of Model Codes (BCMC), ICC has worked toward, and will continue to strive for, accessibility regulations that reflect the highest possible degree of consistency with federal regulations and, more importantly, reasonable and appropriate provisions to meet the needs of people with disabilities.

When a facility or element is altered, it must meet new code requirements. For example, if a door and frame are removed and replaced, the door must meet the requirements for width, height, maneuvering clearances and hardware. If just the doorknob is being removed, it must be replaced with lever hardware.

If the area undergoing alteration does not contain a primary function, there are no additional requirements; however, if the area contains a primary function, there are additional criteria that may require work not in the original scope to achieve accessibility. This additional criteria is to provide an accessible route to the altered area, including any toilets and drinking fountains, that serve it. Requirements for an accessible route might specify that the door previously discussed be removed and replaced because it did not have adequate width or maneuvering clearances.

The principle behind this approach to upgrading existing buildings is that they will become more accessible over time. A valid time to work towards that goal is when a structure is being altered. Special considerations are offered because of the difficulty involved in dealing with existing facilities that may not have been built with accessibility for physically disabled persons in mind. For example, when a historically registered home is being made into a museum, if changing the front door to allow for wheelchair access would alter the historical significance, alternatives are offered in Section 310.9. Another example is the alternatives offered in Section 310.7 if it is technically infeasible to provide full accessibility in an existing building. Please note that the term "technically infeasible" refers to either movement of a major structural element or other physical constraints. For example, a ramp to provide entrance or exit from a particular door may not be possible because of property lines or setback constraints.

Section 310.1 addresses accessibility in existing buildings that are being renovated or altered. The exception for Type B dwelling and sleeping units in existing buildings being altered or undergoing a change of occupancy is for consistency with the FHAA. Additions that contain dwelling and sleeping units required to be Type B in new construction are required to meet Type B dwelling unit requirements. Accessible and Type A dwelling and sleeping units are required in existing institutional and residential buildings undergoing additions or alterations.

310.2 Maintenance of facilities. A building, facility or element that is constructed or altered to be accessible shall be maintained accessible during occupancy.

❖ Continued compliance with the accessibility requirements of the code is dependent on maintenance of such facilities throughout the life of the building. For example, drinking fountains that are required to be accessible are of little value if they malfunction through deterioration or failure of any of the working parts. In other cases, inoperable elevators, locked accessible doors and obstructed accessible routes must be maintained such that they are readily usable by individuals with disabilities.

310.3 Extent of application. An *alteration* of an existing element, space or area of a building or facility shall not impose a requirement for greater accessibility than that which would be required for new construction.

Alterations shall not reduce or have the effect of reducing accessibility of a building, portion of a building or facility.

❖ The purpose of this section is to clarify where alterations and scoping for alterations requirements apply. The requirements in Sections 310.6 and 310.7 do not impose a higher level of accessibility than the level required in new construction. At the same time, alter-

ations cannot result in a lesser degree of accessibility than existed before the alterations were undertaken.

310.4 Change of occupancy. Existing buildings that undergo a change of group or occupancy shall comply with this section.

❖ When an entire building undergoes a change of occupancy, the building must comply with the provision in Section 310.4.2. If a portion of a building undergoes a change of occupancy, such as when there is a tenant change or a partial renovation where a space changes function, then the level of accessibility is addressed in Section 310.4.1.

310.4.1 Partial change in occupancy. Where a portion of the building is changed to a new occupancy classification, any alterations shall comply with Sections 310.6, 310.7 and 310.8.

❖ When a building undergoes a partial change of occupancy, such as where there is a tenant change or a change in function of a specific area, then the level of accessibility provided must achieve the same level as if that space was undergoing an alteration. Basically, the intent is than any spaces or elements being altered will meet new accessibility provisions unless technically infeasible (see Section 310.6). If this area changing occupancy is a primary function of the space, an evaluation of the accessible route, as well as bathrooms and drinking fountains serving this space, must be made. If these elements are not accessible, improvements must be made. However, there is a limit to the cost of the additional improvements to a maximum of 20 percent of the cost of the alteration (see Section 310.7). The reference to Section 310.8 provides for additional allowances because the designer/owner is still dealing with existing building constraints. For example, the accessible route could be provided by a platform lift (see Section 310.8.3) where in new construction, this option is limited (see Sections 1007.5 and 1109.7 of the IBC).

310.4.2 Complete change of occupancy. Where an entire building undergoes a *change of occupancy*, it shall comply with Section 310.4.1 and shall have all of the following accessible features:

1. At least one accessible building entrance.
2. At least one accessible route from an accessible building entrance to *primary function* areas.
3. Signage complying with Section 1110 of the *International Building Code*.
4. Accessible parking, where parking is being provided.
5. At least one accessible passenger loading zone, when loading zones are provided.
6. At least one accessible route connecting accessible parking and accessible passenger loading zones to an accessible entrance.

Where it is *technically infeasible* to comply with the new construction standards for any of these requirements for a change of group or occupancy, the above items shall conform to the requirements to the maximum extent technically feasible.

❖ This section establishes that when an existing building undergoes a complete change of occupancy, full compliance with six accessible route requirements listed are expected, regardless of cost. That way, a person with mobility impairments would be able to arrive at the building (see Items 4 and 5), get to the accessible entrance (see Items 1, 3 and 6) and have at least one accessible route throughout the building to all the primary function areas (see Item 2). Changes between levels could be via a ramp (see Section 310.8.5), an elevator (see Section 310.8.2) or a platform lift (see Section 310.8.3). In addition, with the reference back to Section 310.4.1, bathrooms and drinking fountains serving primary function areas would need to be evaluated. If they are not accessible, they must also be altered, but these elements could use the 20-percent cap on cost offered in Section 310.7, Exception 1. If full compliance is technically infeasible, the element must be made accessible to the fullest extent that is feasible.

Typically a building undergoing a complete change of occupancy is being, at least partially, gutted and undergoing alterations due to changes in function, possibly due to increased occupant load, means of egress requirements, sprinkler requirements, and/or mechanical and plumbing changes. The intent is to create a balance between the change of occupancy meeting all new construction requirements for accessibility and the fact that the designer/owner is dealing with some existing building conditions.

This is not based on any specific provisions of the ADAAG, but parallels the intent of the requirements for the removal of barriers.

310.5 Additions. Provisions for new construction shall apply to *additions*. An *addition* that affects the accessibility to, or contains an area of, a *primary function* shall comply with the requirements in Section 310.7.

❖ Additions must comply with new construction. An addition, however, is also an alteration to an existing building; therefore, accessible route provisions for existing buildings are applicable (see commentary, Section 310.6). For example, a new dining area is added in a restaurant. All accessible elements within the parameter of the addition must be constructed to be accessible. If the route to the addition or the bathrooms is in the existing building, it must be evaluated to see if it needs to be altered.

310.6 Alterations. A building, facility or element that is altered shall comply with the applicable provisions in Chapter 11 of the *International Building Code* and ICC A117.1, unless

technically infeasible. Where compliance with this section is *technically infeasible*, the *alteration* shall provide access to the maximum extent technically feasible.

Exceptions:

1. The altered element or space is not required to be on an accessible route, unless required by Section 310.7.
2. Accessible means of egress required by Chapter 10 of the *International Building Code* are not required to be provided in existing buildings and facilities.
3. The *alteration* to Type A individually owned dwelling units within a Group R-2 occupancy shall meet the provision for a Type B dwelling unit and shall comply with the applicable provisions in Chapter 11 of the *International Building Code* and ICC A117.1.

❖ The code approaches the application of accessibility provisions to a facility that is altered by broadly requiring full conformance to new construction, meaning full accessibility is expected. Exceptions are then provided to indicate the conditions under which less than full accessibility is permitted.

When a facility or element is altered, it must meet new code requirements. For example, if a door and frame are removed and replaced, the door must meet the requirements for width, height, maneuvering clearances and hardware. If just the doorknob is being removed, it must be replaced with lever hardware.

The circumstance under which full compliance with accessibility provisions is not required is when it is deemed to be technically infeasible (see the commentary on the definition of "Technically infeasible" in Chapter 2). This is considered reasonable since, if not provided for, plans for alterations may be otherwise abandoned by the building owner. The opportunity to upgrade and increase the current level of accessibility in an existing building would then be lost. This concern is also embodied in the requirement that an altered element or space is expected to be made accessible to the extent to which it is technically feasible to do so. In this manner, the code accomplishes the greatest degree of accessibility while recognizing the justifiable difficulties that may be involved in providing full accessibility in existing buildings.

The availability and usability of accessible elements are critically dependent on the presence of an accessible route leading to the accessible elements. The requirement for an accessible route represents one of the potential difficulties in an existing building that does not currently have adequate accessible routes. For example, in a multiple-story building, the accessible route to upper floors will most often be provided in the form of an elevator. It may be technically infeasible to provide an elevator in an existing building that does not currently contain an elevator. For this reason, Exception 1 indicates that an altered element or space is not required to be on an accessible route, except to the extent required in Section 310.7. In accordance with Exception 1, if the area undergoing alteration does not contain a primary function (see the definition for "Primary function" in Chapter 2), there are no additional requirements. However, if the area contains a primary function, there are additional criteria to achieve accessibility that may require work not in the original scope of the project. This additional criteria is to provide an accessible route to the altered area, as well as improvements to any toilets and drinking fountains that serve the altered area. Requirements for an accessible route might specify that the door previously discussed be removed and replaced because it did not have adequate width or maneuvering clearances.

Exception 2 indicates that accessible means of egress are not required as a result of undertaking alterations to existing buildings. Strict compliance with Section 1007 of the IBC is often technically infeasible. The requirement for a 48-inch (1219 mm) clear width between handrails would require many stairways to be widened. This often would entail movement of major structural elements in order to accomplish this alteration. Note that this is not an exception for accessible entrance requirements.

In condominiums, Exception 3 would allow for owners of dwellings that had previously been constructed as Type A units to only meet Type B unit requirements when the units are altered. For example, if an owner wanted to alter the bathroom in their unit, they would only be required to meet the lesser accessibility requirements of a Type B unit with the new construction. This exception would not be applicable to units that were for rent.

310.7 Alterations affecting an area containing a primary function. Where an *alteration* affects the accessibility to, or contains an area of, a *primary function*, the route to the *primary function* area shall be accessible. The accessible route to the *primary function* area shall include toilet facilities or drinking fountains serving the area of *primary function*.

Exceptions:

1. The costs of providing the accessible route are not required to exceed 20 percent of the costs of the alterations affecting the area of *primary function*.
2. This provision does not apply to alterations limited solely to windows, hardware, operating controls, electrical outlets and signs.
3. This provision does not apply to alterations limited solely to mechanical systems, electrical systems, installation or *alteration* of fire protection systems and abatement of hazardous materials.
4. This provision does not apply to alterations undertaken for the primary purpose of increasing the accessibility of an *existing building*, facility or element.

❖ An area containing a primary function is one in which a major activity for which the building or facility is intended is carried out. For example, the lobby of a hotel in which the registration and check-out desk is located would be a primary function area. Other examples would be the dining area of a restaurant, the meeting rooms or exhibition halls in a conference center, virtu-

ally all office and work areas in a business building, and retail display areas in a mercantile occupancy. The key concept is that a primary function area is one that contains a major activity of the facility. Areas that contain activities not related to the main purpose of the facility would not be considered a primary function area. For example, a mechanical equipment room, storage closet, toilet facilities, corridors, lounges and locker rooms would not be considered primary function areas. With this background, it is clear that areas containing a primary function are clearly more critical in terms of the purpose for which people enter and use the facility; therefore, this section reflects that when such areas are altered or added, it is important to require that an accessible route to the primary function area be provided. When an accessible route to a primary function area is required by this section, an accessible route to such facilities, including any restrooms and drinking fountains serving the primary function area, must also be made accessible, even though such facilities and areas may not by themselves be considered primary function areas.

There are conditions under which it may not be reasonable to strictly enforce this requirement for an accessible route to an altered or added primary function area. Exception 1 approaches this by utilizing the cost of the alterations or addition as a basis for determining if providing an accessible route is reasonable. The requirement for a complete accessible route does not apply when the cost of providing it exceeds 20 percent of the cost of the alterations or addition to the primary function area. These costs are intended to be based on the actual costs of the planned alterations or addition to the primary function area before consideration of the cost of providing an accessible route. For example, if the planned alterations will cost $100,000, not including the cost of an accessible route to a primary function area, this exception would apply if the additional cost of providing the accessible route would exceed $20,000.

It is not the intent to exempt all requirements for accessibility when the total cost for providing the accessible route exceeds the 20-percent threshold. Improvements to the accessible route are required to the extent that costs do not exceed 20 percent of the cost to the planned alteration or addition. It is not required that the full 20 percent be spent. If the accessible route (including accessible bathrooms) is already provided, no additional expenditure is required. Note that there is not a priority list given for where money should be spent on improving the accessible route. The logical progression is access to the site, accessible exterior routes to accessible entrances, access throughout the facility, access to services within the facility, toilet and bathing rooms and, finally, drinking fountains. Evaluation on how and where the money available should best be spent must be made on a case-by-case basis. For example, if an accessible route is not available to an upper level, and the cost of an elevator is more than 20 percent of the cost of the renovation, then other alternatives could be investigated, such as a platform lift or limited access elevator, or adding the elevator pit and shaft at this time, with elevator equipment added later. If all such items are in excess of the 20-percent limit, perhaps the money available could be spent towards making the toilet rooms accessible. The idea is that existing buildings would become fully accessible over time.

Exceptions 2 and 3 identify certain alterations that are not intended to trigger the requirement for providing an accessible route to a primary function area. Alterations limited to such elements as windows, hardware, operating controls, electrical outlets, signage, mechanical, electrical and fire protection systems, including alterations for the purpose of abating a hazardous materials circumstance, do not affect the usability of a primary function area in the same manner as alterations that affect the floor plan or the configuration, location or size of rooms or spaces. It is therefore considered unreasonable to require the installation of an accessible route when the scope of alterations is limited to that reflected in these exceptions.

Note that the costs for these items are not "backed out" of the total cost for the alteration before applying Exception 1. Exceptions 2 and 3 are alterations limited to the specific items referenced.

Exception 4 is intended to avoid penalizing a building owner who is undertaking alterations or additions for the purpose of increasing accessibility. It is appropriate to encourage owners to make such alterations without requiring them to do more work simply because they chose to increase the accessibility of the space. This could otherwise have the opposite effect of discouraging such alterations to avoid the expense of undertaking more work and expense than was originally planned. For example, federal law (ADA) requires that owners of existing buildings remove certain existing barriers to accessibility. Removal of such barriers may require a permit from the code official. It would be unreasonable to have such activity trigger the mandatory requirement for further alterations to accomplish accessibility beyond the originally planned work. In principle, the code takes the view that some extent of greater accessibility is positive progress and should be encouraged, not penalized.

310.8 Scoping for alterations. The provisions of Sections 310.8.1 through 310.8.14 shall apply to alterations to existing buildings and facilities.

❖ The specific provisions of this section are intended to reflect conditions under which less than full accessibility, as would be required in new construction, is permitted in altered areas. As previously discussed, Section 308.6 requires altered areas to comply with the full range of accessibility-related provisions of the code for new construction. This section reflects a reasonable set of conditions under which a different level of accessibility can be provided. Sections 310.8.1 through

308.8.14 are part of the code's coordination effort with ICC A117.1 and the recommendations for the ADAAG Review Federal Advisory Committee.

310.8.1 Entrances. Accessible entrances shall be provided in accordance with Section 1105 of the *International Building Code*.

Exception: Where an *alteration* includes alterations to an entrance, and the building or facility has an accessible entrance, the altered entrance is not required to be accessible, unless required by Section 310.7. Signs complying with Section 1110 of the *International Building Code* shall be provided.

❖ This provision is contained here to point to the accessibility provisions of Chapter 11 of the IBC for entrances. A facility is not accessible if the entrances into it are inaccessible. Section 1105 of the IBC establishes a reasonable criteria for providing accessible entrances. A facility is not required to have all of its entrances accessible in order to provide reasonable accommodation to disabled persons. If a facility has multiple public entrances, as a minimum, it is not considered unreasonable to require at least 50 percent of the entrances to be accessible. In addition to the 50-percent accessible public entrances, entrances that have a specific function or provide access to only certain portions of the facility must be addressed.

310.8.2 Elevators. Altered elements of existing elevators shall comply with ASME A17.1 and ICC A117.1. Such elements shall also be altered in elevators programmed to respond to the same hall call control as the altered elevator.

❖ Requirements for new construction state that all elevators on an accessible route must be fully accessible in accordance with ICC A117.1. If a passenger elevator is altered, the altered element must be accessible in accordance with the requirements for existing elevators in Section 407.5 of ICC A117.1. If the altered elevator is part of a bank of elevators, the same element must be made accessible in every elevator that is part of that bank. The purpose of this requirement is to have consistency among elevators in a bank so that disabled people are not required to wait for a specific elevator when the general population can take the first available elevator.

310.8.3 Platform lifts. Platform (wheelchair) lifts complying with ICC A117.1 and installed in accordance with ASME A18.1 shall be permitted as a component of an accessible route.

❖ This section provides for the use of platform (wheelchair) lifts in existing buildings. In order to create an accessible route where there are changes in floor levels, the provisions for new construction would most often require the installation of an elevator or ramp. Platform lifts are allowed in new construction for limited conditions (see Section 1109.7 of the IBC). If the space in an existing building precludes the installation of an elevator or ramp, a platform lift may be the only practical solution. Given the choice between no accessibility or accessibility by a platform lift, accessibility is preferable.

310.8.4 Stairs and escalators in existing buildings. In *alterations*, *change of occupancy* or *additions* where an escalator or stair is added where none existed previously and major structural modifications are necessary for installation, an accessible route shall be provided between the levels served by the escalator or stairs in accordance with Sections 1104.4 and 1104.5 of the *International Building Code*.

❖ If a stairway or escalator is added as part of an alteration in a location where one did not previously exist, the alteration must also include an accessible route between the same two levels. If an accessible route is already available between the two levels, or if the stairway or escalator is replacing an existing stairway or escalator, this requirement is not applicable. In conjunction with Section 310.3, if the requirement for the accessible route would be in excess of what is required for new construction, such as an accessible route to an area that was exempted by Section 1103.2, 1104.4, 1107 or 1108 of the IBC, this requirement is not applicable. The intent is that if a route is provided between accessible levels for a nondisabled person to use, it is reasonable to also expect an accessible route.

310.8.5 Ramps. Where steeper slopes than allowed by Section 1010.2 of the *International Building Code* are necessitated by space limitations, the slope of ramps in or providing access to existing buildings or facilities shall comply with Table 310.8.5.

❖ This section recognizes the circumstances where, due to existing site or configuration constraints, a ramp with a slope of one unit vertical in 12 units horizontal (1:12) may not be feasible. A steeper slope is allowed where the elevation change does not exceed 6 inches (152 mm). The remainder of ramp requirements, such as width, landings, etc., are set forth in Section 1010 of the IBC.

TABLE 310.8.5
RAMPS

SLOPE	MAXIMUM RISE
Steeper than 1:10 but not steeper than 1:8	3 inches
Steeper than 1:12 but not steeper than 1:10	6 inches

For SI: 1 inch = 25.4 mm.

❖ In existing buildings, ramps that rise 3 inches (76 mm) or less may have a slope as steep as one unit vertical in eight units horizontal (1:8). In existing buildings, ramps that rise 6 inches (152 mm) or less may have a slope as steep as one unit vertical in 10 units horizontal (1:10). If it is possible to provide a lesser slope, it is desirable to do so. These steeper slopes should only be utilized when the one unit vertical in 12 units horizontal (1:12) slope is not possible.

310.8.6 Performance areas. Where it is *technically infeasible* to alter performance areas to be on an accessible route, at least one of each type of performance area shall be made accessible.

❖ This section recognizes that, because of the existing arrangement and location of performing areas (e.g., stages, platforms, orchestra pits, etc.), it may be infea-

sible to alter all performing areas to be on an accessible route. In such cases, it is reasonable to require that a minimum of one of each type of performing area be made accessible.

310.8.7 Accessible dwelling or sleeping units. Where Group I-1, I-2, I-3, R-1, R-2 or R-4 dwelling or sleeping units are being altered or added, the requirements of Section 1107 of the *International Building Code* for Accessible units apply only to the quantity of spaces being altered or added.

❖ This section sets forth the rate for providing accessible and Type A dwelling or sleeping units in Groups I-1, I-2, I-3, R-1, R-2 and R-4 when such facilities are altered. Assuming that accessible or Type A units are not already provided, the number of accessible or Type A units to be incorporated into each alteration is based on the number being altered. For example, if a nursing home was being altered a portion at a time, 50 percent of the units being altered each time would be required to be wheelchair accessible. It is not the intent that all units being altered are required to be Accessible until 50 percent of the units in the entire facility are accessible. The total number of accessible units in the facility is not required to exceed that required for new construction. It is unreasonable to require a greater level of accessibility in an existing building than is required in new construction.

This section also references visible and audible alarm requirements in Chapter 9 of the IBC. If the alarm system is part of the alteration, the alarms must comply with Section 907 of the IBC, which requires sleeping accommodations in Groups I-1 and R-1 to have visible alarms. Section 907.5.2.3.4 of the IBC also contains requirements for alarms within Group R-2 units. If the alarm system is not part of the alteration, it is not the intent of this section to require the fire alarm system to be upgraded.

310.8.8 Type A dwelling or sleeping units. Where more than 20 Group R-2 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for Type A units apply only to the quantity of the spaces being added.

❖ Type A units are required in new construction when 20 or more apartments (including condominium style) are constructed on a site. Group R-2 requirements for Type A units would also include convents and monasteries with 20 or more sleeping units and could include some townhouse-style units (see the definition "Townhouse" in Chapter 2 and Section 310.1 of the of IBC).

This section sets forth the rate for providing Type A dwelling or sleeping units in Group R-2 facilities when more than 20 units are added either in an addition or changing the function of a space (i.e., a change of occupancy, such as creating apartments in an old warehouse, increasing the number of apartments by changing a storage area to apartment units or reconfiguring larger units into smaller units). Assuming that Type A units are not already provided, the number of Type A units required is based on the number being added. For example, if a story was being added onto an apartment building, the number of Type A units required would be based on the number of units in the new story, not the number of units in the entire building. If Type A units are provided, the total number of Type A units in the facility is not required to exceed that required for new construction, as indicated in Section 310.3. It is unreasonable to require a greater level of accessibility in an existing building than is required in new construction.

310.8.9 Type B dwelling or sleeping units. Where four or more Group I-1, I-2, R-1, R-2, R-3 or R-4 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for Type B units apply only to the quantity of the spaces being added.

❖ In new construction, Type B units are required when four or more dwelling units or sleeping units are constructed together and those units are "intended to be occupied as a residence" (see commentary, Section 1107 of the IBC). The *International Residential Code*® (IRC®) references the IBC Group R-3 for accessibility requirements for IRC units (see the definition for "Townhouse" and Section R320.1 of the IRC).

This section sets forth the rate for providing Type B dwelling or sleeping units in Group I-1, I-2, R-2, R-3 or R-4 facilities when four or more units are added in an addition. Since Section 310.1 exempts Type B units in existing buildings, adding units by changing the function of a space (i.e., increasing the number of units by changing a storage area to apartment units or reconfiguring larger units into smaller units) or a change of occupancy would not result in Type B units being required. The Type B units in the facility are not required to exceed that required for new construction, as indicated in Section 310.3. The exceptions for Type B units in Section 1107.7 of the IBC are applicable to the addition. It is unreasonable to require a greater level of accessibility in an existing building than is required in new construction.

310.8.10 Jury boxes and witness stands. In alterations, accessible wheelchair spaces are not required to be located within the defined area of raised jury boxes or witness stands and shall be permitted to be located outside these spaces where the ramp or lift access restricts or projects into the means of egress.

❖ This exception for jury boxes and witness stands is consistent with the ADAAG. The intent is that if, ramp access to a jury box or witness stand would have the ramp limiting or blocking the means of egress for the general population in the space, alternative locations for potential jurors or witnesses are viable.

310.8.11 Toilet rooms. Where it is *technically infeasible* to alter existing toilet and bathing facilities to be accessible, an accessible family or assisted-use toilet or bathing facility constructed in accordance with Section 1109.2.1 of the *International Building Code* is permitted. The family or assisted-use facility shall be located on the same floor and in the same area as the existing facilities.

❖ This section deals with circumstances in which it is technically infeasible to alter existing toilet facilities to

be accessible. In new construction, both the men's and women's facilities would be required to be accessible. An alternative solution when it is technically infeasible to alter the existing toilet rooms would be the creation of a single-family or assisted-use toilet or bathing room containing accessible facilities. If this alternative is selected, the room must be located on the same floor and in the same area as the existing toilet or bathroom. This is the best alternative to fully complying separate men's and women's facilities. One might argue that it is technically infeasible to accomplish either of these alternatives, since the alternative to altering existing facilities involves the creation of an additional toilet or bathroom that was not otherwise contemplated. This would not be a persuasive argument since there is likely to be space available somewhere in the facility to commit for use as a toilet or bathroom. In any case, the intent is that some form of accessible toilet room or bathing facility is necessary and must be provided.

Signage must be provided at the inaccessible toilet rooms in accordance with Sections 1110.1 and 1110.2 of the IBC to notify disabled persons when a facility is not accessible and direct them to the nearest accessible facilities. It should be noted that this alternative is not offered as a choice between making the existing separate-sex toilet rooms accessible or providing an accessible family or assisted-use toilet room. The existing separate-sex toilet rooms must be altered when it is technically feasible. Consideration of a unisex facility is only available when alteration of the existing toilet rooms is technically infeasible (see the definition of "Technically infeasible" in Chapter 2).

310.8.12 Dressing, fitting and locker rooms. Where it is *technically infeasible* to provide accessible dressing, fitting or locker rooms at the same location as similar types of rooms, one accessible room on the same level shall be provided. Where separate-sex facilities are provided, accessible rooms for each sex shall be provided. Separate-sex facilities are not required where only unisex rooms are provided.

❖ This section takes a similar approach for dressing rooms as provided for in Section 310.8.11 for toilet rooms and bathing facilities. If it is technically infeasible to alter existing dressing rooms to be accessible, then space elsewhere on the level must be committed to providing no less than one accessible dressing room. In this case, if the existing dressing rooms provide separate rooms for each sex, then no less than one accessible dressing room for each sex must be provided.

310.8.13 Fuel dispensers. Operable parts of replacement fuel dispensers shall be permitted to be 54 inches (1370 mm) maximum, measuring from the surface of the vehicular way where fuel dispensers are installed on existing curbs.

❖ The requirements for new fuel dispensers (i.e., gas pumps) can be found in Section 1109.13 of the IBC. Basically, the idea is that the controls must be within the reach ranges for someone standing on the parking lot surface. However, many existing facilities have gas pumps located on raised islands as a feature for protection of the pumps from accidental contact. This section would allow the new gas pump with the reach range of 15 inches (380 mm) to 48 inches (1220 mm) to be located on top of a 6-inch (150 mm) curb and still meet the maximum reach of 54 inches (1370 mm).

310.8.14 Thresholds. The maximum height of thresholds at doorways shall be $^3/_4$ inch (19.1 mm). Such thresholds shall have beveled edges on each side.

❖ Thresholds at doorways may be $^3/_4$ inch (19.1 mm) maximum in existing buildings. In new construction, a typical threshold is $^1/_2$ inch (12.7 mm) maximum in accordance with the IBC. This section recognizes that such things as differences in floor materials may create changes in elevation greater than that allowed in new construction. Edges of thresholds must be beveled to allow for the passage of a wheelchair.

310.9 Historic buildings. These provisions shall apply to buildings and facilities designated as historic structures that undergo alterations or a *change of occupancy*, unless *technically infeasible*. Where compliance with the requirements for accessible routes, entrances or toilet facilities would threaten or destroy the historic significance of the building or facility, as determined by the applicable governing authority, the alternative requirements of Sections 310.9.1 through 310.9.4 for that element shall be permitted.

❖ For this section to be applicable, the building must be registered as historic. Historic buildings are treated much the same as provided for in Sections 310.4 and 310.6, in that a historic building that is altered or has undergone a change of occupancy is expected to comply with accessibility requirements, unless technical infeasibility can be demonstrated; however, this section also goes on to acknowledge that the historic character of a building may be adversely affected by strict compliance with accessibility provisions. For example, compliance with door width requirements may necessitate the removal of an existing set of doors that is critical to the historic character of the building. This section is intended to exempt such conditions in order to maintain the historic character of the building. Because limited extent of accessibility is desired in all facilities, Sections 310.9.1 through 310.9.4 allow for alternatives.

310.9.1 Site arrival points. At least one accessible route from a site arrival point to an accessible entrance shall be provided.

❖ Full compliance would require an accessible route from all site arrival points. If this requirement would adversely affect the historical significance of the building, the alternative available is to provide an accessible route from one site arrival point to an accessible entrance.

310.9.2 Multilevel buildings and facilities. An accessible route from an accessible entrance to public spaces on the level of the accessible entrance shall be provided.

❖ Full compliance might require an accessible route to levels above or below, as well as throughout, the en-

trance level. If this requirement would adversely affect the historical significance of the building, the alternative is to provide an accessible route from the accessible entrance to all spaces open to the public on the entrance level. If elevators are provided, but are not accessible, signage in accordance with Section 1110.2 of the IBC is required.

310.9.3 Entrances. At least one main entrance shall be accessible.

Exceptions:

1. If a main entrance cannot be made accessible, an accessible nonpublic entrance that is unlocked while the building is occupied shall be provided; or
2. If a main entrance cannot be made accessible, a locked accessible entrance with a notification system or remote monitoring shall be provided.

Signs complying with Section 1110 of the *International Building Code* shall be provided at the primary entrance and the accessible entrance.

❖ Full compliance would require 50 percent of the entrances to be accessible. If this requirement would adversely affect the historical significance of the building, only one main entrance is required to be made accessible. If a main entrance cannot be made accessible, then an employee or service entrance may serve as the accessible entrance, provided that it remains unlocked when the building is open. Alternatively, a locked entrance, where monitoring or a notification system is available, could be provided. Signage must be provided at inaccessible entrances in accordance with Sections 1110.1 and 1110.2 of the IBC.

310.9.4 Toilet and bathing facilities. Where toilet rooms are provided, at least one accessible family or assisted-use toilet room complying with Section 1109.2.1 of the *International Building Code* shall be provided.

❖ Full compliance would require an accessible toilet/bathing facility at each location where toilet/bathing facilities are provided. If altering the existing facilities to be accessible would adversely affect the historical significance of the building, only one accessible family or assisted-use toilet/bathing facility is required. Signage must be provided at inaccessible toilet rooms in accordance with Section 1110.2 of the IBC.

Bibliography

The following resource materials are referenced in this chapter or are relevant to the subject matter addressed in this chapter.

42 USC 3601-88, *Fair Housing Amendments Act* (FHAA). Washington, DC: United States Code, 1988.

ASCE 7-05, *Minimum Design Loads for Buildings and Other Structures, including Supplements No. 1 and 2*. New York: American Society of Civil Engineers, 2005.

DOJ 28 CFR, Part 36-91. *Americans with Disabilities Act* (ADA). Washington, DC: Department of Justice, 1991.

FEMA 311-07, *Residential Substantial Damage Estimators In Your Community*. Washington, DC: Federal Emergency Management Agency, 2007.

FEMA P-758, *Substantial Improvement/Substantial Damage Desk Reference*. Washington, DC: Federal Emergency Management Agency, 2009.

IBC-09, *International Building Code*. Washington, DC: International Code Council, 2009.

ICC 300-07, *ICC Standard on Bleachers, Grandstands and Folding and Telescopic Seating*. Washington, DC: International Code Council, 2007.

ICC/A117.1-03, *Accessible and Usable Buildings and Facilities*. Washington, DC: International Code Council, 2003.

IRC-09, *International Residential Code*. Washington, DC: International Code Council, 2009.

NFPA 13-07, *Installation of Sprinkler Systems*. Quincy, MA: National Fire Protection Association, 2007.

Chapter 4: Classification of Work

General Comments

This chapter provides an overview of the process for the repair, alteration and restoration of existing buildings. A brief description that identifies the differences between the three levels of alterations is provided. In addition, the topics of additions, historic buildings and relocated buildings are mentioned.

Purpose

This chapter enables the contractor, design professional or code official to easily identify the classification of and the associated chapter in the code for building alterations, additions and repairs.

SECTION 401 GENERAL

401.1 Scope. The provisions of this chapter shall be used in conjunction with Chapters 5 through 12 and shall apply to the *alteration*, *repair*, *addition* and *change of occupancy* of existing structures, including historic and moved structures, as referenced in Section 101.5.2. The work performed on an *existing building* shall be classified in accordance with this chapter.

❖ This section establishes when the regulations contained in the code must be followed, whether all or in part. Something must happen (modification to an existing building or allowing an existing building or structure to become unsafe) for the code to be applicable. The code is not a maintenance document requiring periodic inspections which will, in turn, result in an enforcement action. Periodic inspections are addressed by the *International Fire Code*® (IFC®).

401.1.1 Compliance with other alternatives. *Alterations*, *repairs*, *additions* and changes of occupancy to existing structures shall comply with the provisions of Chapters 4 through 12 or with one of the alternatives provided in Section 101.5.

❖ This section offers the code user compliance options. In addition to being able to use the provisions listed in Chapters 4 through 12, the code user has three other options. Under Section 101.5 there are three compliance alternatives.

First, Section 101.5.1 offers a prescriptive compliance method for repairs, alterations, additions and changes of occupancy as long as they comply with Chapter 3 of the code and the IFC. Second, Section 101.5.2 describes the work area compliance method that requires compliance with the applicable provisions of Chapters 4 through 12. Third, Section 101.5.3 describes the performance compliance method that requires compliance with Chapter 13.

401.2 Work area. The *work area*, as defined in Chapter 2, shall be identified on the construction documents.

❖ As defined in Chapter 2, a "Work area" is specifically defined as the area of all reconfigured spaces where work is occurring within the scope of a project. These areas are to be shown clearly on the construction documents. Work areas exclude other portions of the building where incidental work is ongoing.

401.3 Occupancy and use. When determining the appropriate application of the referenced sections of this code, the occupancy and use of a building shall be determined in accordance with Chapter 3 of the *International Building Code*.

❖ In the early years of the last century, the essence of regulatory safeguards from fire was to provide a reasonable level of protection to property. The idea was that if property was adequately protected from fire, then the building occupants would also be protected.

From this outlook on fire safety, the concept of equivalent risk has evolved in the code. This concept maintains that, in part, an acceptable level of risk against the damages of fire, respective to a particular occupancy type (group), can be achieved by limiting the height and area of buildings containing such occupancies according to the building's construction type (i.e., its relative fire endurance).

The concept of equivalent risk involves three interdependent considerations: (1) the level of fire hazard associated with the specific occupancy of the facility; (2) the reduction of fire hazard by limiting the floor area(s) and the height of the building based on the fuel load (combustible contents and burnable building components); and (3) the level of overall fire resistance provided by the type of construction used for the building.

The interdependence of these fire safety consider-

ations can be seen by first looking at Tables 601 and 602 of the *International Building Code*® (IBC®), which show the fire-resistance ratings of the principal structural elements comprising a building in relation to the five classifications for types of construction. Type I construction is the classification that generally requires the highest fire-resistance ratings for structural elements, whereas Type V construction, which is designated as a combustible type of construction, generally requires the least amount of fire-resistance-rated structural elements. If one then looks at Table 503 of the IBC, the relationship among group classification, allowable heights and areas, and types of construction becomes apparent. Respective to each group classification, the greater the fire-resistance rating of structure elements, as represented by the type of construction, the greater the floor area and height allowances. The greater the potential fire hazards indicated as a function of the group, the lesser the height and area allowances for a particular construction type.

As a result of extensive research and advancements in fire technology, today's building codes are more comprehensive and complex regulatory instruments than they were in the earlier years of code development. While the principle of equivalent risk remains an important component in building codes, perspectives have changed and life safety is now the paramount fire issue. Even so, occupancy classification still plays a key part in organizing and prescribing the appropriate protection measures. As such, threshold requirements for fire protection and means of egress systems are based on occupancy classification (see Chapters 9 and 10 of the IBC).

SECTION 402
REPAIRS

402.1 Scope. *Repairs,* as defined in Chapter 2, include the patching or restoration or replacement of damaged materials, elements, equipment or fixtures for the purpose of maintaining such components in good or sound condition with respect to existing loads or performance requirements.

❖ This section describes repairs to existing structures, including the restoration or replacement of damaged materials to good or sound condition, as they apply to existing loading and the performance requirements of any part of the building with any of the materials and methods listed in Section 402.1.

402.2 Application. *Repairs* shall comply with the provisions of Chapter 5.

❖ Chapter 5 provides the guidelines for repairs to existing structures. It covers topics ranging from building elements and materials to fire protection and accessibility. The main focus of Chapter 5 is covered in the provisions of Section 506.

402.3 Related work. Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered part of the *repair* and shall not be subject to the provisions of Chapter 6, 7, 8, 9 or 10.

❖ This section makes it clear that portions of a building, while they may be intact, that have to be removed to repair or replace another part of the structure can be considered part of the repair even though they were not damaged and unserviceable. For example, a building that was not properly flashed around penetrations to the exterior envelope develops water intrusion. The water has resulted in the deterioration of the wall structure, which will have to be removed and replaced as necessary. Even though the siding covering the damaged portion of the structure is serviceable, it is considered part of the related work as it has to be removed and then replaced in order to fix the damaged portions.

SECTION 403
ALTERATION—LEVEL 1

403.1 Scope. Level 1 alterations include the removal and replacement or the covering of existing materials, elements, equipment, or fixtures using new materials, elements, equipment, or fixtures that serve the same purpose.

❖ Level 1 alterations represent the most basic or foremost level of building alterations. This includes the removal and replacement or the covering of existing materials, elements, equipment or fixtures. An example would be the addition of a new roof to an existing building. Another example would be the removal of aluminum siding exterior finish to be replaced with vinyl siding.

403.2 Application. Level 1 *alterations* shall comply with the provisions of Chapter 6.

❖ Chapter 6 describes, in detail, the requirements for dealing with Level 1 alterations. It is important to note that historic buildings must also comply with this chapter unless there is a modification noted in Chapter 11.

SECTION 404
ALTERATION—LEVEL 2

404.1 Scope. Level 2 *alterations* include the reconfiguration of space, the *addition* or elimination of any door or window, the reconfiguration or extension of any system, or the installation of any additional equipment.

❖ Chapter 7 describes, in detail, the guidelines for dealing with Level 2 alterations. The exception to Section 701 allows buildings undergoing alterations that are exclusively the result of compliance with the accessibility requirements of Section 605.2 to comply with Chapter 6.

404.2 Application. Level 2 alterations shall comply with the provisions of Chapter 6 for Level 1 *alterations* as well as the provisions of Chapter 7.

❖ In addition to the provisions listed in Chapter 7, Level 2 alterations are also required to meet all of the provi-

sions of Chapter 6, Level 1 alterations. This requirement effectively compounds the requirements for someone planning to alter an existing structure. For example, if during the process of replacing the aluminum siding on a building with vinyl siding, the building owner decides to eliminate one of four windows from a room, then this project would be classified as a Level 2 alteration and would, therefore, be required to meet the provisions of Chapters 6 and 7.

SECTION 405
ALTERATION—LEVEL 3

405.1 Scope. Level 3 *alterations* apply where the *work area* exceeds 50 percent of the aggregate area of the building.

❖ Anytime the project area, as defined in Section 202, exceeds one-half of the aggregate building area, it is considered to be a Level 3 alteration and, therefore, has to meet the requirements of Chapter 8. In the code, a work area encompasses all portions of the existing building that are proposed to be reconfigured.

405.2 Application. Level 3 alterations shall comply with the provisions of Chapters 6 and 7 for Level 1 and 2 *alterations*, respectively, as well as the provisions of Chapter 8.

❖ Any project that qualifies as a Level 3 alteration project must meet all of the requirements for Chapters 6, 7 and 8.

SECTION 406
CHANGE OF OCCUPANCY

406.1 Scope. *Change of occupancy* provisions apply where the activity is classified as a *change of occupancy* as defined in Chapter 2.

❖ A change of occupancy in an existing structure may change the level of inherent hazards that the code was initially intended to address.

This is done so that the applicable code requirements adequately address the specific hazards of the new occupancy. For example, a change from an existing mercantile occupancy to a business occupancy renders all Group B provisions applicable to all portions of the structure where the occupancy has changed.

406.2 Application. Changes of occupancy shall comply with the provisions of Chapter 9.

❖ This section indicates compliance with Chapter 9 for changes of occupancy. Chapter 9 contains frequently used provisions for the application to existing structures, since the occupancy in a building or structure is often subject to change during the life of the building.

SECTION 407
ADDITIONS

407.1 Scope. Provisions for *additions* shall apply where work is classified as an *addition* as defined in Chapter 2.

❖ Any project that would increase the floor area, the number of stories in a building or the height of a structure would qualify as an addition.

407.2 Application. *Additions* to existing buildings shall comply with the provisions of Chapter 10.

❖ Additions to existing structures are specifically covered in Chapter 10 of the code.

SECTION 408
HISTORIC BUILDINGS

408.1 Scope. Historic buildings provisions shall apply to buildings classified as historic as defined in Chapter 2.

❖ The most important criterion for the application of this section is that the building must be certified as being of historic significance by a qualified party or agency. Usually this is done by a state or local authority after careful review of the historical value of the building. Most, if not all, states have such authorities, as do many local jurisdictions. The agencies with such authority can be located at the state or local government level or through the local chapter of the American Institute of Architects (AIA). Other considerations for classification as a historical building include the structural condition of the building (i.e., is the building structurally sound), its proposed use, its impact on life safety and how the intent of the code, if not the letter, will be achieved.

408.2 Application. Except as specifically provided for in Chapter 11, historic buildings shall comply with applicable provisions of this code for the type of work being performed.

❖ Chapter 11 covers the various aspects of existing historic structures and includes specific sections on repairs, fire safety, alterations, change of occupancy and structure. In the absence of any specific requirements or provisions in Chapter 11, the remainder the code is applicable to work proposed for historic buildings.

SECTION 409
RELOCATED BUILDINGS

409.1 Scope. Relocated buildings provisions shall apply to relocated or moved buildings.

❖ Any structure that is relocated or moved to a different lot or a new location on the same lot falls within the scope of Section 409.

409.2 Application. Relocated buildings shall comply with the provisions of Chapter 12.

❖ The requirements for relocated or moved buildings are found in Chapter 12 of the code.

Bibliography

The following resource materials are referenced in this chapter or are relevant to the subject matter addressed in this chapter.

IBC-09, *International Building Code*. Washington, DC: International Code Council, 2009.

IFC-09, *International Fire Code*. Washington, DC: International Code Council, 2009.

Chapter 5: Repairs

General Comments

Chapter 5 governs the repair of existing buildings. The provisions define conditions under which repairs may be made using materials and methods like those of the original construction or the extent to which repairs must comply with requirements for new buildings.

Purpose

Repairs to an existing structure must be made with the proper materials in a manner that will safeguard the public and ensure the building does not become a hazard to life, health or property.

SECTION 501 GENERAL

501.1 Scope. Repairs as described in Section 402 shall comply with the requirements of this chapter. Repairs to historic buildings shall comply with this chapter, except as modified in Chapter 11.

❖ Repairs are described in Section 402 as the patching or restoration of materials and elements for the purpose of maintaining such materials and elements in good or sound condition. The scoping provisions of this section refer the user to Section 402 to be certain the work classification is "repair" and Chapter 5 is the appropriate chapter to be used. There are additional provisions specific to repairs in historic buildings and the code user is referred to Chapter 11 for the possible applicability of those provisions in addition to the requirements of Chapter 5. It is the intent of the code to allow original materials and construction methods for repairs to historical buildings in order to limit any negative impact on the structure's historical significance.

501.2 Conformance. The work shall not make the building less conforming than it was before the *repair* was undertaken.

❖ The general limitation on repairs is that the level of safety, health and public welfare of the existing building must not be reduced by any work being performed. This requirement can be broadly interpreted, as its applications vary on a case-by-case situation, but the level of safety provided by the structure and systems, such as plumbing and mechanical, is not to be decreased in the course of making repairs.

501.3 Flood hazard areas. In flood hazard areas, repairs that constitute *substantial improvement* shall require that the building comply with Section 1612 of the *International Building Code*.

❖ If located in designated flood hazard areas, buildings and structures that are damaged by any cause are to be examined to determine if the damage constitutes substantial damage, in which the cost of repairing/restoring the building or structure to its predamaged condition equals or exceeds 50 percent of its market value before the damage occurred. All substantial improvements and repairs of buildings and structures that are substantially damaged are to meet the flood-resistant provisions of the *International Building Code*® (IBC®).

SECTION 502 BUILDING ELEMENTS AND MATERIALS

502.1 Existing building materials. Materials already in use in a building in conformance with requirements or approvals in effect at the time of their erection or installation shall be permitted to remain in use unless determined by the *code official* to render the building or structure unsafe or *dangerous* as defined in Chapter 2.

❖ If a material or system had been approved before the code took effect, it can continue to be used as long as it can be shown that the material or system is not detrimental to the health or safety of the building occupants or the public. In other words, the code is not retroactive.

502.2 New and replacement materials. Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. Like materials shall be permitted for repairs and alterations, provided no *dangerous* or *unsafe* condition, as defined in Chapter 2, is created. Hazardous materials, such as asbestos and lead-based paint, shall not be used where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location.

❖ There are two options for materials used in repairs to an existing building. Generally, the materials used for repairs should be those that are presently required or permitted for new construction under the *International Codes*® (I-Codes®). It is also acceptable to use materials consistent with those that are already present, except where those materials pose a hazard. This allowance follows the general concept that any repair

should not make a building more hazardous than it was prior to the repair. It is generally possible to repair a structure, its components and its systems with materials consistent with those materials that were used previously. However, where materials that are now deemed hazardous are involved in the repair work, they may no longer be used. For example, the code identifies asbestos and lead-based paint as two common hazardous materials that cannot be used in the repair process. Certain materials previously considered acceptable for building construction are now a threat to the health of the occupants.

502.3 Glazing in hazardous locations. Replacement glazing in hazardous locations shall comply with the safety glazing requirements of the *International Building Code* or *International Residential Code* as applicable.

Exception: Glass block walls, louvered windows, and jalousies repaired with like materials.

❖ When glazing in an existing building is replaced within the same building, it must comply with the current requirements and standards of the IBC or the *International Residential Code*® (IRC®), as applicable. This includes installing new glass in an existing window, door or other type of opening, even where the glass replaced did not comply with the standards of the code.

Glass block walls are described in Chapter 21 of the IBC, which eliminates the Consumer Product Safety Commission (CPSC) test requirement. Glass block walls are not required to meet the test requirements of CPSC 16 CFR, Part 1201 for safety glazing; however, there are still safety requirements placed on the installation of the glass block.

Louvered and jalousie windows are exempt from safety glazing requirements in all applications, including those where a flat plane of glass is otherwise required to be safety glass. This exemption is based on records that show the injuries associated with this use of glass are primarily from persons impacting the glass edge with no cutting or piercing injuries resulting from glass breakage. Safety glass would not have an effect on the type of injury. There are also practical production reasons associated with fabricating safety glazing for the relatively long, thin slats.

SECTION 503
FIRE PROTECTION

503.1 General. Repairs shall be done in a manner that maintains the level of fire protection provided.

❖ Any level of fire protection that currently exists in a building must not be adversely affected as a result of any repair. For example, repairing the existing ceiling and sprinkler heads or repairing the fire alarm system equipment must ultimately provide the same level of coverage and protection that existed prior to the repairs being undertaken.

SECTION 504
MEANS OF EGRESS

504.1 General. Repairs shall be done in a manner that maintains the level of protection provided for the means of egress.

❖ Any level of protection provided by the means of egress that currently exists in a building must not be adversely affected as a result of any repair. For example, repairing the walls and doors of a corridor must ultimately provide the same level of protection that existed prior to the repairs being undertaken.

SECTION 505
ACCESSIBILITY

505.1 General. Repairs shall be done in a manner that maintains the level of accessibility provided.

❖ The level of accessibility that currently exists in a building must not be adversely affected as a result of any repair. Continued compliance with the accessibility requirements of the code is dependent on the maintenance of such facilities throughout the life of the building. For example, drinking fountains that are required to be accessible are of little value if they malfunction through the deterioration or failure of any of the working parts. In other cases, inoperable elevators, locked accessible doors and obstructed accessible routes must be maintained such that they are readily usable by individuals with disabilities.

SECTION 506
STRUCTURAL

506.1 General. Structural repairs shall be in compliance with this section and Section 501.2. Regardless of the extent of structural or nonstructural damage, *dangerous* conditions shall be eliminated. Regardless of the scope of *repair*, new structural members and connections used for *repair* or rehabilitation shall comply with the detailing provisions of the *International Building Code* for new buildings of similar structure, purpose and location.

❖ This section gives the requirements that pertain to structural materials and elements in need of repair; Section 506.2.1 addresses repairs for less than substantial structural damage; Section 506.2.2 addresses repairs for substantial structural damage to vertical elements of the lateral-force-resisting system; and Section 506.2.3 addresses repairs for substantial structural damage to gravity load-carrying components. This section also required dangerous conditions to be eliminated. See the definition of "Dangerous" in Section 202 for a list of the conditions that must always be corrected regardless of the extent of damage. Finally, regardless of the scope of work, new connections and new structural members need to be in compliance with the IBC.

506.2 Repairs to damaged buildings. Repairs to damaged buildings shall comply with this section.

❖ Buildings can suffer damage from numerous sources. Natural disasters, such as earthquakes, floods, hurricanes and tornadoes, can cause extensive damage over widespread areas, depending on the severity of the event. Water intrusion due to a failure in the building envelope, termite infestations or exposure to corrosive chemicals can all lead to the deterioration of structural members over time. For the most part, this section does not differentiate between the possible causes of the damage (the exceptions are Sections 506.2.2.3 and 506.2.3.1). Needless to say, determining the root cause of any damage would be advisable so that an owner can ascertain the risk of a recurrence and, if necessary, develop a plan to address that risk.

The primary concern in determining how repairs are to be accomplished is establishing the extent of the damage that has been sustained to see if it exceeds either of the thresholds contained in the definition of "Substantial structural damage." Where it does not, Section 506.2.4 applies and the repairs can typically be limited to restoring the building to its predamaged state. For buildings that have suffered substantial structural damage, the approach to repairs is dependent on whether that damage is to elements of the lateral system (see Section 506.2.2) or only to elements of the gravity system (see Section 506.2.3). This parallels the classes of substantial structural damage defined in Section 202. The definition of "Substantial structural damage" would itself necessitate some preliminary level of structural evaluation.

There are two repair requirements that are not related to the extent of the damage. Dangerous conditions must always be eliminated (see Section 506.2.1) and any new structural member must meet the code requirements for new construction.

506.2.1 Repairs for less than substantial structural damage. For damage less than *substantial structural damage*, the damaged elements shall be permitted to be restored to their predamage condition.

❖ For damage less than substantial structural damage, repairs are allowed that restore the building to its predamaged state using materials and strengths that existed prior to the damage. Again, as required in Section 506.1, new structural members and connections used for this repair shall comply with the detailing provisions of the IBC for new buildings of similar structure, purpose and location.

506.2.2 Repairs for substantial structural damage to vertical elements of the lateral-force-resisting system. A building that has sustained *substantial structural damage* to the vertical elements of its lateral-force-resisting system shall be evaluated in accordance with Section 506.2.2.1, and either repaired in accordance with Section 506.2.2.2 or repaired and rehabilitated in accordance with Section 506.2.2.3 depending on the results of the evaluation.

❖ This section provides requirements that apply where the damage threshold that is based on the extent of damage to the vertical elements of the lateral-force-resisting system in any story is exceeded. Substantial structural damage to the lateral system triggers the evaluation of the whole building for wind and seismic loads (see Section 506.2.2.1). The emphasis is placed on vertical elements, such as walls and columns, rather than horizontal elements, because it is the vertical elements of the lateral-force-resisting system that determine the structure's response, particularly to earthquakes. Based on the results of this evaluation, the lateral-force-resisting system is required to either be repaired (see Section 506.2.2.2), or repaired and rehabilitated (see Section 506.2.2.3).

506.2.2.1 Evaluation. The building shall be evaluated by a registered design professional, and the evaluation findings shall be submitted to the *code official*. The evaluation shall establish whether the damaged building, if repaired to its predamaged state, would comply with the provisions of the *International Building Code*, except that the seismic design criteria shall be the reduced IBC level seismic forces specified in Section 101.5.4.2.

❖ This section contains the requirements for the building evaluation required by Section 506.2.2. For the purpose of establishing the structure's adequacy, the evaluation is to utilize the strength and stiffness of the original, predamaged structure.

The structural evaluation must assess the entire structure for compliance with the IBC provisions. This means that the evaluation must demonstrate compliance for all loads that are applicable to new construction. The only exception is that the approaches permitted for the reduced seismic forces in Section 506.1.1.3 may be used for the evaluation of seismic effects on the structure. Since no other exceptions are stated, the implication is that new construction requirements for material strength and detailing must be satisfied for loading considerations other than earthquakes.

If this evaluation indicates that the building's lateral-force-resisting system complies with the IBC using the permitted reduced seismic design criteria (see Section 101.5.4.2), then it need only be repaired to the predamaged condition. Otherwise, the lateral-force-resisting system must be rehabilitated in accordance with Section 506.2.2.3.

506.2.2.2 Extent of repair for compliant buildings. If the evaluation establishes that the building in its predamage condition complies with the provisions of Section 506.2.2.1, then the damaged elements shall be permitted to be restored to their predamage condition.

❖ Where the evaluation provided for in Section 506.2.2.1 establishes that the predamaged building meets the

structural provisions of the IBC, the repairs may be limited to a restoration of the structural components.

506.2.2.3 Extent of repair for noncompliant buildings. If the evaluation does not establish that the building in its predamage condition complies with the provisions of Section 506.2.2.1, then the building shall be rehabilitated to comply with the provisions of this section. The wind load for the *repair* and rehabilitation shall be those required by the building code in effect at the time of original construction, unless the damage was caused by wind, in which case the wind loads shall be in accordance with the *International Building Code*. The seismic loads for this rehabilitation design shall be those required by the building code in effect at the time of original construction, but not less than the reduced-level seismic forces specified in Section 101.5.4.2.

❖ If the evaluation of the building, when hypothetically repaired to its predamaged condition, does not comply with the requirements established in Section 506.2.1.1, then the building must be rehabilitated as described in this section. The general requirement is to comply with the IBC load combinations, which are used to establish the required strength of structural members. The effects of wind and seismic loads warrant special consideration.

In determining the level of compliance for repairs to buildings that have sustained substantial structural damage, it is important to determine if wind forces have caused that damage. If so, it is considered prudent to require the repairs of wind damage to use wind loading that is the higher of the building code in effect at the time of original construction or the IBC. If not, the wind loading in effect at the time of the original construction is the basis for design. Seismic forces for the rehabilitation can be those required by the building code in effect at the time of the building's construction, but this may not be less than the reduced IBC seismic force level.

506.2.3 Substantial structural damage to gravity load-carrying components. Gravity load-carrying components that have sustained *substantial structural damage* shall be rehabilitated to comply with the applicable provisions for dead and live loads in the *International Building Code*. Snow loads shall be considered if the *substantial structural damage* was caused by or related to snow load effects. Undamaged gravity load-carrying components that receive dead, live or snow loads from rehabilitated components shall also be rehabilitated if required to comply with the design loads of the rehabilitation design.

❖ Substantial structural damage to gravity load-carrying elements, such as columns or bearing walls, must be repaired so that these members are adequate to resist the dead and live loads in accordance with current code requirements, as must other elements of the load path. Snow loads must also be considered if the substantial damage was in any way caused by snow load effects.

506.2.3.1 Lateral-force-resisting elements. Regardless of the level of damage to gravity elements of the lateral-force-resisting system, if substantial structural damage gravity load-carrying components was caused primarily by wind or seismic effects, then the building shall be evaluated in accordance with Section 506.2.2.1 and, if noncompliant, rehabilitated in accordance with Section 506.2.2.3.

❖ In determining the extent of repairs to these gravity load-carrying elements that are not part of the lateral-force-resisting system, it is important to determine if wind or earthquakes have caused the structural damage. If the substantial structural damage is due to wind or earthquake, then the lateral system is suspect and it must be checked even if no damage is apparent. Where this is the case, then the structure must be evaluated in accordance with Section 506.2.2.1.

506.2.4 Flood hazard areas. In flood hazard areas, buildings that have sustained *substantial damage* shall be brought into compliance with Section 1612 of the *International Building Code*.

❖ The definition of "Flood hazard area" provided in Section 202 is taken from the IBC and establishes where this provision is applicable. If located in designated flood hazard areas, buildings that are damaged by any cause must be examined to determine if the damage constitutes substantial damage (see the definition of "substantial damage" in Section 202). Buildings are considered to have sustained substantial damage when the cost of repairing the building to its predamaged condition is 50 percent or more of its market value before the damage occurred. Buildings determined to be substantially damaged must meet the flood-resistant provisions of the IBC (see FEMA 213).

Section 1612 of the IBC addresses requirements for buildings in designated flood hazard areas. The design and construction is required to be in accordance with ASCE 24, which in turn references the flood loading given in ASCE 7. Through use of these IBC provisions, communities meet a significant portion of the flood plain management regulation requirements necessary to participate in the National Flood Insurance Program (NFIP).

SECTION 507
ELECTRICAL

507.1 Material. Existing electrical wiring and equipment undergoing *repair* shall be allowed to be repaired or replaced with like material.

❖ In essence, this section states that existing wiring systems can be maintained in the same manner in which they were installed. Repairs are to be made with materials and components that do not in any way make the existing wiring system less safe. Materials and components can be replaced with items of equal quality and integrity or with items of superior quality and integrity. The intent is to allow necessary repairs without subjecting the system to new construction requirements. A wiring system material or component that is obsolete

or no longer recognized by current codes is permitted to be used for the purpose of making repairs provided that it is consistent with the existing materials and components, and the system is not made any less safe.

507.1.1 Receptacles. Replacement of electrical receptacles shall comply with the applicable requirements of Section 406.3(D) of NFPA 70.

❖ This section ties the replacement of receptacle devices to the provisions of NFPA 70, which do not always allow replacement with similar devices. For example, where a grounding means exists, ungrounded-type (two conductor) receptacles must be replaced only with grounding-type (three conductor) receptacles. Similarly, receptacles in locations where ground-fault circuit-interrupter (GFCI) protection is required must be replaced only with GFCI-type receptacles or the branch circuit must provide such GFCI protection. See Sections 406.3(D)(1) through 406.3(3)(c) of NFPA 70 for more replacement provisions.

507.1.2 Plug fuses. Plug fuses of the Edison-base type shall be used for replacements only where there is no evidence of over fusing or tampering per applicable requirements of Section 240.51(B) of NFPA 70.

❖ This section does not allow Edison-base-type (screw base) fuses to replace existing fuses, except where there is no reason to believe that the wrong size fuses have been or are being used or where there is no evidence of attempts to defeat the protection afforded by the fuses. Edison-base fuses are plug-style fuses with the same screw thread base as the common incandescent lamp. Such fuses have ampere ratings of 30 amps and less, and are interchangeable, meaning that occupants are not prevented from inserting fuses that are rated higher than the capacity of the wiring they are intended to protect; therefore, fire hazards are likely to be created.

Evidence of oversized fuses being used or tampered with is the code's justification for prohibiting the installation of any new Edison-base plug fuses in existing fuseholders. Obviously, the hazardous condition of overfusing or tampering must not be allowed to continue to exist. In such cases, replacement fuses must be Type S fuses, which are designed to thwart overfusing and attempts at tampering or bypassing.

507.1.3 Nongrounding-type receptacles. For replacement of nongrounding-type receptacles with grounding-type receptacles and for branch circuits that do not have an equipment grounding conductor in the branch circuitry, the grounding conductor of a grounding-type receptacle outlet shall be permitted to be grounded to any accessible point on the grounding electrode system or to any accessible point on the grounding electrode conductor in accordance with Section 250.130(C) of NFPA 70.

❖ This section is a recognition of the provisions of Section 250.130(C) of NFPA 70. Section 507.1.1 addresses circumstances where existing receptacles cannot be replaced with like receptacles and this section describes one of the options specified in Section 406.3(D) of NFPA 70.

507.1.4 Group I-2 receptacles. Non-"hospital grade" receptacles in patient bed locations of Group I-2 shall be replaced with "hospital grade" receptacles, as required by NFPA 99 and Article 517 of NFPA 70.

❖ This section reflects the intent of Section 517.18(B) of NFPA 70 and its an exception.

507.1.5 Grounding of appliances. Frames of electric ranges, wall-mounted ovens, counter-mounted cooking units, clothes dryers and outlet or junction boxes that are part of the existing branch circuit for these appliances shall be permitted to be grounded to the grounded circuit conductor in accordance with Section 250.140 of NFPA 70.

❖ This section is a recognition of a provision of Section 250.140 of NFPA 70 that parallels the intent of the code to allow repairs to be consistent with the original installation. Although allowed in the past, grounding of appliances to the grounded circuit conductor is considered to be unnecessarily risky and, therefore, is now allowed only for existing wiring installations under specified conditions that serve to limit the risk to an acceptable level.

SECTION 508
MECHANICAL

508.1 General. Existing mechanical systems undergoing *repair* shall not make the building less conforming than it was before the *repair* was undertaken.

❖ This section is essentially a referencing section to direct the user's attention to the possibility of other sections that might be relevant to mechanical systems. Repair work must not alter the nature of appliances and equipment in a way that would invalidate the listing or conditions of approval.

508.2 Mechanical draft systems for manually fired appliances and fireplaces. A mechanical draft system shall be permitted to be used with manually fired appliances and fireplaces where such a system complies with all of the following requirements:

1. The mechanical draft device shall be listed and installed in accordance with the manufacturer's installation instructions.
2. A device shall be installed that produces visible and audible warning upon failure of the mechanical draft device or loss of electrical power at any time that the mechanical draft device is turned on. This device shall be equipped with a battery backup if it receives power from the building wiring.
3. A smoke detector shall be installed in the room with the appliance or fireplace. This device shall be equipped with a battery backup if it receives power from the building wiring.

❖ This section contains a remedy for existing chimneys that do not produce sufficient draft. Some chimneys

fail to produce sufficient draft intermittently because of wind speed and direction or outdoor temperatures. Gas-fired and oil-fired appliances can be interlocked to the exhauster to immediately shut off the flow of fuel if there is a power failure or malfunction of the exhauster. Obviously, the same interlock cannot be used in a wood-burning fireplace or stove. This section allows the use of mechanical draft systems with solid fuel-burning appliances and fireplaces if certain requirements are met.

The first requirement is that the draft device must be listed for this application and installed in compliance with the manufacturer's installation instructions. This will ensure that the draft system is installed in the same way it was tested in the laboratory of the listing agency.

The second requirement is that a visible and audible alarm be installed to warn occupants upon failure of the mechanical draft device or loss of electrical power. If the exhauster fails to operate, the solid fuel will continue to burn and produce smoke and other products of combustion. The occupants of the building must be warned that the potentially deadly products of combustion might be spilling into the living space. This is especially important in residential occupancies where the occupants may have gone to sleep with the fireplace or appliance still burning.

The third requirement is that a smoke detector must be installed in the room with the appliance to provide further warning should the exhauster fail to operate properly. This section is not intended to allow mechanical draft systems (chimney exhausters) as a substitute for proper chimney design and construction. It is intended to apply to existing chimneys that fail to produce the required draft.

SECTION 509
PLUMBING

509.1 Materials. Plumbing materials and supplies shall not be used for repairs that are prohibited in the *International Plumbing Code*.

❖ This section is essentially referencing the user to the *International Plumbing Code*® (IPC®) in order to determine prohibited materials for use in the repair of plumbing systems. For example, Chapters 6 and 7 of the IPC contain prohibited plumbing system joint and connection methods that would also be applicable to repair work.

509.2 Water closet replacement. The maximum water consumption flow rates and quantities for all replaced water closets shall be 1.6 gallons (6 L) per flushing cycle.

Exception: Blowout-design water closets [3.5 gallons (13 L) per flushing cycle].

❖ Federal legislation mandates the design and use of water closets to have flow rates restricted to 1.6 gallons (6.1 L) per flushing cycle, except where blowout-type fixtures are utilized. Blowout-designed water closets are exempt from the 1.6-gallon (6.1 L) requirement because such fixtures depend on high-volume and high-velocity water flow to evacuate the contents of the bowl. Therefore, such fixture designs may not be able to function at lower consumption rates.

Bibliography

The following resource materials are referenced in this chapter or are relevant to the subject matter addressed in this chapter.

ASCE 7-05, *Minimum Design Loads for Buildings and Other Structures with Supplement No. 1*. Reston, VA: American Society of Civil Engineers, 2005.

ASCE 24-05, *Flood-resistant Design and Construction Standard*. Reston, VA: American Society of Civil Engineers, 2005.

ASCE 31-03, *Seismic Evaluation of Existing Buildings*. Reston, VA: American Society of Civil Engineers, 2003.

ATC 20, *Procedures for Postearthquake Safety Evaluation of Buildings*. Redwood City, CA: Applied Technology Council, 1989.

ATC 20-2, *Addendum to the ATC 20 Postearthquake Building Safety Evaluation Procedures*. Redwood City, CA: Applied Technology Council, 1995.

ATC 40, *Seismic Evaluation and Retrofit of Concrete Buildings*. Redwood City, CA: Prepared by the Applied Technology Council for the California Seismic Safety Commission, 1996.

Chang, David and Hamid Naderi. "International Existing Building Code." *Structural Engineer*. October 2003, pp 22-25.

Chen, Wai-Fah and Charles Scawthorn. *Earthquake Engineering Handbook*. Boca Raton, FL: CRC Press LLC, 2003.

CPSC 16 CFR, Part 1201, *Safety Standard for Architectural Glazing*. Washington, DC: Consumer Product Safety Commission, 1977.

FEMA 178, *NEHRP Handbook for the Seismic Evaluation of Existing Buildings*. Washington, DC: Federal Emergency Management Agency, 1992.

FEMA 213, *Answers to Questions About Substantially Damaged Buildings*. Washington, DC: Federal Emergency Management Agency, 1991.

FEMA 259, *Engineering Principles and Practices for Retrofitting Flood-prone Residential Buildings*. Washington, DC: Federal Emergency Management Agency, 1995.

FEMA 273, *NEHRP Guidelines for the Seismic Rehabilitation of Buildings*. Washington, DC: Federal Emergency Management Agency, 1997.

FEMA 274, *NEHRP Commentary on the Guidelines for the Seismic Rehabilitation of Buildings*. Washington, DC: Federal Emergency Management Agency, 1997.

FEMA 310, *Handbook for the Seismic Evaluation of Buildings—A Prestandard*. Washington, DC: Federal Emergency Management Agency, 1998.

FEMA 311, *Guidance on Estimating Substantial Damage Using the NFIP Residential Substantial Damage Estimator*. Washington, DC: Federal Emergency Management Agency, 1998.

FEMA 312, *Homeowner's Guide to Retrofitting—Six Ways to Protect Your House From Flooding*. Washington, DC: Federal Emergency Management Agency, 1998.

FEMA 356, *Prestandard and Commentary for the Seismic Rehabilitation of Buildings*. Washington, DC: Federal Emergency Management Agency, 2000.

FEMA 450-1, *NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures, Part 1*. Washington, DC: Prepared by the Building Seismic Safety Council for the Federal Emergency Management Agency, 2004.

FEMA 450-2, *NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures Commentary, Part 2 Commentary*. Washington, DC: Prepared by the Building Seismic Safety Council for the Federal Emergency Management Agency, 2004.

Ghosh, S.K. and David A. Fanella. *Seismic and Wind Design of Concrete Buildings (2000 IBC, ASCE 7-98, ACI 318-99)*. Washington, DC: International Code Council, 2003.

IPC-09, *International Plumbing Code*. Washington, DC: International Code Council, 2009.

IRC-09, *International Residential Code*. Washington, DC: International Code Council, 2009.

Leyendecker, E.V., A.D. Frankel, K.S. Rustales. *Seismic Design Parameters*, U.S. Geological Survey Open-File Report 01-437. Washington, DC: United States Geological Survey, 2001.

Naeim, Farzad. *The Seismic Design Handbook*. Norwell, MA: Kluwer Academic Publishers, 2001.

NBC-99, *National Building Code*. Country Club Hills, IL: Building Officials & Code Administrators International, Inc., 1999.

NFPA 70-08, *National Electric Code*. Quincy, MA: National Fire Protection Association, 2008.

Recommended Lateral Force Requirements and Commentary (SEAOC Blue Book). Sacramento, CA: Structural Engineers Association of California, 1999.

Reducing Flood Losses Through the International Code Series: Meeting the Requirements of the National Flood Insurance Program. Washington, DC: International Code Council, May 2000.

SBC-99, *Standard Building Code*. Birmingham, AL: Southern Building Code Congress International, 1999.

Taly, Narendra. *Loads and Loads Paths in Buildings Principles of Structural Design*. Washington, DC: International Code Council, 2003.

UBC-97, *Uniform Building Code*. Whittier, CA: International Conference of Building Officials, 1997.

UCBC-97, *Uniform Code for Building Conservation*. Whittier, CA: International Conference of Building Officials, 1997.

Williams, Alan. *Seismic and Wind Forces Structural Design Examples*. Washington, DC: International Code Council, 2003.

Chapter 6: Alterations—Level 1

General Comments

This chapter provides the technical requirements for those existing buildings that undergo Level 1 alterations as described in Section 403, which includes the replacement or covering of existing materials, elements, equipment or fixtures using new materials for the same purpose.

This chapter, similar to other chapters of the code, covers all building-related subjects, such as structural, mechanical, plumbing, electrical and accessibility, as well as the fire and life safety issues when the alterations are classified as Level 1. Sections 601 and 602 are related to scoping building elements and materials. It should be noted that, in the interest of being brief and avoiding the presentation of materials that are repetitive in nature in various chapters, Section 701.2 requires that Level 2 alterations comply not only with Chapter 7, but also with Chapter 6. Similarly, Section 801.2 requires that Level 3 alterations comply with Chapters 6 and 7, as well as Chapter 8. As such, Chapter 6 is applicable to all levels of alteration work. Section 602, Building Elements and Materials, covers, in detail, elements such as interior finishes and carpeting. Section 602 also refers to the *International Building Code*® (IBC®), *International Energy Conservation Code*® (IECC®), *International Mechanical Code*® (IMC®) and *International Plumbing Code*® (IPC®) for new materials. The remainder of the chapter is related to fire protection, means of egress, accessibility, structural and energy conservation.

Alterations of Level 1 classification are considered the least drastic of alterations. The decision to divide the level typically known as "alterations" in the IBC and previous legacy building codes into three parts of Level 1, Level 2 and Level 3 was based on the fact that minor alterations that do not include space reconfiguration and extensive alterations that might range from relocation of walls and partitions in various floors or in the entire building should be treated differently and with different threshold levels for requiring upgrades or improvements to the building or spaces within the building.

Purpose

The purpose of this chapter is to provide detailed requirements and provisions to identify the required improvements in the existing building elements, building spaces and building structural system. This chapter is distinguished from Chapters 7 and 8 by only involving the replacement of building components with new components. In contrast, Level 2 alterations involve more space reconfiguration and Level 3 alterations involve more extensive space reconfiguration, exceeding 50 percent of the building area.

SECTION 601 GENERAL

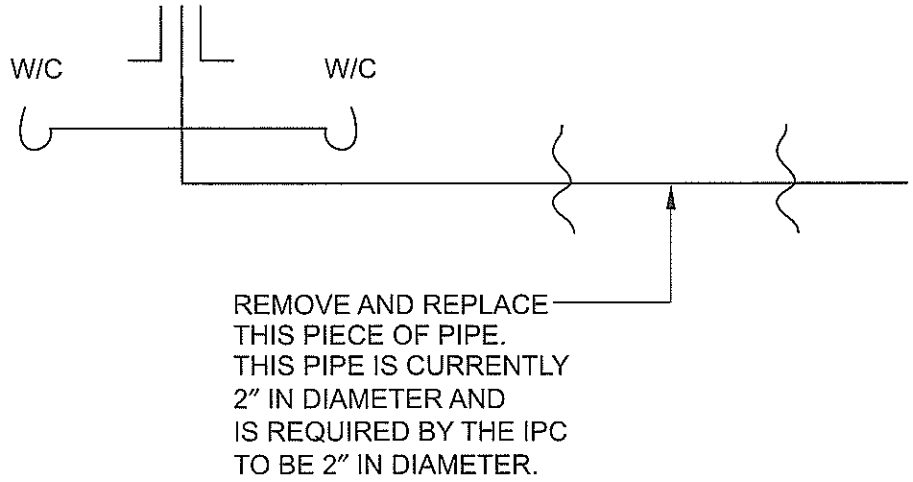
601.1 Scope. Level 1 alterations as described in Section 403 shall comply with the requirements of this chapter. Level 1 alterations to historic buildings shall comply with this chapter, except as modified in Chapter 11.

❖ Level 1 alterations are described in Section 403 as the type of alterations that include the removal and replacement or the covering of existing materials and elements. The scoping provisions of this section refer the user to Section 403 to be certain that the work classification is Level 1 alterations and that Chapter 6 is the appropriate chapter to be used. There are additional provisions specific to Level 1 alterations in historic buildings, and the code user is referred to Chapter 11 for the possible applicability of those provisions in addition to the requirements of Chapter 6.

601.2 Conformance. An *existing building* or portion thereof shall not be altered such that the building becomes less safe than its existing condition.

Exception: Where the current level of safety or sanitation is proposed to be reduced, the portion altered shall conform to the requirements of the *International Building Code*.

❖ The current level of safety or the level of compliance with regulatory provisions in a building are not, in general, allowed to be reduced, regardless of the type of work taking place in the building. For example, a Class B interior wall finish in an exit passageway will not be allowed to be replaced with a finish material that has a Class C rating. The exception describes the only situation where the reduction of the level of safety or the level of compliance is allowed. This is the condition where the existing level of compliance is above the level required by the IBC and the reduced level of com-



For SI: 1 inch = 25.4 mm.

Figure 601.2
CONFORMANCE OF AN EXISTING WATER SUPPLY SYSTEM

pliance still meets or exceeds the IBC requirements. Some other examples where the reduction of level of compliance is not allowed might be to meet water supply requirements (see Figure 601.2), and to meet electrical loads or reduction in existing light and ventilation to below the levels required in the IBC, or below the existing levels, whichever is lower.

601.3 Flood hazard areas. In flood hazard areas, alterations that constitute *substantial improvement* shall require that the building comply with Section 1612 of the *International Building Code*.

❖ When alterations to existing buildings that are located in flood hazard areas are proposed, determinations are to be made as to whether the proposed work is a substantial improvement. If the proposed alterations are determined to be substantial improvements, then the existing building is to be brought into compliance with the flood-resistant provisions of the IBC, which requires the design and construction of the building to comply with ASCE 24.

SECTION 602
BUILDING ELEMENTS AND MATERIALS

602.1 Interior finishes. All newly installed interior wall and ceiling finishes shall comply with Chapter 8 of the *International Building Code*.

❖ Newly installed interior finish materials are required to comply with the flame spread and smoke-developed index requirements of the IBC. The level of developed smoke, surface burning, flame spread and toxic byproducts of combustion are critical elements to be considered in fire situations. For this reason, the code explicitly outlines the criteria for interior finishes. These are requirements that have potentially dramatic effects on building and occupant safety in fire situations.

602.2 Interior floor finish. New interior floor finish, including new carpeting used as an interior floor finish material, shall comply with Section 804 of the *International Building Code*.

❖ The same description and reasoning provided in Section 602.1 applies here to materials newly installed as floor finish materials, including, but not limited to, carpeting.

602.3 Interior trim. All newly installed interior trim materials shall comply with Section 806 of the *International Building Code*.

❖ The same description and reasoning provided in Section 602.1 applies here to materials newly installed as interior trim materials.

602.4 Materials and methods. All new work shall comply with materials and methods requirements in the *International Building Code*, *International Energy Conservation Code*, *International Mechanical Code*, and *International Plumbing Code*, as applicable, that specify material standards, detail of installation and connection, joints, penetrations, and continuity of any element, component, or system in the building.

❖ Materials and methods requirements refer to the requirements of various codes, such as the IBC, IMC and IPC, that specify material standards, details of installation and connection, joints, penetrations and continuity of any element, component or system in the building. This description, which is not presented in the form of a definition, is so broad that there are numerous sections in the *International Codes*® (I-Codes®) that are considered to be related to materials and methods. One way of dealing with this section might have been to list every section in every I-Code that deals with materials and methods. As this would have been a long list of sections, the committee and the membership chose to address this issue in general terms rather than listing such sections from the

I-Codes, except for the materials and methods sections of the *International Fuel Gas Code*® (IFGC®) that have been specifically listed in Section 602.1.

All new work in Level 1 alterations must comply with the materials and methods requirements of the I-Codes.

For example, the sheetrock from one side of an existing corridor is to be removed and replaced with new sheetrock and finish paneling. Regardless of how the existing sheetrock was attached and what the characteristics of the finish material were, the new sheetrock must comply with material referenced standards in Section 2506 of the IBC and its installation must be in accordance with Table 2508.1 of the IBC. Accordingly, the interior finish paneling used must be of a class in compliance with Table 803.9 of the IBC.

[FG] 602.4.1 International Fuel Gas Code. The following sections of the *International Fuel Gas Code* shall constitute the fuel gas materials and methods requirements for Level 1 alterations.

1. All of Chapter 3, entitled "General Regulations," except Sections 303.7 and 306.
2. All of Chapter 4, entitled "Gas Piping Installations," except Sections 401.8 and 402.3.
    2.1. Sections 401.8 and 402.3 shall apply when the work being performed increases the load on the system such that the existing pipe does not meet the size required by code. Existing systems that are modified shall not require resizing as long as the load on the system is not increased and the system length is not increased even if the altered system does not meet code minimums.
3. All of Chapter 5, entitled "Chimneys and Vents."
4. All of Chapter 6, entitled "Specific Appliances."

❖ Any alteration of fuel gas equipment or piping that falls under the category of Level 1 alterations must comply with the materials and methods requirements of the IFGC. This section identifies those sections of the IFGC that are considered to be related to materials and methods. These, with the exception of four specific sections, include all of Chapters 3, 4, 5 and 6 of the IFGC.

SECTION 603
FIRE PROTECTION

603.1 General. Alterations shall be done in a manner that maintains the level of fire protection provided.

❖ Any level of fire protection that currently exists in a building must not be adversely affected or lessened as a result of any alteration. For example, removing and replacing the existing ceiling and rearranging of some fire sprinkler heads should ultimately provide the same level of sprinkler coverage and protection that existed prior to the alterations being undertaken. A fire protection feature that is already installed in a building cannot be removed even if the present code does not require the fire protection feature.

SECTION 604
MEANS OF EGRESS

604.1 General. Repairs shall be done in a manner that maintains the level of protection provided for the means of egress.

❖ Any level of safety that currently exists in a building's means of egress system must not be adversely affected or lessened as a result of any alteration. This means that any new building element that is replacing the old one or new elements that are covering existing elements must be at least as good and as safe as the old one. The entire Chapter 6 must be checked for those cases where the building elements or components being installed as part of the alteration might need to comply with the IBC or the *International Residential Code*® (IRC®). For example, replacement interior finishes are not allowed to be just as good or as safe as the old one; they are required to meet the IBC requirements based on Section 602.1.

SECTION 605
ACCESSIBILITY

605.1 General. A building, facility or element that is altered shall comply with the applicable provisions in Sections 605.1.1 through 605.1.14, Chapter 11 of the *International Building Code* and ICC A117.1 unless it is *technically infeasible*. Where compliance with this section is *technically infeasible*, the *alteration* shall provide access to the maximum extent that is technically feasible.

A building, facility or element that is constructed or altered to be accessible shall be maintained accessible during occupancy.

Exceptions:

1. The altered element or space is not required to be on an accessible route unless required by Section 605.2.
2. Accessible means of egress required by Chapter 10 of the *International Building Code* are not required to be provided in existing buildings and facilities.
3. Type B dwelling or sleeping units required by Section 1107 of the *International Building Code* are not required to be provided in existing buildings and facilities.
4. The *alteration* to Type A individually owned dwelling units within a Group R-2 occupancy shall meet the provisions for Type B dwelling units and shall comply with the applicable provisions in Chapter 11 of the *International Building Code* and ICC A117.1.

❖ The purpose of Section 605.1 is to establish the minimum criteria for accessibility when dealing with existing buildings and facilities that are being renovated or altered. The history and efforts involved are similar to that discussed in the commentary for Chapter 11 of the IBC. Briefly, access to buildings and structures for

people with physical disabilities has been a subject that the building codes have regulated since the early 1970s. They have consistently relied on a consensus national standard, ICC A117.1, as the technical basis for accessibility. There has been a great deal of emphasis and awareness recently placed on the subject of accessibility through the passage of two federal laws. The Americans with Disabilities Act (ADA) and the Fair Housing Amendment Act (FHAA) are federal regulations that affect building construction as it relates to accessibility. Efforts for coordination with the federal accessibility requirements are ongoing. Representatives from interested accessibility groups, the Department of Housing and Urban Development (HUD) and the Architectural and Transportation Barriers Compliance Board (ATBCB), commonly referred to as the Access Board, have been attending and participating in the code change process for the IBC and ICC A117.1. In addition, the International Code Council® (ICC®) has participated in the public comment process on the development of federal regulations for accessibility. Appendix B includes information found in the new *American's with Disabilities Act Accessibility Guidelines* (ADAAG) that cannot be enforced through the typical code enforcement process, but would provide beneficial information for the designer/owner for full compliance purposes.

The code approaches the application of accessibility provisions to a facility that is altered by broadly requiring full conformance to new construction, meaning full accessibility is expected (see Section 605.1.12). Exceptions are then provided to indicate the conditions under which less than full accessibility is permitted.

When a facility or element is altered, it must meet new code requirements. For example, if a door and frame are removed and replaced, the door must meet the requirements for width, height, maneuvering clearances and hardware. If just the doorknob is being removed, it must be replaced with lever hardware.

The circumstance under which full compliance with accessibility provisions is not required is when it is deemed to be technically infeasible (see the commentary to the definition of "Technically infeasible" in Section 202). This is considered reasonable since, if not provided for, plans for alterations may be otherwise abandoned by the building owner. The opportunity to upgrade and increase the current level of accessibility in an existing building would then be lost. This concern is also embodied in the requirement that an altered element or space is expected to be made accessible to the extent to which it is technically feasible to do so. In this manner, the code accomplishes the greatest degree of accessibility while at the same time recognizing the justifiable difficulties that may be involved in providing full accessibility in existing buildings.

The level of accessibility that currently exists in a building must not be adversely affected as a result of any repairs. Continued compliance with the accessibility requirements of the code is dependent on the maintenance of such facilities throughout the life of the building. For example, drinking fountains that are required to be accessible are of little value if they malfunction through deterioration or failure of any of the working parts. In other cases, inoperable elevators, locked accessible doors and obstructed accessible routes must be maintained such that they are readily usable by individuals with disabilities.

In accordance with Exception 1, if the area undergoing alteration does not contain a primary function (see Section 605.2), there are no additional requirements. However, if the area contains a primary function, there are additional criteria to achieve accessibility that may require work not in the original scope of the project. This additional criteria is to provide an accessible route to the altered area, as well as improvements to any toilets and drinking fountains that serve the altered area. Requirements for an accessible route might specify that the door previously discussed be removed and replaced because it does not have adequate width or maneuvering clearances.

Exception 2 indicates that accessible means of egress are not required in existing buildings. In existing buildings, strict compliance with Section 1007 of the IBC is often technically infeasible. The requirement for a 48- inch (1219 mm) clear width between handrails would require many stairways to be widened. This often would entail the movement of major structural elements in order to accomplish this alteration. Note that this is not an exception for the accessible entrance requirements.

Exception 3 exempts existing buildings being altered from providing Type B dwelling and sleeping units. Since this section is referenced from Chapter 8, this would include existing buildings undergoing a change of occupancy. This is for consistency with the FHAA (see the definitions of "Dwelling unit" and "Sleeping unit" in Section 202 of the IBC, and the definitions of "Dwelling unit or sleeping unit, Type B" in Section 1102 of the IBC). Additions that contain four or more dwelling and sleeping units required to be Type B in new construction would be required to provide Type B units. It should be noted that accessible and Type A dwelling and sleeping units are required in existing residential and institutional buildings undergoing alterations (see Section 605.1.8 of the code and the definitions of "Accessible unit" and "Dwelling or sleeping unit, Type A" in Section 1102 of the IBC).

In condominiums, Exception 4 would allow for owners of dwellings that had previously been constructed as Type A units to only meet Type B unit requirements when the units are altered. For example, if an owner wanted to alter the bathroom in his or her unit, he or she would only be required to meet the lesser accessibility requirements of a Type B unit with the new construction. This exception would not be applicable to units that are for rent.

The specific provisions of the following subsections are intended to reflect conditions under which less than full accessibility, as would be required in new construc-

tion, is permitted in altered areas. As previously discussed, Section 605.1 requires altered areas to comply with the full range of accessibility-related provisions of the code for new construction. The exceptions and subsections reflect a reasonable set of conditions under which a different level of accessibility can be provided. Sections 605.1.1 through 605.1.12 are part of the IBC coordination effort with the ICC A117.1 accessibility standard and the recommendations for the ADAAG Review Federal Advisory Committee.

605.1.1 Entrances. Where an *alteration* includes alterations to an entrance, and the building or facility has an accessible entrance on an accessible route, the altered entrance is not required to be accessible unless required by Section 605.2. Signs complying with Section 1110 of the *International Building Code* shall be provided.

❖ If the building already has the accessible entrances required by Section 1105 of the IBC, an entrance that is being altered is not required to be made accessible. An exception to this would be if the entrance was required to be made accessible as part of the route to the altered primary function area. If not all entrances are accessible, provide appropriate signage to notify persons with disabilities when an entrance is or is not accessible and, if not accessible, directs them to the nearest accessible entrance.

605.1.2 Elevators. Altered elements of existing elevators shall comply with ASME A17.1 and ICC A117.1. Such elements shall also be altered in elevators programmed to respond to the same hall call control as the altered elevator.

❖ Requirements for new construction state that all elevators on an accessible route must be fully accessible in accordance with ICC A117.1. If a passenger elevator is altered, the altered element must be accessible in accordance with the requirements for existing elevators in Section 407 of ICC A117.1. If the altered elevator is part of a bank of elevators, the same element must be made accessible in every elevator that is part of that bank. The purpose of this requirement is to have consistency among elevators in a bank so that disabled people are not required to wait for a specific elevator, whereas the general population can take the first available elevator.

605.1.3 Platform lifts. Platform (wheelchair) lifts complying with ICC A117.1 and installed in accordance with ASME A18.1 shall be permitted as a component of an accessible route.

❖ This section provides for the use of platform (wheelchair) lifts in existing buildings. In order to create an accessible route where there are changes in floor levels, the provisions for new construction would most often require the installation of an elevator or ramp. Platform lifts are allowed in new construction for limited conditions (see Section 1109.7 of the IBC). If the space in an existing building precludes the installation of an elevator or ramp, a platform lift may be the only practical solution. Given the choice between no accessibility or accessibility by a platform lift, accessibility is preferred. Previously, platform lift requirements were addressed in the elevator standard, ASME A17.1, but they are now addressed in their own standard, ASME A18.1. One of the many changes was the removal of the requirement for key operation, which previously discouraged independent utilization of platform lifts. Note that in accordance with Section 1007.5 of the IBC, platform lifts are also permitted for an accessible means of egress in some limited locations. However, accessible means of egress are not required in existing buildings in accordance with Section 605.1, Exception 2.

605.1.4 Ramps. Where steeper slopes than allowed by Section 1010.2 of the *International Building Code* are necessitated by space limitations, the slope of ramps in or providing access to existing buildings or facilities shall comply with Table 605.1.4.

❖ This section recognizes the circumstances where, due to existing site or configuration constraints, a ramp with a slope of one unit vertical in 12 units horizontal (1:12) may not be feasible. A steeper slope is allowed where the elevation change does not exceed 6 inches (152 mm). The remainder of ramp requirements, such as width, landings, etc., is set forth in Section 1010 of the IBC.

TABLE 605.1.4
RAMPS

SLOPE	MAXIMUM RISE
Steeper than 1:10 but not steeper than 1:8	3 inches
Steeper than 1:12 but not steeper than 1:10	6 inches

For SI: 1 inch = 25.4 mm.

❖ In existing buildings, ramps that rise 3 inches (76 mm) or less may have a slope as steep as one unit vertical in eight units horizontal (1:8). In existing buildings, ramps that rise 6 inches (152 mm) or less may have a slope as steep as one unit vertical in 10 units horizontal (1:10). If it is possible to provide a lesser slope, it is desirable to do so. These steeper slopes should only be utilized when the one unit vertical in 12 units horizontal (2 percent) (1:12) slope is not possible.

605.1.5 Dining areas. An accessible route to raised or sunken dining areas or to outdoor seating areas is not required provided that the same services and decor are provided in an accessible space usable by any occupant and not restricted to use by people with a disability.

❖ The intent of this section is to provide equal access to dining services for a disabled individual without segregation in existing buildings undergoing alterations. If equivalent dining services are available on an accessible level, an accessible route to other levels, or to outside dining, is not required as part of the alteration to an existing dining area. For example, where a snack bar is located on one level, while full dining is provided on two other levels, an accessible route would be required to the snack bar level and one of the full dining levels.

605.1.6 Performance areas. Where it is *technically infeasible* to alter performance areas to be on an accessible route, at least one of each type of performance area shall be made accessible.

❖ This section recognizes that, because of the existing arrangement and location of performing areas (e.g., stages, platforms, orchestra pits, etc.), it may be infeasible to alter all performing areas to be on an accessible route. In such cases, it is reasonable to require that a minimum of one of each type of performing area be made accessible. This is intended to include access to any supporting areas utilized by the performers, such as practice rooms, dressing rooms, green rooms, etc.

605.1.7 Jury boxes and witness stands. In alterations, accessible wheelchair spaces are not required to be located within the defined area of raised jury boxes or witness stands and shall be permitted to be located outside these spaces where ramp or lift access poses a hazard by restricting or projecting into a required means of egress.

❖ This exception for jury boxes and witness stands is consistent with Section 232 of ADAAG, Judicial facilities. The intent is that if ramp access to a jury box or witness stand would have the ramp limiting or blocking the means of egress for the general population in the space, alternative locations for potential jurors or witnesses is viable.

605.1.8 Accessible dwelling or sleeping units. Where Group I-1, I-2, I-3, R-1, R-2 or R-4 dwelling or sleeping units are being altered, the requirements of Section 1107 of the *International Building Code* for accessible units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being altered.

❖ This section sets forth the rate for providing accessible dwelling or sleeping units in Groups I-1, I-2, I-3, R-1, R-2 and R-4 when such facilities are altered (also see Section 606.3 of the code, the definitions of "Dwelling units" and "Sleeping units" in Section 202 of the IBC and the definition of "Accessible units" in Section 1102 of the IBC). Assuming that the required number of accessible units are not already provided, the number of accessible units to be incorporated into each alteration is based on the number being altered. For example, if a nursing home was being altered a portion at a time, 50 percent of the units being altered each time would be required to be wheelchair accessible. It is not the intent that all units being altered are required to be accessible units until 50 percent of the units in the entire facility are accessible units. The total number of accessible units in the facility is not required to exceed that required for new construction, as indicated in Section 605.1.12. It is unreasonable to require a greater level of accessibility in an existing building than is required in new construction. The technical criteria for accessible units is found in ICC A117.1, Chapters 3 through 9. This section also references visible and audible alarm requirements in Chapter 9 of the IBC. Sleeping accommodations in Groups I-1 and R-1 are required to have visible alarms in accordance with Table 907.5.2.3.3 of the IBC. Section 907.5.2.3.4 of the IBC also contains requirements for alarms within Group R-2 units. In a repair or Level 1 alterations, if the alarm system is not part of the alteration, it is not the intent of this section to require the fire alarm system to be upgraded. In Level 2 and 3 alterations, which involve a change of occupancy and additions, an upgrade of the system may be required.

605.1.9 Type A dwelling or sleeping units. Where more than 20 Group R-2 dwelling or sleeping units are being altered, the requirements of Section 1107 of the *International Building Code* for Type A units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being altered.

❖ This section sets forth the rate for providing Type A dwelling or sleeping units in Group R-2 when such facilities are altered. Assuming that the required number of Type A units are not already provided, and that the alteration includes more than 20 dwelling or sleeping units, the number of Type A units to be incorporated into each alteration is based on the number being altered. For example, if 24 units within a Group R-2 apartment building are being altered 2 percent of the 24 units being altered would be required to be designed to conform to Type A unit requirements. The technical criteria for Accessible units is found in ICC A117.1, Chapter 10. This section also references visible and audible alarm requirements in Chapter 9 of the IBC. Section 907.5.2.3.4 of the IBC contains requirements for alarms within Group R-2 units.

605.1.10 Toilet rooms. Where it is *technically infeasible* to alter existing toilet and bathing facilities to be accessible, an accessible family or assisted-use toilet or bathing facility constructed in accordance with Section 1109.2.1 of the *International Building Code* is permitted. The family or assisted-use facility shall be located on the same floor and in the same area as the existing facilities.

❖ This section deals with circumstances in which it is technically infeasible to alter existing toilet or bathing facilities to be accessible. In new construction, both the men's and women's facilities would be required to be accessible. When it is technically infeasible to alter the existing toilet or bathing rooms to meet new construction requirements, an accessible or assisted-use toilet or bathing room must be provided, and must be located on the same floor and in the same area as the existing toilet or bathing room. Signage is also required at the inaccessible toilet rooms to notify persons with a disability when a facility is not accessible and direct them to the nearest accessible facilities. It should be noted that this alternative is not offered as a choice between making the existing separate-sex toilet and bathing rooms accessible or providing an accessible or assisted-use toilet or bathing room toilet room. The existing separate-sex toilet rooms must be altered when it is technically feasible. Consideration of an accessible or assisted-use toilet or bathing room is only available when the alteration of the existing toilet rooms is technically infeasible (see the definition of "Technically infeasible" in Section 202).

605.1.11 Dressing, fitting and locker rooms. Where it is *technically infeasible* to provide accessible dressing, fitting, or locker rooms at the same location as similar types of rooms, one accessible room on the same level shall be provided. Where separate sex facilities are provided, accessible rooms for each sex shall be provided. Separate sex facilities are not required where only unisex rooms are provided.

❖ This section takes a similar approach for dressing rooms as provided for in Section 605.1.10 for toilet and bathing facilities. If it is technically infeasible to alter existing dressing rooms to be accessible, then space elsewhere on the level must be committed to providing not less than one accessible dressing room. In this case, if the existing dressing rooms provide separate rooms for each sex, then not less than one accessible dressing room for each sex must be provided.

605.1.12 Fuel dispensers. Operable parts of replacement fuel dispensers shall be permitted to be 54 inches (1370 mm) maximum measured from the surface of the vehicular way where fuel dispensers are installed on existing curbs.

❖ This section permits a maximum reach range height of 54 inches (1370 mm) for replacement fuel-dispensing equipment when such equipment is installed on an existing fuel-dispensing island. Although this is a greater reach range than required for new construction, which is 48 inches (1290 mm) in accordance with ICC A117.1, it does allow for reuse of existing equipment islands and industry standard dispensers.

605.1.13 Thresholds. The maximum height of thresholds at doorways shall be $^3/_4$ inch (19.1 mm). Such thresholds shall have beveled edges on each side.

❖ Thresholds at doorways may be $^3/_4$ inch (19.1 mm) maximum in existing buildings. In new construction, a typical threshold is $^1/_2$ inch (12.7 mm) maximum in accordance with Section 1008.1.7 of IBC. This section recognizes that such things as differences in floor materials may create changes in elevation greater than that allowed in new construction. Edges of thresholds greater than $^1/_4$ inch (6.4 mm) must be beveled to allow for the passage of a wheelchair.

605.1.14 Extent of application. An *alteration* of an existing element, space, or area of a building or facility shall not impose a requirement for greater accessibility than that which would be required for new construction. Alterations shall not reduce or have the effect of reducing accessibility of a building, portion of a building, or facility.

❖ The purpose of this section is to clarify to which level the requirements of Sections 605.1.1 through 605.1.11 apply. The requirements are not intended to impose a higher level of accessibility than that required in new construction. At the same time, alterations cannot result in a lesser degree of accessibility than existed before alterations were undertaken.

605.2 Alterations affecting an area containing a primary function. Where an *alteration* affects the accessibility to a, or contains an area of, *primary function*, the route to the *primary function* area shall be accessible. The accessible route to the *primary function* area shall include toilet facilities or drinking fountains serving the area of *primary function*.

Exceptions:

1. The costs of providing the accessible route are not required to exceed 20 percent of the costs of the alterations affecting the area of *primary function*.
2. This provision does not apply to alterations limited solely to windows, hardware, operating controls, electrical outlets and signs.
3. This provision does not apply to alterations limited solely to mechanical systems, electrical systems, installation or *alteration* of fire protection systems and abatement of hazardous materials.
4. This provision does not apply to alterations undertaken for the primary purpose of increasing the accessibility of an *existing building*, facility or element.

❖ The text references documents from the Department of Transportation and the Department of Justice for the definition of a "Primary function area." A primary function area is defined by 49 CFR, Part 37.43(c) as follows:

> A primary function is a major activity for which the facility is intended. Areas of transportation facilities that involve primary functions include, but are not necessarily limited to, ticket purchase and collection areas, passenger waiting areas, train or bus platforms, baggage checking and return areas, and employment areas [except those involving nonoccupiable spaces accessed only by ladders, catwalks, crawl spaces, very narrow passageways or freight (nonpassenger) elevators, which are frequented only by repair personnel].

A "Primary function" area is defined by 28 CFR, Part 36.430 as follows:

> Primary function. A primary function is a major activity for which the facility is intended. Areas that contain a primary function include, but are not limited to, the customer services lobby of a bank, the dining area of a cafeteria, the meeting rooms in a conference center, as well as offices and other work areas in which the activities of the public accommodation or other private entity using the facility are carried out. Mechanical rooms, boiler rooms, supply storage rooms, employee lounges or locker rooms, janitorial closets, entrances, corridors and restrooms are not areas containing a primary function.

While a primary function area is not defined in the IBC or the code, the intent is that an area containing a primary function is one in which a major activity for which the building or facility is intended is carried out. The key concept is that a primary function area is one that contains a major activity of the facility (e.g., dining area in a restaurant, meeting rooms in a conference center, sales and display areas in a store). Areas that contain activities not related to the main purpose of

the facility would not be considered a primary function area (e.g., the kitchen in a restaurant, public bathrooms, employee breakrooms, storage areas, mechanical rooms). With this information, it is clear that areas containing a primary function are clearly more critical in terms of the purpose for which people enter and use the facility. Therefore, this section reflects that when such areas are altered or added, it is important to require that an accessible route to the primary function area be provided.

In addition, any toilet rooms and drinking fountains serving the primary function area must also be made accessible, even though such facilities and areas may not by themselves be considered primary function areas. This would include providing an accessible route to the toilet rooms and drinking fountains, as well as altering the existing toilet room, fixtures within the room and drinking fountains to meet accessibility requirements.

There are conditions under which it may not be reasonable to strictly enforce this requirement for an accessible route to an altered or added primary function area.

Exception 1 approaches this by utilizing the cost of the alterations or addition as a basis for determining if providing an accessible route is reasonable. The requirement for a complete accessible route does not apply when the cost of providing it exceeds 20 percent of the cost of the alterations or addition to the primary function area. These costs are intended to be based on the actual costs of the planned alterations or addition to the primary function area before consideration of the cost of providing an accessible route. For example, if the planned alterations will cost $100,000, not including the cost of an accessible route to a primary function area, this exception would apply if the additional cost of providing the accessible route would exceed $20,000.

It is not the intent to exempt all requirements for accessibility when the total cost for providing the accessible route exceeds the 20-percent threshold. Improvements to the accessible route are required to the extent that costs do not exceed 20 percent of the cost to the planned alteration or addition. It is not required that the full 20 percent be spent. If the accessible route (including accessible toilet rooms and drinking fountains) is already provided, no additional expenditure is required. Note that there is not a priority list given for where funds should be spent on improving the accessible route. The logical progression is access to the site, accessible exterior routes to accessible entrances, access throughout the facility, access to services within the facility, toilet and bathing rooms and, finally, drinking fountains. Evaluation on how and where the funds available should best be spent must be made on a case-by-case basis. For example, if an accessible route is not available to an upper level, and the cost of an elevator is more than 20 percent of the cost of the renovation, then other alternatives could be investigated, such as a platform lift or limited access elevator, or adding the elevator pit and shaft at this time, with elevator equipment added later. If all such items are in excess of the 20-percent limit, perhaps the available funds could be spent towards making the toilet rooms accessible. The idea is that existing buildings would become fully accessible over time.

Exceptions 2 and 3 identify certain alterations that are not intended to trigger the requirement for providing an accessible route to a primary function area. Alterations limited to such elements as windows, hardware, operating controls, electrical outlets, signage, mechanical, electrical and fire protection systems, including alterations for the purpose of abating a hazardous materials circumstance, do not affect the usability of a primary function area in the same manner as alterations that affect the floor plan or the configuration, location or size of rooms or spaces. It is therefore considered unreasonable to require the installation of an accessible route when the scope of alterations is limited to that reflected in these exceptions. Note that costs for these items are not "backed out" of the total cost for the alteration before applying Exception 1. Exceptions 2 and 3 are alterations limited to the specific items referenced.

Exception 4 is intended to avoid penalizing a building owner who is undertaking alterations or additions for the purpose of increasing accessibility. It is appropriate to encourage owners to make such alterations without requiring them to do more work simply because they chose to increase the accessibility of the space. This could otherwise have the opposite effect of discouraging such alterations to avoid the expense of undertaking more work and expense than was originally planned. For example, federal law (ADA) requires that owners of existing buildings remove certain existing barriers to accessibility. Removal of such barriers may require a permit from the code official. It would be unreasonable to have such an activity trigger the mandatory requirement for further alterations to accomplish accessibility beyond the original planned work. In principle, the code takes the view that some extent of greater accessibility is positive progress and should be encouraged, not penalized.

SECTION 606
STRUCTURAL

606.1 General. Where alteration work includes replacement of equipment that is supported by the building or where a reroofing permit is required, the provisions of this section shall apply.

❖ These requirements apply to alterations involving reroofing or the replacement of equipment that is supported by the building.

606.2 Addition or replacement of roofing or replacement of equipment. Where addition or replacement of roofing or replacement of equipment results in additional dead loads, structural components supporting such reproofing or equip-

ment shall comply with the gravity load requirements of the *International Building Code*.

Exceptions:

1. Structural elements where the additional dead load from the roofing or equipment does not increase the force in the element by more than 5 percent.
2. Buildings constructed in accordance with the *International Residential Code* or the conventional light-frame construction methods of the *International Building Code* and where the dead load from the roofing or equipment is not increased by more than 5 percent.
3. Addition of a second layer of roof covering weighing 3 pounds per square foot (0.1437 kN/m²) or less over an existing, single layer of roof covering.

❖ Where reroofing, the addition of a new layer of roofing or replacement of equipment results in a net increase in the supported dead load; the affected structural components must be checked to verify that the gravity load requirements of the IBC for a new structure are satisfied. The reference to only gravity loads is an indication that an analysis for the effects of lateral loads, such as seismic, would not be a necessity for this level of alteration.

There are three exceptions to satisfy full compliance with the IBC. Exception 1 allows an increase in the force in a structural element of up to 5 percent due to the additional dead load from the roofing or equipment. Exception 2 allows additional dead loads from roof coverings or replacement equipment to be increased by 5 percent beyond the original dead load of the roof coverings and equipment without having to do any further analysis, such as computation of structural member stress increases. Exceptions 1 and 2 do not specifically address the cumulative affects from successive alterations; for instance, it would be prudent to limit cumulative increases under these exceptions to a total of 5 percent unless it is clearly documented that the structure has additional capacity.

Exception 3 allows the addition of a second layer of roof covering over an existing single layer of roof covering as long as the new roof covering does not weigh more than 3 pounds per square foot (0.1437 kN/m²). Under this exception, even though the new layer of roof covering might be adding more than 5 percent of the original dead load, there is still no analysis required. This exception recognizes a common practice in many jurisdictions across the country where the addition of a new lightweight layer of roof covering over an existing single layer has been allowed without known life safety issues.

606.2.1 Wall anchors for concrete and masonry buildings. Where a permit is issued for reroofing more than 25 percent of the roof area of a building assigned to Seismic Design Category D, E or F with a structural system consisting of concrete or reinforced masonry walls with a flexible roof diaphragm or unreinforced masonry walls with any type of roof diaphragms, the work shall include installation of wall anchors at the roof line to resist the reduced *International Building Code* level seismic forces as specified in Section 101.5.4.2 of this code and design procedures of Section 101.5.4, unless an evaluation demonstrates compliance of existing wall anchorage.

❖ Wall anchorage systems in existing buildings that are being reroofed, are in Seismic Design Category D, E or F, have a structural system consisting of reinforced concrete or masonry walls, and a flexible roof diaphragm may be required to have wall anchors installed at the roof line to resist the reduced seismic forces allowed in Section 101.5.4.2. The wall anchorage system includes the elements within the diaphragm required to develop wall anchorage forces, including wall anchors, struts, subdiaphragms, cross ties and continuity ties. Note that if a structural evaluation indicates that the existing wall anchorage provided can already resist and transfer these forces, additional wall anchorage is not required.

606.3 Additional requirements for reroof permits. The requirements of this section shall apply to *alteration* work requiring reroof permits.

❖ This section refers the code user to Sections 606.3.1 and 606.3.2 for additional requirements for reroofing projects where a permit has been issued.

606.3.1 Bracing for unreinforced masonry bearing wall parapets. Where a permit is issued for reroofing for more than 25 percent of the roof area of a building assigned to Seismic Design Category D, E or F that has parapets constructed of unreinforced masonry, the work shall include installation of parapet bracing to resist the reduced *International Building Code* seismic forces specified in Section 101.5.4.2 of this code, unless an evaluation demonstrates compliance of such items.

❖ The failure of parapets in unreinforced masonry- bearing (URM) wall buildings has been a recurring problem in areas that experience significant earthquakes. Because this poses a very real risk, the code requires these elements to be braced where the seismic hazard is deemed to be relatively high as reflected in a building's seismic design category. Since the code does not provide the requirements for establishing the seismic design category, Section 1613.5.6 of the IBC must be used for this purpose. For an explanation of this process, see the commentary to Section 101.5.4. The code allows this parapet bracing to be designed using the reduced seismic forces of Section 101.5.4.2 and the design procedures listed in Section 101.5.4. See ASCE 41 or Section A113.6 of *Guidelines for Seismic Evaluation of Existing Buildings* (GSREB) in Appendix A of the code for specific requirements for parapets.

An example of the prescribed parapet bracing is illustrated schematically in Figure 606.3.1. The approach shown—a steel brace anchored to the parapet wall and the roof structure—is a commonly used method of providing lateral support for a parapet. Other methods of strengthening a parapet can be used to mitigate the hazard, provided their use is approved as alternative methods of design and construction under Section 104.11.

Note that only the parapet bracing for seismic loads is required. Some buildings, especially those east of the Rocky Mountains, were not designed for seismic loads. They were only designed to resist wind loads. At the present time, the code does not require a review of the building for seismic loads.

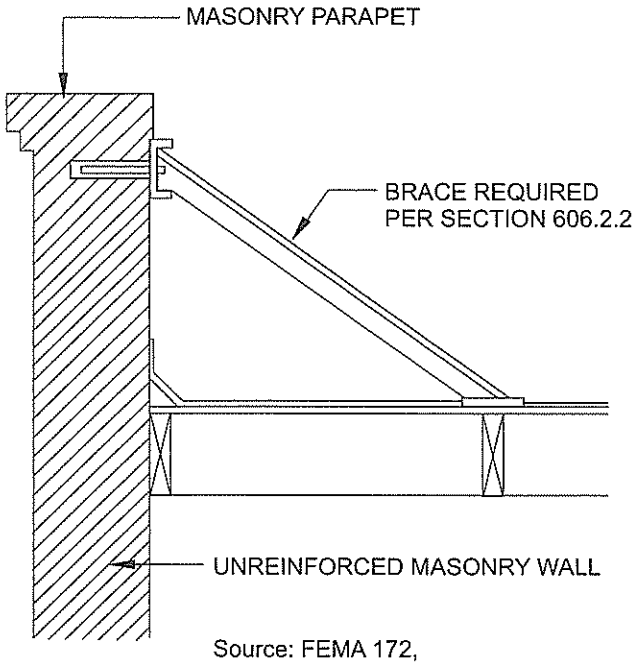
606.3.2 Roof diaphragms resisting wind loads in high-wind regions. Where roofing materials are removed from more than 50 percent of the roof diaphragm of a building or section of a building located where the basic wind speed is greater than 90 mph or in a special wind region, as defined in Section 1609 of the *International Building Code*, roof diaphragms and connections that are part of the main wind-force resisting system shall be evaluated for the wind loads specified in the *International Building Code*, including wind uplift. If the diaphragms and connections in their current condition do not comply with those wind provisions, they shall be replaced or strengthened in accordance with the loads specified in the *International Building Code*.

❖ The removal of roofing provides an opportunity to inspect a portion of the structure that is otherwise concealed. In reroofing operations where more than 50 percent of the roof covering is removed and where the building is located where the basic wind speed is greater than 90 miles per hour (144.8 km/hour), a roof diaphragm that is a part of the main windforce-resisting system is required to be evaluated for adequate strength to resist and transfer the wind loads in the IBC, including uplift loads. If the roof diaphragm is found deficient because of insufficient or deteriorated connections, such connections shall be strengthened or replaced.

SECTION 607
ENERGY CONSERVATION

607.1 Minimum requirements. Level 1 alterations to existing buildings or structures are permitted without requiring the entire building or structure to comply with the energy requirements of the *International Energy Conservation Code* or *International Residential Code*. The alterations shall conform to the energy requirements of the *International Energy Conservation Code* or *International Residential Code* as they relate to new construction only.

❖ A building that undergoes Level 1 alterations is required to meet a certain level of energy compliance. The level of compliance depends on the extent of the alterations taking place. As Level 1 alterations are those alterations where certain building elements are removed and replaced with new elements or where old elements are covered with new elements, then any such new element is required to meet the applicable energy provisions of the IECC or IRC, in the case of buildings that fall under the scoping of the IRC. Elements within the building that are not being affected do not need to be evaluated and do not need to comply with the energy provisions. Essentially, the entire building is not required to meet the energy provisions; only a degree of possible improvement in the energy performance of the building is intended to be achieved



Source: FEMA 172,
NEHRP Handbook for Seismic Rehabilitation of Existing Buildings

Figure 606.3.1
MASONRY PARAPET BRACE

by making the new elements meet the IECC or IRC requirements. The language in this section is intended to be consistent with the requirements in the IECC and IRC for alterations.

Bibliography

The following resource materials are referenced in this chapter or are relevant to the subject matter addressed in this chapter.

28 CFR, Part 36.430-01, *Nondiscrimination on the Basis of Sex in Education Programs or Activities Receiving Federal Financial Assistance*. Washington, DC: United States Code, 2001.

49 CFR, Part 37.43(c)-07, *Alteration of Transportation Facilities by Public Entities.* Washington, DC: United States Code, 2007.

42 USC 3601-88, *Fair Housing Amendments Act* (FHA). Washington, DC: United States Code, 1988.

ASCE 24-05, *Flood-resistance Design and Construction Standard*. Reston, VA: American Society of Civil Engineers, 2005.

ASCE 41-06, *Seismic Rehabilitation Existing Buildings*. Reston, VA: American Society of Civil Engineers, 2006.

ASME A17.1/CSA B44-07, *Safety Code for Elevators and Escalators*. New York, NY: American National Standards Institute, 2007.

ASME A18.1-05, *Safety Standard for Platform Lifts and Stairway Chairlifts.* New York, NY: American National Standards Institute, 2005.

DOJ 28 CFR, Part 36-91. *Americans with Disabilities Act* (ADA). Washington, DC: Department of Justice, 1991.

DOJ 28 CFR, Part 36-91 (Appendix A). *ADA Accessibility Guidelines for Building and Facilities* (ADAAG). Washington, DC: Department of Justice, 1991.

FEMA 74, *Reducing the Risks of Nonstructural Earthquake Damage—A Practical Guide*. Washington, DC: Federal Emergency Management Agency, 1994.

FEMA 172, *NEHRP Handbook for the Seismic Rehabilitation of Existing Buildings*. Washington, DC: Federal Emergency Management Agency, 1997.

FEMA 356, *Prestandard and Commentary for the Seismic Rehabilitation of Buildings*. Washington, DC: Federal Emergency Management Agency, 2000.

Guidelines for Seismic Retrofit of Existing Buildings. Birmingham, AL: Southern Building Code Congress International, 2000.

IBC-09, *International Building Code*. Washington, DC: International Code Council, 2009.

ICC/A117.1-03, *Accessible and Usable Buildings and Facilities*. Washington, DC: International Code Council, 2003.

IECC-09, *International Energy Conservation Code.* Washington, DC: International Code Council, 2009.

IFGC-09, *International Fuel Gas Code*. Washington, DC: International Code Council, 2009.

IMC-09, *International Mechanical Code*. Washington, DC: International Code Council, 2009.

IPC-09, *International Plumbing Code.* Washington, DC: International Code Council, 2009.

NBC-99, *BOCA National Building Code.* Country Club Hills, IL: Building Officials & Code Administrators International, Inc., 1999.

SBC-99, *Standard Building Code.* Birmingham, AL: Southern Building Code Congress International, 1999.

UBC-97, *Uniform Building Code*. Whittier, CA: International Conference of Building Officials, 1997.

Chapter 7: Alterations—Level 2

General Comments

This chapter provides the technical requirements for those existing buildings that undergo Level 2 alterations. Reference is made to Level 2 alterations as described in Section 404, which includes the reconfiguration of space. Installation of additional equipment that did not previously exist, or the addition or elimination of doors and windows, are also considered Level 2 alterations and, hence, are covered by this chapter.

This chapter, similar to other chapters of the code, covers all building-related subjects, such as structural, mechanical, plumbing, electrical and accessibility, as well as the fire and life safety issues when the alterations are classified as Level 2. Sections 701, 702 and 703 are related to scoping, special use and occupancy, and building elements and materials. In the interest of being brief and avoiding the presentation of materials that are repetitive in nature in various chapters, Section 701.2 requires that Level 2 alterations comply not only with Chapter 7, but also with Chapter 6. As such, any alteration work that is classified as Level 2 is assumed to include everything related to Level 1 alterations plus the reconfiguration of space. Section 703, Building Elements and Materials, covers, in detail, elements such as existing vertical openings and when such openings might be required to be enclosed, stairway enclosures, interior finishes and guards. The remainder of the chapter is related to fire protection, means of egress, accessibility, structural, electrical, mechanical and plumbing provisions. While the means of egress, Section 705, covers subjects such as the minimum number of exits, fire escape requirements and construction details, corridor openings and exit signs, the structural part of this chapter, Section 707, addresses subjects such as new and existing structural members, gravity loads, lateral loads and snow drift loads.

The level of improvements required as a result of Level 2 alterations are extensive when compared to Level 1 alterations because the extent of alterations are more drastic and space reconfiguration is involved. The decision to divide the level typically known as "alterations" in the *International Building Code*® (IBC®) and previous legacy building codes into three parts of Level 1, Level 2 and Level 3 was based on the fact that minor alterations that do not include space reconfiguration and extensive alterations that might range from the relocation of walls and partitions in various floors or in the entire building should be treated differently and with different threshold levels for requiring upgrades or improvements to the building or spaces within the building.

Purpose

The purpose of this chapter is to provide detailed requirements and provisions to identify the required improvements in the existing building elements, building spaces and building structural system. This chapter is distinguished from Chapters 6 and 8 by involving space reconfiguration that could be up to and including 50 percent of the area of the building. In contrast, Level 1 alterations do not involve space reconfiguration and Level 3 alterations involve extensive space reconfiguration that exceed 50 percent of the building area. Depending on the nature of alteration work, its location within the building and whether it encompasses one or more tenants, improvements and upgrades could be required for the open-floor penetrations, sprinkler system or the installation of additional means of egress, such as stairs or fire escapes. At times, and under certain situations, this chapter also intends to improve the safety of certain building features beyond the work area and in other parts of the building where no alteration work might be taking place.

SECTION 701 GENERAL

701.1 Scope. Level 2 *alterations* as described in Section 404 shall comply with the requirements of this chapter.

Exception: Buildings in which the reconfiguration is exclusively the result of compliance with the accessibility requirements of Section 605.2 shall be permitted to comply with Chapter 6.

❖ Any alteration work that results in the reconfiguration of space or otherwise falls under the classification of Level 2 alterations, as described in Section 404, must comply with Chapter 7 (see Figure 701.1). The exception is intended to encourage existing buildings to improve the accessibility for the disabled by allowing any such alterations (which are solely for compliance with the accessibility provisions of Section 605) to only comply with Chapter 6 provisions, as if no space reconfiguration has taken place. This is an advantage for improving accessibility in buildings because Chapter 6 is related to alterations that do not encompass any space reconfiguration and, as such, has a lower level of compliance requirement and higher thresholds for triggering other improvements.

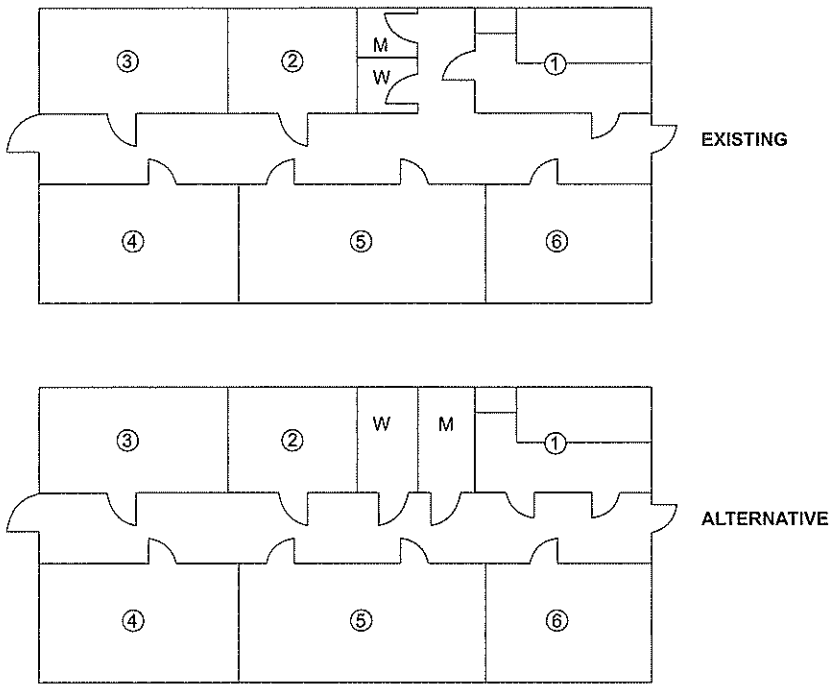


Figure 701.1
RECONFIGURED SPACE

Example 701.1:

An existing office building does not comply with current accessibility requirements. The owner wishes to make the building completely accessible to the disabled by installing ramps, enlarging toilet rooms and widening doorways.

Q: What, if any, additional code requirements are triggered?

A: All affected areas can be rebuilt with similar materials, except glass at human impact areas, which must comply with safety glass requirements (see Section 502).

701.2 Alteration Level 1 compliance. In addition to the requirements of this chapter, all work shall comply with the requirements of Chapter 6.

❖ Chapters 7 and 8 have cascading effects by requiring that each level of alteration must comply with the chapter for the lower level of alteration. Accordingly, an alteration project that is classified as Level 2 must comply with Chapters 6 and 7. Similarly, an alteration project classified as Level 3 must comply with Chapters 6, 7 and 8. This is to eliminate the repetition of various requirements from Chapter 6 in Chapters 7 and 8 and from Chapter 7 in Chapter 8, as a Level 2 alteration, in general, includes various aspects of a Level 1 alteration, and a Level 3 alteration, in general, includes various aspects of Level 1 and 2 alterations. The code drafting committee decided to make reference to these chapters rather than repeat all such provisions again.

701.3 Compliance. All new construction elements, components, systems, and spaces shall comply with the requirements of the *International Building Code*.

Exceptions:

1. Windows may be added without requiring compliance with the light and ventilation requirements of the *International Building Code*.
2. Newly installed electrical equipment shall comply with the requirements of Section 708.
3. The length of dead-end corridors in newly constructed spaces shall only be required to comply with the provisions of Section 705.6.
4. The minimum ceiling height of the newly created habitable and occupiable spaces and corridors shall be 7 feet (2134 mm).

❖ New elements, components and spaces created as a result of Level 2 alteration work must comply with the IBC or other applicable code, as Section 101.4 of the IBC makes reference to other *International Codes*® (I-Codes®), such as the *International Plumbing Code*® (IPC®), *International Mechanical Code*® (IMC®) and *International Fire Code*® (IFC®). Exception 1 allows new windows to be added without complying with the IBC light and ventilation requirements, so as not to discourage a building owner from making improvements in the current amount of natural light and ventilation. Exceptions 2 and 3 refer the user to Sections 705.6 and 708, which provide detailed provisions for electrical equipment and dead-end corridors. Exception 4 allows the minimum ceiling height of newly created

spaces to be lowered from the IBC requirement of 7 feet, 6 inches (2289 mm) to 7 feet (2134 mm), recognizing that even though the space is newly created, it is within an existing building that might have framing members that will prohibit higher ceilings.

SECTION 702
SPECIAL USE AND OCCUPANCY

702.1 General. *Alteration* of buildings classified as special use and occupancy as described in the *International Building Code* shall comply with the requirements of Section 701.1 and the scoping provisions of Chapter 1 where applicable.

❖ Special use and occupancy buildings described in Chapter 4 of the IBC, such as covered mall buildings and high-rise buildings, are treated the same as any other building when the work taking place is a Level 2 alteration. This section specifically and clearly provides this information because at higher levels of alteration work, or where there is a change of occupancy, some special use and occupancy buildings are required to comply with the IBC, either completely or in particular alteration areas (see Sections 802 and 902). By reference to Section 701.1 and Chapter 1, this section makes indirect reference to Sections 101.2, 115 and applicable subsections of 1003.

SECTION 703
BUILDING ELEMENTS AND MATERIALS

703.1 Scope. The requirements of this section are limited to work areas in which Level 2 *alterations* are being performed, and shall apply beyond the *work area* where specified.

❖ This section provides the scoping provisions for vertical openings, smoke barriers, interior finish and guards by requiring that the work areas must comply with this section, and that at times there are supplementary requirements that apply to spaces beyond the work areas. Such supplementary requirements are found in Sections 703.2.2, 703.2.3 and 703.4.1 where the extent of compliance beyond the work area is identified.

703.2 Vertical openings. Existing vertical openings shall comply with the provisions of Sections 703.2.1, 703.2.2, and 703.2.3.

❖ The purpose of this section is to provide requirements for vertical openings in Level 2 alterations. Sections 703.2.1, 703.2.2 and 703.2.3 provide these requirements.

703.2.1 Existing vertical openings. All existing interior vertical openings connecting two or more floors shall be enclosed with approved assemblies having a fire-resistance rating of not less than 1 hour with approved opening protectives.

Exceptions:

1. Where vertical opening enclosure is not required by the *International Building Code* or the *International Fire Code*.
2. Interior vertical openings other than stairways may be blocked at the floor and ceiling of the *work area* by installation of not less than 2 inches (51 mm) of solid wood or equivalent construction.
3. The enclosure shall not be required where:
   - 3.1. Connecting the main floor and mezzanines; or
   - 3.2. All of the following conditions are met:
     - 3.2.1. The communicating area has a low hazard occupancy or has a moderate hazard occupancy that is protected throughout by an automatic sprinkler system.
     - 3.2.2. The lowest or next to the lowest level is a street floor.
     - 3.2.3. The entire area is open and unobstructed in a manner such that it may be assumed that a fire in any part of the interconnected spaces will be readily obvious to all of the occupants.
     - 3.2.4. Exit capacity is sufficient to provide egress simultaneously for all the occupants of all levels by considering all areas to be a single floor area for the determination of required exit capacity.
     - 3.2.5. Each floor level, considered separately, has at least one half of its individual required exit capacity provided by an exit or exits leading directly out of that level without having to traverse another communicating floor level or be exposed to the smoke or fire spreading from another communicating floor level.
4. In Group A occupancies, a minimum 30-minute enclosure shall be provided to protect all vertical openings not exceeding three stories.
5. In Group B occupancies, a minimum 30-minute enclosure shall be provided to protect all vertical openings not exceeding three stories. This enclosure, or the enclosure specified in Section 703.2.1, shall not be required in the following locations:
   - 5.1. Buildings not exceeding 3,000 square feet (279 m^2) per floor.
   - 5.2. Buildings protected throughout by an approved automatic fire sprinkler system.
6. In Group E occupancies, the enclosure shall not be required for vertical openings not exceeding three stories when the building is protected throughout by an approved automatic fire sprinkler system.

7. In Group F occupancies, the enclosure shall not be required in the following locations:

   7.1. Vertical openings not exceeding three stories.

   7.2. Special purpose occupancies where necessary for manufacturing operations and direct access is provided to at least one protected stairway.

   7.3. Buildings protected throughout by an approved automatic sprinkler system.

8. In Group H occupancies, the enclosure shall not be required for vertical openings not exceeding three stories where necessary for manufacturing operations and every floor level has direct access to at least two remote enclosed stairways or other approved exits.

9. In Group M occupancies, a minimum 30-minute enclosure shall be provided to protect all vertical openings not exceeding three stories. This enclosure, or the enclosure specified in Section 703.2.1, shall not be required in the following locations:

   9.1. Openings connecting only two floor levels.

   9.2. Occupancies protected throughout by an approved automatic sprinkler system.

10. In Group R-1 occupancies, the enclosure shall not be required for vertical openings not exceeding three stories in the following locations:

    10.1. Buildings protected throughout by an approved automatic sprinkler system.

    10.2. Buildings with less than 25 dwelling units or sleeping units where every sleeping room above the second floor is provided with direct access to a fire escape or other approved second exit by means of an approved exterior door or window having a sill height of not greater than 44 inches (1118 mm) and where:

        10.2.1. Any exit access corridor exceeding 8 feet (2438 mm) in length that serves two means of egress, one of which is an unprotected vertical opening, shall have at least one of the means of egress separated from the vertical opening by a 1-hour fire barrier; and

        10.2.2. The building is protected throughout by an automatic fire alarm system, installed and supervised in accordance with the *International Building Code*.

11. In Group R-2 occupancies, a minimum 30-minute enclosure shall be provided to protect all vertical openings not exceeding three stories. This enclosure, or the enclosure specified in Section 703.2.1, shall not be required in the following locations:

    11.1. Vertical openings not exceeding two stories with not more than four dwelling units per floor.

    11.2. Buildings protected throughout by an approved automatic sprinkler system.

    11.3. Buildings with not more than four dwelling units per floor where every sleeping room above the second floor is provided with direct access to a fire escape or other approved second exit by means of an approved exterior door or window having a sill height of not greater than 44 inches (1118 mm) and the building is protected throughout by an automatic fire alarm system complying with Section 704.4.

12. One- and two-family dwellings.

13. Group S occupancies where connecting not more than two floor levels or where connecting not more than three floor levels and the structure is equipped throughout with an approved automatic sprinkler system.

14. Group S occupancies where vertical opening protection is not required for open parking garages and ramps.

❖ All existing vertical openings connecting two or more floors must be enclosed with assemblies of 1-hour fire-resistance-rated construction and approved protected openings. Even without the following 14 exceptions, this provision is more relaxed than the IBC shaft enclosure requirements that require 2-hour fire-resistance-rated enclosures for buildings four stories or more in height. Additionally, the user should remember the scoping provisions of Section 703.1, which indicates that the enclosure requirements triggered under Level 2 alterations apply only to work areas. As such, if the alteration is on the first floor of a multiple-story building, and the vertical opening is within the work area, only the portion of the vertical opening within the first floor is required to be enclosed and not the entire vertical opening from the bottom to top floor.

Exception 1 is provided so that the provisions of the code in relation to vertical openings are not more restrictive than those of the IBC and IFC. The IFC regulates vertical openings in existing buildings in Section 704 of that code. This section references Chapter 46 of the IFC, which contains protection of options for vertical openings in various occupancy groups connecting up to five stories.

Exception 2 allows vertical openings other than stairways to be blocked by solid wood of 2 inches (51 mm) in thickness or equivalent construction. The 2 inches (51 mm) used here is the nominal thickness of the solid wood members.

Exception 3.1 is a repetition of Exception 9 of Section 708.2 of the IBC. Exception 3.2 provides five conditions that, if all are met simultaneously, do not require the enclosure of vertical openings. The combination of these five conditions is equivalent to a situation where the occupancy is a low hazard occupancy, fire sprinklers are present and there is sufficient means-of-egress capacity.

Exceptions 4 through 11 and Exception 13 allow either a 30-minute protection for vertical openings in lieu of 1 hour or allow the vertical opening to remain open for buildings three stories or less in height with certain features such as sprinklers or multiple remote means of egress.

Exceptions 12 and 14 allow existing vertical openings to remain open in single-family, duplex buildings and open parking garages. The IBC and IFC exception is listed under Exception 1. As can be seen, the exceptions within the IBC and the code allow for numerous methods of dealing with vertical openings so that the building owners and designers have many options to provide a minimum level of protection intended by the codes.

703.2.2 Supplemental shaft and floor opening enclosure requirements. Where the *work area* on any floor exceeds 50 percent of that floor area, the enclosure requirements of Section 703.2 shall apply to vertical openings other than stairways throughout the floor.

Exception: Vertical openings located in tenant spaces that are entirely outside the *work area*.

❖ Unenclosed vertical openings and shafts, other than stairways that would typically be required to be enclosed by the IBC, are required to be enclosed throughout a floor where the work area on that floor exceeds 50 percent of the floor area. Stairways are not included here because they are specifically addressed in Section 703.2.3. This is the first of the supplemental requirements for vertical enclosures to which the code user is referred in Section 703.1. The proportionality philosophy of the code is applied here, as it is believed that a work area extending to more than 50 percent of the floor area of a story is large enough to trigger additional vertical openings, other than stairways, to be enclosed. As the undertaking of such work in tenant spaces, which are completely outside of the work area and are not within the scope of the originally proposed alteration, is disruptive and an unacceptable practice, the exception eliminates this requirement in such tenant spaces.

Example 703.2.2:

An existing four-story retail building is being altered on the third floor. The alterations involve the reconfiguration of space in about 70 percent of the third floor. There are two enclosed stairways, an open escalator and an elevator without protected enclosures. The building is not sprinklered.

Q: Will the escalator and the elevator be required to be protected or enclosed in accordance with the IBC?

A: Since the work area on the third floor exceeds 50 percent of the area of the third floor, both the elevator and the escalator must be protected even though the elevator is outside of the work area. The protection is needed on the third floor only (see Section 703.1 and Figure 703.2.2).

703.2.3 Supplemental stairway enclosure requirements. Where the *work area* on any floor exceeds 50 percent of that floor area, stairways that are part of the means of egress serving the *work area* shall, at a minimum, be enclosed with smoke-tight construction on the highest *work area* floor and all floors below.

Exception: Where stairway enclosure is not required by the *International Building Code* or the *International Fire Code*.

❖ Stairways serving as part of the means-of-egress system must be enclosed, where possible, to increase the degree of protection for building occupants. The triggering mechanism in this section is the percentage of the work area on any given floor. If the work area exceeds 50 percent of the floor area on any floor, then stairways that are part of the means of egress and serve that the work area must be enclosed, even though the stairways may not be located within the work area. This provision could affect several stairways, all of which might be located outside of the proposed work area. For example, a multiple-story building contains three required stairways, all of which are unenclosed. The work area on an upper floor that exceeds 50 percent of that story area triggers the requirement for the enclosure of all three stairways if they each serve as one of the exits for that work area. The enclosure need only be smoke tight and need not provide any fire-resistance rating, and the openings into such a smoke-tight enclosure need not be protected with fire-resistant assemblies, only smoke-protected assemblies. The extent of the enclosure is specified to be from the floor at which the work areas have triggered this requirement and all floors below it. The exception is a reminder that stairways not required to be enclosed by the IBC or IFC are not affected by this section.

703.3 Smoke barriers. Smoke barriers in Group I-2 occupancies shall be installed where required by Sections 703.3.1 and 703.3.2.

❖ This section is the charging paragraph for smoke barrier requirements in Group I-2 occupancies. Sections 703.3.1 and 703.3.2 give the requirements.

703.3.1 Compartmentation. Where the *work area* is on a story used for sleeping rooms for more than 30 patients, the story shall be divided into not less than two compartments by smoke barrier walls complying with Section 703.3.2 such that each compartment does not exceed 22,500 square feet (2093 m^2), and the travel distance from any point to reach a door in the required smoke barrier shall not exceed 200 feet (60 960 mm).

Exception: Where neither the length nor the width of the smoke compartment exceeds 150 feet (45 720 mm), the travel distance to reach the smoke barrier door shall not be limited.

❖ The smoke barrier provisions in alterations classified as Level 2 apply only to Group I-2 occupancies, such as hospitals, nursing homes, mental hospitals and detoxification facilities. In such facilities, Section 703.3.1

requires that a story used for sleeping rooms for more than 30 patients be divided into at least two compartments by the use of smoke barriers. No such compartment can be larger than 22,500 square feet (2093 m^2). Realizing that a 22,500-square-foot (2093 m^2) compartment could be a very long and narrow space, the travel distance from any point to reach a door in the smoke barrier is limited to 200 feet (60 960 mm). This requirement, and the related compartment size and travel distance, are taken directly from the IBC, with the exception that the trigger under the code is only for sleeping areas for more than 30 patients, as opposed to the IBC, which requires compartmentation in all sleeping areas regardless of occupant load, and in nonsleeping areas with an occupant load of 50 or more (see commentary, Section 407.4 of the IBC).

The exception is a reflection of space geometry where spaces do not have dimensions larger than 150 feet (45 720 mm) and, therefore, will most likely meet the maximum 200-foot (60 960 mm) travel distance limitation.

703.3.2 Fire-resistance rating. The smoke barriers shall be fire-resistance rated for 30 minutes and constructed in accordance with the *International Building Code*.

❖ This is a less restrictive requirement than the requirement for a 1-hour fire-resistance rating given by the IBC to allow the possibility of the use of existing walls and partitions as smoke barriers that results in minimal disruption and construction in existing facilities while still improving the safety features for Group I-2 facilities. The construction requirements for smoke barriers, including requirements for continuity, openings, penetrations, joints and duct openings, are given in Section 709 of the IBC.

703.4 Interior finish. The interior finish of walls and ceilings in exits and corridors in any *work area* shall comply with the requirements of the *International Building Code*.

Exception: Existing interior finish materials that do not comply with the interior finish requirements of the *International Building Code* shall be permitted to be treated with an approved fire-retardant coating in accordance with the manufacturer's instructions to achieve the required rating.

❖ The interior finish of corridor and exit walls and ceilings within the work areas must meet the flame spread and smoke-development limitations and requirements of the IBC. "Corridors" and "exits" are defined in Section 1002.1 of the IBC, and flame spread and smoke-developed classification are determined from Table 803.9 of the IBC and based on ASTM E 84. To be able to maintain some interior finish materials that do not comply with the flame spread and smoke-develop-

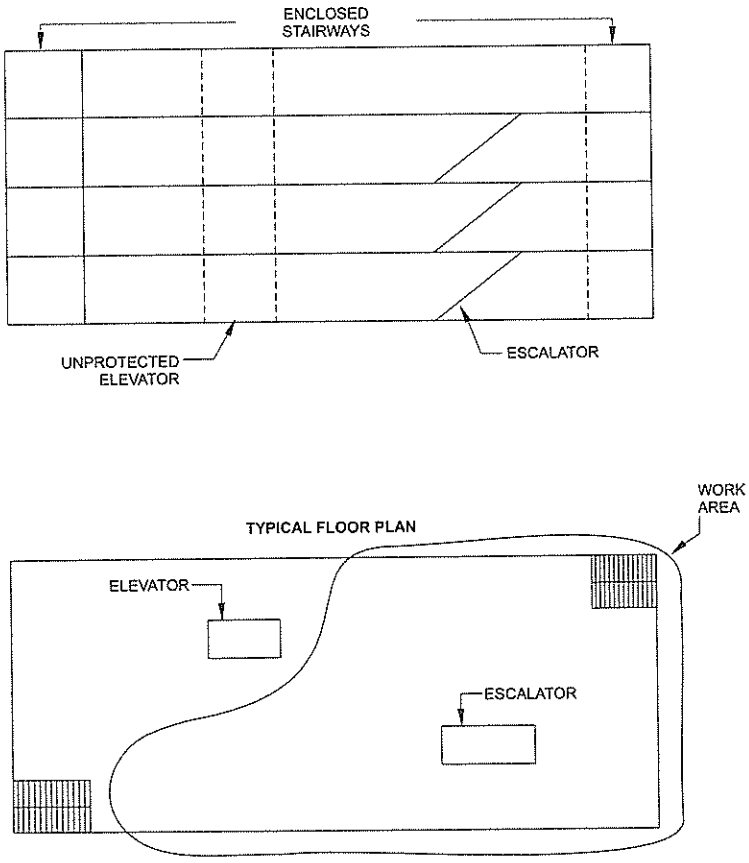


Figure 703.2.2
SUPPLEMENTAL SHAFT AND FLOOR OPENING ENCLOSURE REQUIREMENTS

ment requirements of the code rather than remove and replace them, the exception provides the option of available technology for the use of fire-retardant treatment of such surfaces as long as the code official approves the coating and it is applied in accordance with the manufacturer's instructions to achieve the required rating.

703.4.1 Supplemental interior finish requirements. Where the *work area* on any floor exceeds 50 percent of the floor area, Section 703.4 shall also apply to the interior finish in exits and corridors serving the *work area* throughout the floor.

Exception: Interior finish within tenant spaces that are entirely outside the *work area*.

❖ The interior finish requirements discussed in Section 703.4 are also applicable in corridors and exits that are outside of the work area but serve that same work area, if the work area on any floor exceeds 50 percent of the floor area at that level. Similar to other supplemental requirements, this extended area of code application is not required in tenant spaces that are entirely outside of the work area.

703.5 Guards. The requirements of Sections 703.5.1 and 703.5.2 shall apply in all *work areas*.

❖ This is the charging paragraph for guard requirements. The detailed requirements are given in Sections 703.5.1 and 703.5.2.

703.5.1 Minimum requirement. Every portion of a floor, such as a balcony or a loading dock, that is more than 30 inches (762 mm) above the floor or grade below and is not provided with guards, or those in which the existing guards are judged to be in danger of collapsing, shall be provided with guards.

❖ To reduce the potential of an accidental fall, the IBC requires guards where open sides of walking surfaces, mezzanines, stairways, ramps, landings and other similar areas are located more than 30 inches (702 mm) above the floor or grade below. The code, in this section, uses the same criteria to require new guards where none existed before or to require that dangerous guards be replaced. This requirement is applicable only in the work areas and does not contain supplementary provisions. Replacement of existing guards is required if they are judged to be in danger of collapsing. This sentence makes it clear that the replacement of guards is triggered if anyone, including the owner, designer or code official, judge the guard to be in danger of collapsing. It needs to be stressed, though, that guards that could potentially collapse or could be considered dangerous, as defined in Section 202, are required to be replaced on the basis of Section 115.1, whether it is in the work area or not. Section 116 of the IBC and Section 110 of the IFC have the same effect and could require the replacement of guards anywhere within the building, even if no alterations are planned.

Where Section 703.5.1 triggers the installation of new guards or the replacement of existing guards, the new guards must comply with the IBC for height, spacing between balusters and structural strength (see Sections 1013 and 1607.7 of the IBC).

Example 703.1:

An existing restaurant has an elevated platform for performances, an elevated dining area and an outside dining deck, all of which require guards under the IBC. The performance area has no guards and the elevated dining area has existing guards that are in acceptable physical condition, but the spacing between the rails is $5^1/_2$ inches (140 mm). The outside dining deck has guards that are deteriorated and might collapse under applied loads. The owner plans to make some rearrangements of the kitchen, toilets and the elevated dining deck, which are all in the same area.

Q: What requirements related to guards are applicable?

A: 1. The guards for the elevated dining area do not require any upgrading, as they are in acceptable physical shape.

A: 2. The elevated performance area and the outside dining deck are not within the work area and, as such, are not covered by this section of the code. Both of these areas, however, could most likely be considered unsafe under the provisions of Section 115.1 and, accordingly, guards in full compliance with the IBC must be installed in both locations.

703.5.2 Design. Where there are no guards or where existing guards must be replaced, the guards shall be designed and installed in accordance with the *International Building Code*.

❖ The strength, load-carrying capacity and maximum opening requirements for guards are given by the IBC. This is consistent with the requirements of Section 602.4 for new building materials and equipment.

SECTION 704
FIRE PROTECTION

704.1 Scope. The requirements of this section shall be limited to work areas in which Level 2 alterations are being performed, and where specified they shall apply throughout the floor on which the work areas are located or otherwise beyond the *work area*.

❖ The scoping provisions of fire protection are the same as all other subjects in Chapter 7. The requirements are triggered within work areas and, at times, there are supplemental requirements that apply to areas outside of the work area.

704.1.1 Corridor ratings. Where an approved automatic sprinkler system is installed throughout the story, the required fire-resistance rating for any corridor located on the story shall be permitted to be reduced in accordance with the *International Building Code*. In order to be considered for a corridor rating reduction, such system shall provide coverage for the

stairwell landings serving the floor and the intermediate landings immediately below.

❖ Corridor reductions on a fully sprinklered floor provides a significant incentive to sprinklering the floor and a reasonable level of safety for the occupants of the floor. Once water is brought to the floor, trade offs for rated corridor doors and dampers, plus the increase in multiple leasing design options supports an owner's decision to sprinkler. To be considered a fully sprinklered floor, the sprinkler system also needs to include the exit stair(s). Once the sprinkler risers are provided in an existing building, future alterations may also easily be sprinklered by utilizing the riser. This trade off is permitted for both sprinklers that are required as a result of the alteration, as well as a voluntary installation.

704.2 Automatic sprinkler systems. Automatic sprinkler systems shall be provided in accordance with the requirements of Sections 704.2.1 through 704.2.5. Installation requirements shall be in accordance with the *International Building Code*.

❖ The sprinkler requirements are grouped into four sections: high-rise buildings; Groups A, E, F-1, H, I, M, R-1, R-2, R-4, S-1 and S-2; windowless stories; and buildings and areas listed in Table 903.2.11.6 of the IBC.

704.2.1 High-rise buildings. In high-rise buildings, work areas that have exits or corridors shared by more than one tenant or that have exits or corridors serving an occupant load greater than 30 shall be provided with automatic sprinkler protection in the entire *work area* where the *work area* is located on a floor that has a sufficient sprinkler water supply system from an existing standpipe or a sprinkler riser serving that floor.

❖ The requirement in high-rise buildings is dependent upon the availability of a sufficient sprinkler water supply from an existing standpipe, or a sprinkler riser serving the floor where the alteration work area is located. This criteria is included because of the complexity and extensive cost involved in completely constructing new sprinkler water mains, risers, and associated piping and equipment in high-rise buildings. Where there are existing standpipe or sprinkler risers with a sufficient water supply serving a particular floor, work areas on that floor must be sprinklered if such work areas have exits or corridors shared by more than one tenant, or that have exits or corridors that serve an occupant load greater than 30.

704.2.1.1 Supplemental automatic sprinkler system requirements. Where the *work area* on any floor exceeds 50 percent of that floor area, Section 704.2.1 shall apply to the entire floor on which the *work area* is located.

Exception: Tenant spaces that are entirely outside the *work area*.

❖ If the work area on a floor exceeds 50 percent of that floor area, sprinklers as previously discussed must be installed throughout the floor except in tenant areas that are entirely outside the work area. Note that the 50-percent rule applies to the floor area only and, therefore, this does not become a Level 3 alteration until the work area exceeds 50 percent of the aggregate area of all floors.

704.2.2 Groups A, B, E, F-1, H, I, M, R-1, R-2, R-4, S-1 and S-2. In buildings with occupancies in Groups A, B, E, F-1, H, I, M, R-1, R-2, R-4, S-1 and S-2, work areas that have exits or corridors shared by more than one tenant or that have exits or corridors serving an occupant load greater than 30 shall be provided with automatic sprinkler protection where all of the following conditions occur:

1. The *work area* is required to be provided with automatic sprinkler protection in accordance with the *International Building Code* as applicable to new construction;
2. The *work area* exceeds 50 percent of the floor area; and
3. The building has sufficient municipal water supply for design of a fire sprinkler system available to the floor without installation of a new fire pump.

❖ While, in general, automatic sprinkler protection for various occupancies in the IBC is a function of the "fire area" size, in the code, it is a function of five conditions in select occupancies. This section establishes the criteria for all occupancies, except for Group F-2 and U occupancies, because these groups are not required to be sprinklered in the IBC unless they are in special buildings, such as covered malls, high rises and the so-called windowless stories. First and foremost to be considered for the possibility of requiring a sprinkler system is whether such a work area would be required to be sprinklered under the provisions of the IBC for new construction. If the IBC does not require a sprinkler system for the space or building under consideration, neither will the code. Once this is established, the other conditions consisting of whether the work area exits or corridors shared by more than one tenant, or that has exits or corridors that serve an occupant load greater than 30; whether the work area exceeds 50 percent of the floor area; and whether the building has a sufficient municipal water supply for a sprinkler system at the floor where the work area is located, are evaluated. The 30-occupant-load threshold in this section is taken from Table 1016.1 of the IBC, which uses this threshold in most occupancies to require either sprinklers or rated corridors. The availability of sufficient water at the floor being considered must be evaluated without consideration for a new fire pump.

704.2.2.1 Mixed uses. In work areas containing mixed uses, one or more of which requires automatic sprinkler protection in accordance with Section 704.2.2, such protection shall not be required throughout the *work area* provided that the uses requiring such protection are separated from those not requiring protection by fire-resistance-rated construction having a minimum 2-hour rating for Group H and a minimum 1-hour rating for all other occupancy groups.

❖ Designers and owners who do not wish to sprinkler entire work areas, just because one of a multiple number

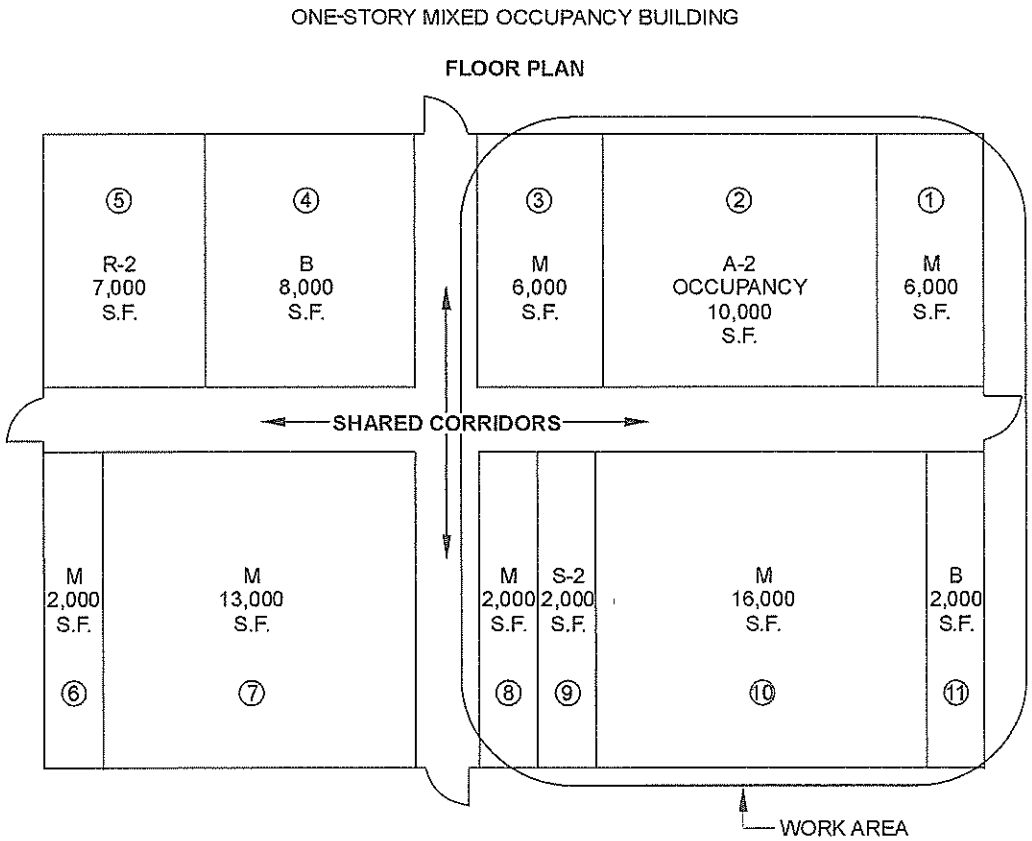
of mixed uses requires automatic sprinklers, are provided an option to separate the various occupancies. This concept is very similar to the concept in Section 508 of the IBC, where two options of nonseparated uses and separated uses are provided. Here, the code user is given the option of separating the occupancies by a 1-hour fire-resistance rating (2-hour rating in Group H occupancies) and sprinkler only the occupancy that has been triggered to provide sprinklers, or provide the automatic sprinkler in the entire work area and multiple occupancies within such work areas, thus eliminating the need for separation of the various mixed occupancies.

Example 704.2.2.1:

Q: Which occupancies or tenants must be provided with a sprinkler system?

A: First, the three conditions of Section 704.2.2 must be verified. Conditions 2 and 3 are present. For Condition 1, Section 903 of the IBC requires sprinklers for tenants 2, 5, 7 and 10. Tenants 5 and 7, however, are outside of the work area and, as such, are not going to be required to provide sprinklers (see Section 704.1). Tenants 2 and 10 are within the work area. Accordingly, all of the tenants within the work area (tenants 1, 2, 3, 8, 9, 10 and 11) will be required to be sprinklered, even though tenants 1, 3, 8, 9 and 11 are not individually required to be sprinklered by the IBC. If the owner wishes to only sprinkler tenants 2 and 10, then full-height, 1-hour-rated partitions must be provided to separate tenants 2 and 10 from the adjacent tenants 1, 3, 9 and 11 (see Figure 704.2.2.1).

704.2.3 Windowless stories. Work located in a windowless story, as determined in accordance with the *International*



For SI: 1 square foot = 0.0929 m^2.

Figure 704.2.2.1

Building Code, shall be sprinklered where the *work area* is required to be sprinklered under the provisions of the *International Building Code* for newly constructed buildings and the building has a sufficient municipal water supply without installation of a new fire pump.

❖ In the context of the code, a windowless story is a reference to Section 903.2.11.1 of the IBC. Within this context, work areas within any story or basement larger than 1,500 square feet (139 m^2) that do not have access to openings, as described in Items 1 and 2 of Section 903.2.11.1 of the IBC, are required to be sprinklered. The only exception is if there is not a sufficient municipal water supply available to the building without the need for a new fire pump.

704.2.4 Other required suppression systems. In buildings and areas listed in Table 903.2.11.6 of the *International Building Code*, *work areas* that have exits or corridors shared by more than one tenant or that have exits or corridors serving an occupant load greater than 30 shall be provided with sprinkler protection under the following conditions:

1. The *work area* is required to be provided with automatic sprinkler protection in accordance with the *International Building Code* applicable to new construction; and
2. The building has sufficient municipal water supply for design of a fire sprinkler system available to the floor without installation of a new fire pump.

❖ Special buildings and occupancies, such as covered malls, atriums, stages and others listed in Table 903.2.11.6 of the IBC that use suppression systems, such as smoke-protected seating, dry cleaning plants, spray booths and others listed in Table 903.2.11.6 of the IFC, must also be separately considered for the possibility of automatic sprinklers or other suppression system requirements. The first condition to be considered for an area to require a sprinkler system is whether such a work area would be required to be sprinklered under the provisions of the IBC for new construction. If the IBC does not require a sprinkler system for the space or building under consideration, neither will the code. Once this is established, other conditions are evaluated, such as whether the work area has exits or corridors shared by more than one tenant; has exits or corridors that serve an occupant load greater than 30; and whether the building has a sufficient municipal water supply for a sprinkler system at the floor where the work area is located without consideration for a new fire pump. The 30-occupant-load threshold in this section is taken from Table 1016.1 of the IBC, which uses this threshold in most occupancies to require either sprinklers or rated corridors.

704.2.5 Supervision. Fire sprinkler systems required by this section shall be supervised by one of the following methods:

1. Approved central station system in accordance with NFPA 72;
2. Approved proprietary system in accordance with NFPA 72;
3. Approved remote station system of the jurisdiction in accordance with NFPA 72; or
4. When approved by the *code official*, approved local alarm service that will cause the sounding of an alarm in accordance with NFPA 72.

   Exception: Supervision is not required for the following:

   1. Underground gate valve with roadway boxes.
   2. Halogenated extinguishing systems.
   3. Carbon dioxide extinguishing systems.
   4. Dry and wet chemical extinguishing systems.
   5. Automatic sprinkler systems installed in accordance with NFPA 13R where a common supply main is used to supply both domestic and automatic sprinkler systems and a separate shutoff valve for the automatic sprinkler system is not provided.

❖ If a sprinkler system is required based on Sections 704.2.1, 704.2.2, 704.2.3 and 704.2.4, then such a system must be supervised in accordance with NFPA 72, the same standard used for the supervision of sprinklers in new buildings constructed under the IBC. This section identifies the four acceptable methods described in NFPA 72: central station system, proprietary systems, remote station system of the jurisdiction or local alarm service that will cause the sounding of an alarm. Five exceptions are provided where supervision is not required; these five exceptions are similar to the exceptions found in Sections 903.4 and 903.4.1 of the IBC.

704.3 Standpipes. Where the *work area* includes exits or corridors shared by more than one tenant and is located more than 50 feet (15 240 mm) above or below the lowest level of fire department access, a standpipe system shall be provided. Standpipes shall have an approved fire department connection with hose connections at each floor level above or below the lowest level of fire department access. Standpipe systems shall be installed in accordance with the *International Building Code*.

Exceptions:

1. No pump shall be required provided that the standpipes are capable of accepting delivery by fire department apparatus of a minimum of 250 gallons per minute (gpm) at 65 pounds per square inch (psi) (946 L/m at 448KPa) to the topmost floor in buildings equipped throughout with an automatic sprinkler system or a minimum of 500 gpm at 65 psi (1892 L/m at 448KPa) to the topmost floor in all other buildings. Where the standpipe terminates below the topmost floor, the standpipe shall be designed to meet (gpm/psi) (L/m/KPa) requirements of this exception for possible future extension of the standpipe.

2. The interconnection of multiple standpipe risers shall not be required.

❖ Once a work area encompasses corridors that are shared by exits or more than one tenant, the standpipe requirement is triggered only by work area height criteria, similar to building height criteria in Section 905.3.1 of the IBC. The standpipe triggers in the IBC for new buildings contain additional criteria based on Group A occupancies (see Section 905.3.2 of the IBC), covered mall buildings (see Section 905.3.3 of the IBC), underground buildings (see Section 905.3.5 of the IBC), and helistops and heliports (see Section 905.3.6 of the IBC), none of which are used as the basis for standpipe triggers in the code. Where the work area that includes exits or corridors serving more than one tenant is located more than 50 feet (15 240 mm) above or below the lowest level of fire department vehicle access, a standpipe system is required. Such standpipes must have a fire department connection with a hose connection at each floor level up to the level where the work area is located in accordance with the IBC. Even though the class of the standpipe system is not specified in this section, because the trigger is based on work area height, the standpipe intended is a Class III standpipe. The exceptions in Section 905.3.1 of the IBC that allow a Class I standpipe in lieu of a Class III would also be allowed here. Exception 1 allows the installation of a standpipe system without a fire pump if sufficient water with sufficient pressure could be delivered by means of fire department apparatus pumps to the topmost floor of the building. Under this exception, the location of the work area that has triggered the standpipe requirement is irrelevant, and the topmost floor must be considered whether the work area is located at the topmost floor or not. Exception 2 recognizes the fact that over the life of a building, and as a result of various alteration work in different parts of the building, multiple independent standpipe risers might be present and these are allowed to remain independent and function separately as needed.

704.4 Fire alarm and detection. An approved fire alarm system shall be installed in accordance with Sections 704.4.1 through 704.4.3. Where automatic sprinkler protection is provided in accordance with Section 704.2 and is connected to the building fire alarm system, automatic heat detection shall not be required.

An approved automatic fire detection system shall be installed in accordance with the provisions of this code and NFPA 72. Devices, combinations of devices, appliances, and equipment shall be approved. The automatic fire detectors shall be smoke detectors, except that an approved alternative type of detector shall be installed in spaces such as boiler rooms, where products of combustion are present during normal operation in sufficient quantity to actuate a smoke detector.

❖ Fire alarm system requirements are solely based on the nature of occupancy. Fire detection system requirements are based on specific features to perform specific functions as described in the IBC, such as elevator recall (see Section 3003.2 of the IBC) or smokeproof enclosure ventilation (see Section 909.20 of the IBC). These requirements apply within the work area only. Such devices, where required, much the same as the IBC, must be installed in accordance with NFPA 72 and need not be anything other than smoke detectors with certain minor exceptions. The requirements in this section are the same as the provisions found in Section 907.3 of the IFC.

704.4.1 Occupancy requirements. A fire alarm system shall be installed in accordance with Sections 704.4.1.1 through 704.4.1.7. Existing alarm-notification appliances shall be automatically activated throughout the building. Where the building is not equipped with a fire alarm system, alarm-notification appliances within the *work area* shall be provided and automatically activated.

Exceptions:

1. Occupancies with an existing, previously approved fire alarm system.
2. Where selective notification is permitted, alarm-notification appliances shall be automatically activated in the areas selected.

❖ As previously mentioned, fire alarm system requirements are based on occupancy classification as determined by Sections 704.4.1.1 through 704.4.1.7. If the automatic alarm system is required in the work area in a certain occupancy, and there also happens to be alarm notification devices already existing in other parts of the building, all such existing devices must be connected to the new alarm system and be automatically activated upon the activation of the new alarm system. If there are no such existing alarms or notification devices, then the new alarm and its notification devices are only required within the work area. Unless the supplemental fire alarm system requirements of Section 704.4.2 are applicable, fire alarm systems are required in work areas only, in Groups E, I-1 residential care/assisted-living, I-2, I-3, R-1, R-2 and R-4 residential care/assisted-living facilities. The triggers are the same as the IFC retroactive triggers for the same occupancies.

704.4.1.1 Group E. A fire alarm system shall be installed in *work areas* of Group E occupancies as required by the *International Fire Code* for existing Group E occupancies.

❖ A building with a maximum of 1,000 square feet (93 m^2) in area that contains a single classroom and is located 50 feet (15 240 mm) or more from another building, and any building with an occupant load less than 50, are not required to have an alarm system. Work areas in Group E buildings are required to be provided with a manual fire alarm system. It must be noted, however, that, in this case, the requirements of the IFC are more stringent than the code. If a jurisdiction enforces the retroactive provisions of the IFC, the entire Group E occupancy (and not just the work area) is required to be provided with a manual fire alarm system based on the size and occupant load criteria just discussed.

704.4.1.2 Group I-1. A fire alarm system shall be installed in *work areas* of Group I-1 residential care/assisted living facilities as required by the *International Fire Code* for existing Group I-1 occupancies.

❖ A manual fire alarm system must be installed in work areas of all Group I-1 residential care/assisted-living facilities. Section 907.2.6.1 of the IFC requires this same system retroactively in the entire Group I-1 occupancy, which, if enforced, is more comprehensive than the code's requirement.

704.4.1.3 Group I-2. A fire alarm system shall be installed in *work areas* of Group I-2 occupancies as required by the *International Fire Code* for existing Group I-2 occupancies.

❖ A manual fire alarm system is required to be provided in the work areas. Here again, the IFC retroactive provisions are more stringent than the code and require the entire existing Group I-2 occupancies to be provided with a manual fire alarm system (see IFC Sections 907.2.6.2 and 907.2.6 of the IFC).

704.4.1.4 Group I-3. A fire alarm system shall be installed in *work areas* of Group I-3 occupancies as required by the *International Fire Code* for existing Group I-3 occupancies.

❖ The work areas of Group I-3 must be provided with a manual and automatic fire alarm system. Section 907.2.6.3 of the IFC requires this same system retroactively in the entire Group I-3 occupancy, which, if enforced, is more comprehensive than the code's requirement.

704.4.1.5 Group R-1. A fire alarm system shall be installed in Group R-1 occupancies as required by the *International Fire Code* for existing Group R-1 occupancies.

❖ The fire alarm requirement is again referred to the retroactive provisions of the IFC. The IFC deals with Group R-1, hotels and motels, and Group R-1, boarding and rooming houses, differently. Boarding and rooming houses are required to be provided with a fire alarm system within the work area, regardless of the size of the building, height or number of stories. For hotels and motels, the trigger is set for buildings that are more than three stories in height or with more than 20 guestrooms. There is also an exception that is related to buildings that are less than two stories in height (see Section 907.2.8.1 of the IFC).

704.4.1.6 Group R-2. A fire alarm system shall be installed in *work areas* of Group R-2 apartment buildings as required by the *International Fire Code* for existing Group R-2 occupancies.

❖ The fire alarm system trigger for apartments is similar to that of hotels and motels, and is set at buildings of more than three stories in height or containing more than 16 dwelling units. Section 907.2.9.1 of the IFC includes three exceptions that are also applicable under the code for Group R-2 apartment buildings.

704.4.1.7 Group R-4. A fire alarm system shall be installed in *work areas* of Group R-4 residential care/assisted living facilities as required by the *International Fire Code* for existing Group R-4 occupancies.

❖ Other than the three exceptions found under Section 907.2.10.1 of the IFC, work areas in Group R-4 residential care/assisted-living facilities must be provided with a fire alarm system.

704.4.2 Supplemental fire alarm system requirements. Where the *work area* on any floor exceeds 50 percent of that floor area, Section 704.4.1 shall apply throughout the floor.

> **Exception:** Alarm-initiating and notification appliances shall not be required to be installed in tenant spaces outside of the *work area*.

❖ The fire alarm requirements previously discussed for various occupancies apply to the work area only (except where the retroactive provisions of the IFC govern and are enforced by the jurisdiction, as prevously discussed above), unless the work area on any floor exceeds 50 percent of that floor area; in which case, the fire alarm system must be provided beyond the work area throughout that floor. Where this provision applies and there are multiple tenants on the floor that is required to be equipped with a fire alarm system, the extension of the alarm system into tenant areas that are not part of the alteration work is very interruptive and, in most cases, acts as a major deterrent to undertaking certain levels of alteration. For this reason, the exception eliminates the requirement for the alarm-initiating and notification appliances to be installed within such tenant spaces that are not part of the alteration work.

704.4.3 Smoke alarms. Individual sleeping units and individual dwelling units in any *work area* in Group R-1, R-2, R-3, R-4, and I-1 occupancies shall be provided with smoke alarms in accordance with the *International Fire Code*.

> **Exception:** Interconnection of smoke alarms outside of the rehabilitation *work area* shall not be required.

❖ Smoke detectors in sleeping and dwelling units that are within the work area must be provided as required by the IFC. Section 907.2.11 of the IFC is the applicable section for smoke detectors. According to this section, smoke detectors are required in the sleeping rooms, in every room in the path of the means of egress from the sleeping areas and in each story and basement. Interconnection of such smoke detectors is still required, unless such smoke alarms are located outside of the work area.

SECTION 705
MEANS OF EGRESS

705.1 Scope. The requirements of this section shall be limited to work areas that include exits or corridors shared by more

than one tenant within the *work area* in which Level 2 alterations are being performed, and where specified they shall apply throughout the floor on which the work areas are located or otherwise beyond the *work area*.

❖ Section 705 is entirely devoted to the means-of-egress requirements in existing buildings that are undergoing Level 2 or 3 alterations. The requirements of this section apply to the work area only, unless there are specific sections addressing supplemental requirements; in which case, the requirements will apply throughout the floor under consideration or beyond. The provisions of Section 705 are applicable only when the alteration work area includes exits or corridors shared by more than one tenant. As such, in multiple-tenant buildings where the reconfiguration of space takes place within one of the tenant spaces and does not include corridors or exits that affect others, the tenant space undergoing alterations need only comply with the means-of-egress requirements of Section 604. In essence, if there are any egress conditions that are considered unsafe, the conditions must be remedied. It is not necessary to confirm that the level of egress safety has not been reduced compared to the current conditions.

705.2 General. The means of egress shall comply with the requirements of this section.

Exceptions:

1. Where the *work area* and the means of egress serving it complies with NFPA 101.
2. Means of egress conforming to the requirements of the building code under which the building was constructed shall be considered compliant means of egress if, in the opinion of the *code official*, they do not constitute a distinct hazard to life.

❖ The provisions of Section 705 are intended to address improvements in the means of egress that are crucial for the safe egress of occupants. With the exception of very old buildings, most existing buildings designed under the building codes of a jurisdiction provide a certain degree of safe egress. Accordingly, unless the code official finds that all or parts of the means of egress system constitute a distinct hazard, the means-of-egress does not need to comply with Section 705 as long as it complies with the requirements of the building code under which it was built, including NFPA 101. Where the code official finds a distinct hazard, the provisions of Section 705 could be applied or whatever other remedy determined by the code official must be followed. This provision is also found in Section 1027.1 of the IFC.

705.3 Number of exits. The number of exits shall be in accordance with Sections 705.3.1 through 705.3.3.

❖ The number of exits in any building is one of the most important factors in the safe egress of occupants. The IBC and IFC make it unlawful to reduce the number of exits in a building.

705.3.1 Minimum number. Every story utilized for human occupancy on which there is a *work area* that includes exits or corridors shared by more than one tenant within the *work area* shall be provided with the minimum number of exits based on the occupancy and the occupant load in accordance with the *International Building Code*. In addition, the exits shall comply with Sections 705.3.1.1 and 705.3.1.2.

❖ Given that the number of exits is so important, this section requires that every story with a work area that falls within the limitations discussed in Section 705.1 be provided with a minimum number of exits as required for new construction (in accordance with the IBC). The code does, however, provide exceptions that allow single-exit construction, many of which are common to the IBC, as listed in Section 705.3.1.1. In addition, fire escapes can be used as a solution where more than one exit is required, as provided in Section 705.3.1.2.

705.3.1.1 Single-exit buildings. Only one exit is required from buildings and spaces of the following occupancies:

1. In Group A, B, E, F, M, U and S occupancies, a single exit is permitted in the story at the level of exit discharge when the occupant load of the story does not exceed 50 and the exit access travel distance does not exceed 75 feet (22 860 mm).
2. Group B, F-2, and S-2 occupancies not more than two stories in height that are not greater than 3,500 square feet per floor (326 m^2), when the exit access travel distance does not exceed 75 feet (22 860 mm). The minimum fire-resistance rating of the exit enclosure and of the opening protection shall be 1 hour.
3. Open parking structures where vehicles are mechanically parked.
4. In community residences for the developmentally disabled, the maximum occupant load excluding staff is 12.
5. Groups R-1 and R-2 not more than two stories in height, when there are not more than four dwelling units per floor and the exit access travel distance does not exceed 50 feet (15 240 mm). The minimum fire-resistance rating of the exit enclosure and of the opening protection shall be 1 hour.
6. In multilevel dwelling units in buildings of occupancy Group R-1 or R-2, an exit shall not be required from every level of the dwelling unit provided that one of the following conditions is met:
   - 6.1. The travel distance within the dwelling unit does not exceed 75 feet (22 860 mm); or
   - 6.2. The building is not more than three stories in height and all third-floor space is part of one or more dwelling units located in part on the second floor; and no habitable room within any such dwelling unit shall have a travel distance that exceeds 50 feet (15 240 mm) from the outside of the habitable room entrance

door to the inside of the entrance door to the dwelling unit.

7. In Group R-2, H-4, H-5 and I occupancies and in rooming houses and child care centers, a single exit is permitted in a one-story building with a maximum occupant load of 10 and the exit access travel distance does not exceed 75 feet (22 860 mm).

8. In buildings of Group R-2 occupancy that are equipped throughout with an automatic fire sprinkler system, a single exit shall be permitted from a basement or story below grade if every dwelling unit on that floor is equipped with an approved window providing a clear opening of at least 5 square feet (0.47 m^2) in area, a minimum net clear opening of 24 inches (610 mm) in height and 20 inches (508 mm) in width, and a sill height of not more than 44 inches (1118 mm) above the finished floor.

9. In buildings of Group R-2 occupancy of any height with not more than four dwelling units per floor; with a smokeproof enclosure or outside stair as an exit; and with such exit located within 20 feet (6096 mm) of travel to the entrance doors to all dwelling units served thereby.

10. In buildings of Group R-3 occupancy equipped throughout with an automatic fire sprinkler system, only one exit shall be required from basements or stories below grade.

❖ There are 10 specific conditions described where the building or a certain story could be provided with only one single exit. Several of these 10 conditions are either the same or similar to various provisions in the IBC. For example, Item 1 in this section is similar to the first row in Table 1021.2 of the IBC. The only difference is that Item 1 of this section allows the condition at the level of exit discharge in multiple-story buildings as opposed to Table 1021.2 of the IBC that allows this condition in a one-story building only. Item 3 of this section is the same as Section 1021.1.2 of the IBC, and Item 7 is the same as the third row in Table 1021.2 of the IBC.

The characteristics considered for a building to be of single-exit construction include occupancy, maximum height of building above grade plane, maximum occupants or dwelling units per floor, and exit access travel distance per floor. The occupant load of each floor is determined in accordance with the provisions of Section 1004.1 of the IBC. The exit access travel distance is measured along the natural and unobstructed path to the exit, as described in Section 1016.1 of the IBC.

705.3.1.2 Fire escapes required. When more than one exit is required, an existing or newly constructed fire escape complying with Section 705.3.1.2.1 shall be accepted as providing one of the required means of egress.

❖ The use of fire escapes as an element of the required means of egress has not been allowed by building codes in many years. The typical problems with fire escapes are the difficulty of access to them in conditions of panic, the minimal width and their location outside the building where they can be subjected to ice, snow and slippery conditions. In existing buildings, however, where the construction of a new exit stair is either impossible due to the proximity of the exterior walls to property lines; the infeasibility of penetrating or rearranging interior or exterior structural elements; when it is extremely cost prohibitive due to the need for major restructuring of building elements; or when affecting other relevant occupancy issues, the utilization of fire escapes is very valuable. As such, this section provides for the use of existing or newly constructed fire escapes to be used as a required element of the means-of-egress system in cases where more than one exit is required and only if it meets the construction requirements of this section. The fire escapes can be counted only as one of the required means of egress and not both. Specific detail requirements and construction requirements are given in Sections 705.3.1.2.1 and 705.3.1.2.2.

705.3.1.2.1 Fire escape access and details. Fire escapes shall comply with all of the following requirements:

1. Occupants shall have unobstructed access to the fire escape without having to pass through a room subject to locking.

2. Access to a new fire escape shall be through a door, except that windows shall be permitted to provide access from single dwelling units or sleeping units in Group R-1, R-2 and I-1 occupancies or to provide access from spaces having a maximum occupant load of 10 in other occupancy classifications.

   2.1. The window shall have a minimum net clear opening of 5.7 square feet (0.53 m^2) or 5 square feet (0.46 m^2) where located at grade.

   2.2. The minimum net clear opening height shall be 24 inches (610 mm) and net clear opening width shall be 20 inches (508 mm).

   2.3. The bottom of the clear opening shall not be greater than 44 inches (1118 mm) above the floor.

   2.4. The operation of the window shall comply with the operational constraints of the *International Building Code*.

3. Newly constructed fire escapes shall be permitted only where exterior stairs cannot be utilized because of lot lines limiting the stair size or because of the sidewalks, alleys, or roads at grade level.

4. Openings within 10 feet (3048 mm) of fire escape stairs shall be protected by fire assemblies having minimum $^3/_4$-hour fire-resistance ratings.

   Exception: Opening protection shall not be required in buildings equipped throughout with an approved automatic sprinkler system.

5. In all buildings of Group E occupancy, up to and including the 12th grade, buildings of Group I occupancy, rooming houses and childcare centers, ladders of any

type are prohibited on fire escapes used as a required means of egress.

❖ This section provides the access and detail conditions that must be followed in order to make a fire escape an acceptable second exit.

Newly constructed fire escapes are allowed only if the construction of exterior stairs is impossible due to property lines, sidewalks, alleys or roads. If allowed to be used by this section, then a fire escape must be readily accessible without any obstructions, and access to it must be through a door with the exception of a single dwelling unit or sleeping unit and spaces with a maximum occupant load of 10, in which case access through a window is acceptable. The requirements for the size and location of a window providing access to the fire escape mirrors the requirement for emergency escape and rescue openings contained in Chapter 10 of the IBC. The height of the bottom of the clear opening is limited to 44 inches (1118 mm) or less such that it can be used effectively as an emergency escape.

If security grilles, decorations or similar devices are installed on escape windows, such items must be readily removable to permit occupant escape without the use of any tools, keys or a force greater than that required for the normal operation of the window.

Where bars, grilles or grates are placed over the emergency escape and rescue opening, it is important that they are easily removable. Thus, the requirements for ease of operation are the same as required for windows.

All openings within 10 feet (3048 mm) of fire escape stairs used for a required means of egress must be protected by fire assemblies having a minimum of $^3/_4$-hour fire-resistance rating. This is consistent with the protection of openings adjacent to exterior exit stairs required by Section 1022.6 of the IBC. Much the same as Section 1022.6 of the IBC, the protection of openings within 10 feet (3048 mm) of fire escapes is not required for buildings equipped throughout with an approved automatic sprinkler system. Based on the type of occupancy involved, the appropriate sprinkler system, complying with NFPA 13 or 13R, is appropriate.

Example 705.3.1.2.1:

An existing two-story downtown building is used for shops on the first floor and the second floor is used for offices of several tenants. The owner wishes to rearrange and add interior partitions and alter about 80 percent of the second floor. The second floor has only one stairway and, due to its current uses and the building location on the lot, is not able to add a second stairway. The area of the second floor is such that it would require two stairways under the IBC.

Q: Would the alteration trigger the requirement of the second stairway?

A: This would require the construction of a second stairway; however, it would allow fire escapes to be utilized in this case (see Sections 705.3 and 705.3.1.2).

705.3.1.2.2 Construction. The fire escape shall be designed to support a live load of 100 pounds per square foot (4788 Pa) and shall be constructed of steel or other approved noncombustible materials. Fire escapes constructed of wood not less than nominal 2 inches (51 mm) thick are permitted on buildings of Type V construction. Walkways and railings located over or supported by combustible roofs in buildings of Types III and IV construction are permitted to be of wood not less than nominal 2 inches (51 mm) thick.

❖ Sections 705.3.1.2.2 and 705.3.1.2.3 provide the minimum structural and dimensional requirements for new fire escapes. Existing fire escapes are not restricted to compliance with Sections 705.3.1.2.2 and 705.3.1.2.3, but must be inspected and evaluated to be sure no dangerous conditions exist and that they will function as intended for a required means of egress.

705.3.1.2.3 Dimensions. Stairs shall be at least 22 inches (559 mm) wide with risers not more than, and treads not less than, 8 inches (203 mm). Landings at the foot of stairs shall not be less than 40 inches (1016 mm) wide by 36 inches (914 mm) long and located not more than 8 inches (203 mm) below the door.

❖ Sections 705.3.1.2.2 and 705.3.1.2.3 provide the minimum structural and dimensional requirements for new fire escapes. Existing fire escapes are not restricted to compliance with Sections 705.3.1.2.2 and 705.3.1.2.3, but must be inspected and evaluated to be sure no dangerous conditions exist and that they will function as intended for a required means of egress.

705.3.2 Mezzanines. Mezzanines in the *work area* and with an occupant load of more than 50 or in which the travel distance to an exit exceeds 75 feet (22 860 mm) shall have access to at least two independent means of egress.

Exception: Two independent means of egress are not required where the travel distance to an exit does not exceed 100 feet (30 480 mm) and the building is protected throughout with an automatic sprinkler system.

❖ The means-of-egress requirements for mezzanines are almost exactly the same as the provisions found in the IBC. This applies to those mezzanines that are in the work area. The triggers for requiring two independent means of egress from mezzanines is the occupant load being greater than 50 or the travel distance being greater than 75 feet (22 860 mm), with an exception for sprinklered buildings allowing travel distance up to 100 feet (30 480 mm). Similar provisions in the IBC are found in Sections 505.3, 1014.3 and 1015.1. The code is somewhat less restrictive than the IBC since the occupant load trigger is set at over 50 regardless of occupancy classification, whereas Table 1015.1 of the IBC has a lower level of threshold trigger for hazardous, industrial, residential and storage occupancies. Additionally, the code limitation of 75 feet (22 860 mm) [or 100 feet (30 480 mm) in sprinklered buildings] is the measurement of travel distance, whereas the similar provisions in Section 1014.3 of the IBC is the measurement of the common path of egress travel.

705.3.3 Main entrance—Group A. All buildings of Group A with an occupant load of 300 or more shall be provided with a main entrance capable of serving as the main exit with an egress capacity of at least one half of the total occupant load. The remaining exits shall be capable of providing one half of the total required exit capacity.

Exception: Where there is no well-defined main exit or where multiple main exits are provided, exits shall be permitted to be distributed around the perimeter of the building provided that the total width of egress is not less than 100 percent of the required width.

❖ Assembly occupancy egress, particularly the capacity of the main entrance/main exit, is so critical for high occupant load assembly occupancies that the code, in this section, provides the same exact requirements found in Section 1024.2 of the IBC for new construction. Accordingly, when Level 2 or 3 alteration work is taking place in assembly occupancies with an occupant load greater than 300, the main entrance/exit must provide sufficient width to accommodate one-half of the total occupant load.

Example 705.3.3:

An existing community hall shown in Figure 705.3.3 is to undergo some reconfiguration of its interior spaces. There are currently several 3-foot (914 mm) doors that provide the needed exit width and separation of exit requirements based on the IBC.

Q: Are there any additional requirements related to the exterior doors that must be complied with?

A: Yes. A main entrance must be provided that is wide enough to accommodate one-half of the total occupant load (450/2 = 225). This is a width of 225 × 0.2 = 45 inches (1143 mm) (see Section 1005.1 of the IBC and Figure 705.3.3).

705.4 Egress doorways. Egress doorways in any *work area* shall comply with Sections 705.4.1 through 705.4.5.

❖ This is the charging paragraph for the requirements for egress doorways in Level 2 or 3 alterations. The specific requirements are given in Sections 705.4.1 through 705.4.5, relating the number of egress doorways, door swing, door closing, panic hardware and emergency power in detention facilities.

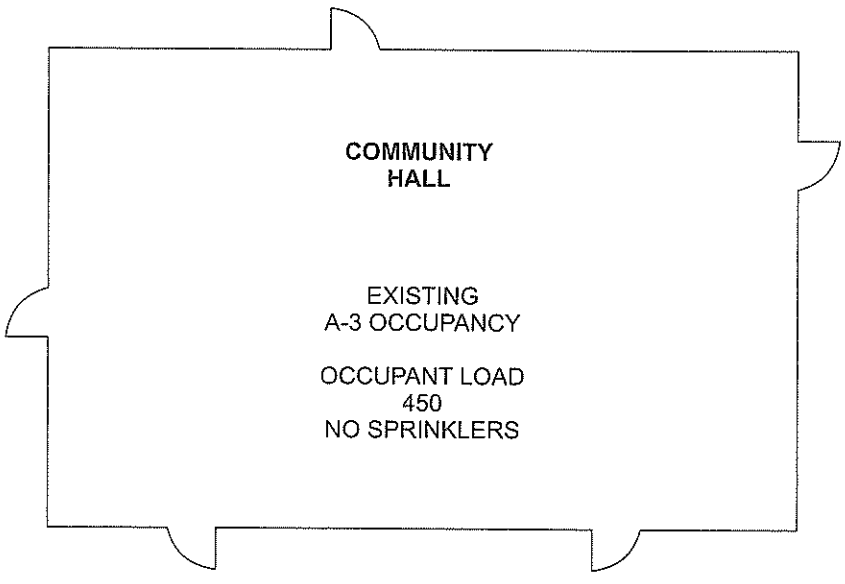
705.4.1 Two egress doorways required. Work areas shall be provided with two egress doorways in accordance with the requirements of Sections 705.4.1.1 and 705.4.1.2.

❖ The triggers for requiring two egress doorways are similar in some respects to the IBC triggers. Section 705.4.1.1 relates these triggers for all occupancies, and Section 705.4.1.2 deals with Group I-2 occupancies.

705.4.1.1 Occupant load and travel distance. In any *work area*, all rooms and spaces having an occupant load greater than 50 or in which the travel distance to an exit exceeds 75 feet (22 860 mm) shall have a minimum of two egress doorways.

Exceptions:

1. Storage rooms having a maximum occupant load of 10.



For SI: 1 foot = 304.8 mm.

Figure 705.3.3
MAIN ENTRANCE—GROUP A

2. Where the *work area* is served by a single exit in accordance with Section 705.3.1.1.

❖ The discussion in Section 705.3 demonstrated how several criteria for requiring only one means of egress is also found in the IBC for new construction. The same is true here: the occupant load being greater than 50 and travel distance exceeding 75 feet (22 860 mm) are the triggers used to require at least two egress doorways for all occupancies.

Exception 1 to Section 705.4.1.1 addresses storage rooms with small occupant loads that might be of such dimensions that the travel distance might exceed 75 feet (22 860 mm). Realizing that many storage rooms are generally not occupied regularly, and when occupied, such occupants are either employees or individuals who are familiar with the surroundings, this exception allows storage rooms of any size and any length of travel distance to have only one egress doorway as long as the occupant load does not exceed 10.

Example 705.4.1.1:

An existing grocery store as shown in Figure 705.4.1.1 is undergoing Level 2 or 3 alterations. The storage area has a travel distance of 90 feet (27 432 mm) within the storage room and an overall travel distance of 10 feet (3048 mm) to exit the building. There is currently one egress doorway from the storage room to the retail area.

Q: Is a second egress doorway required from the storage area?

A: No. The storage room has an occupant load of 10 (3,000/300 = 10) and falls under Exception 1.

- Storage room occupant load = 10 (see Table 1004.1.1 of the IBC).
- Maximum travel distance in storage room = 90 feet (27 432 mm).
- One egress doorway from the storage room is acceptable (see Exception 1 to Section 705.4.1.1 and Figure 705.4.1.1).

Exception 2 refers the user back to Section 705.3.1.1 so that a building or space that qualifies under any of the 10 items listed would still be required to have one egress doorway.

705.4.1.2 Group I-2. In buildings of Group I-2 occupancy, any patient sleeping room or suite of patient rooms greater than 1,000 square feet (93 m²) within the *work area* shall have a minimum of two egress doorways.

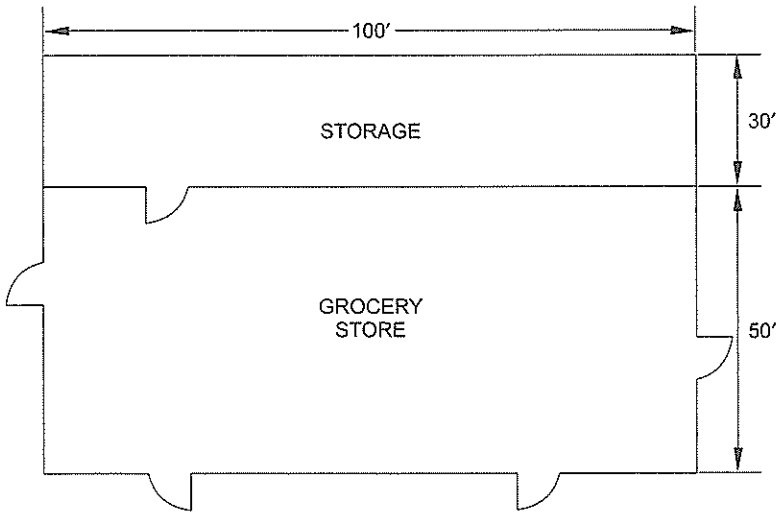
❖ Group I-2 occupancies have additional criteria for patient sleeping rooms or suites in this section. This additional criterion for Group I-2 patient sleeping areas is taken directly from a part of Section 1014.2.2 of the IBC, and recognizes the low patient-to-staff ratio of these facilities where the staff is directly responsible for the safety of the patients in the event of a fire.

705.4.2 Door swing. In the *work area* and in the egress path from any *work area* to the exit discharge, all egress doors serving an occupant load greater than 50 shall swing in the direction of exit travel.

❖ Door swings must be considered not only in the work area, but all the way from the work area along the path of egress to the exit discharge. Again, door swing is such a critical element of safe egress that existing doors must comply just as new doors do under the IBC. The threshold of "serving an occupant load greater than 50" of Section 705.4.2 is taken directly from Section 1008.1.2 of the IBC.

Example 705.4.2:

An existing three-story office building as shown in Figure 705.4.2 is undergoing Level 2 or 3 alterations on the third floor. Stairway 1 is the most obvious, the clos-



For SI: 1 foot = 304.8 mm.

Figure 705.4.1.1
OCCUPANT LOAD AND TRAVEL DISTANCE

est and the most likely path of egress for the occupants in the work area under consideration.

Q: Which doors are required to swing in the direction of egress travel?

A: Doors 2, 3, 4 and 7 in Figure 705.4.2 must swing in the direction of egress travel as they serve an occupant load greater than 50 and are either in the work area or along the egress path to the exit discharge (door 1 serves an occupant load less than 50, and doors 5 and 6 are not along the path of egress of the work area and, as such, are not required to comply with Section 705.4.2) (see Figure 705.4.2).

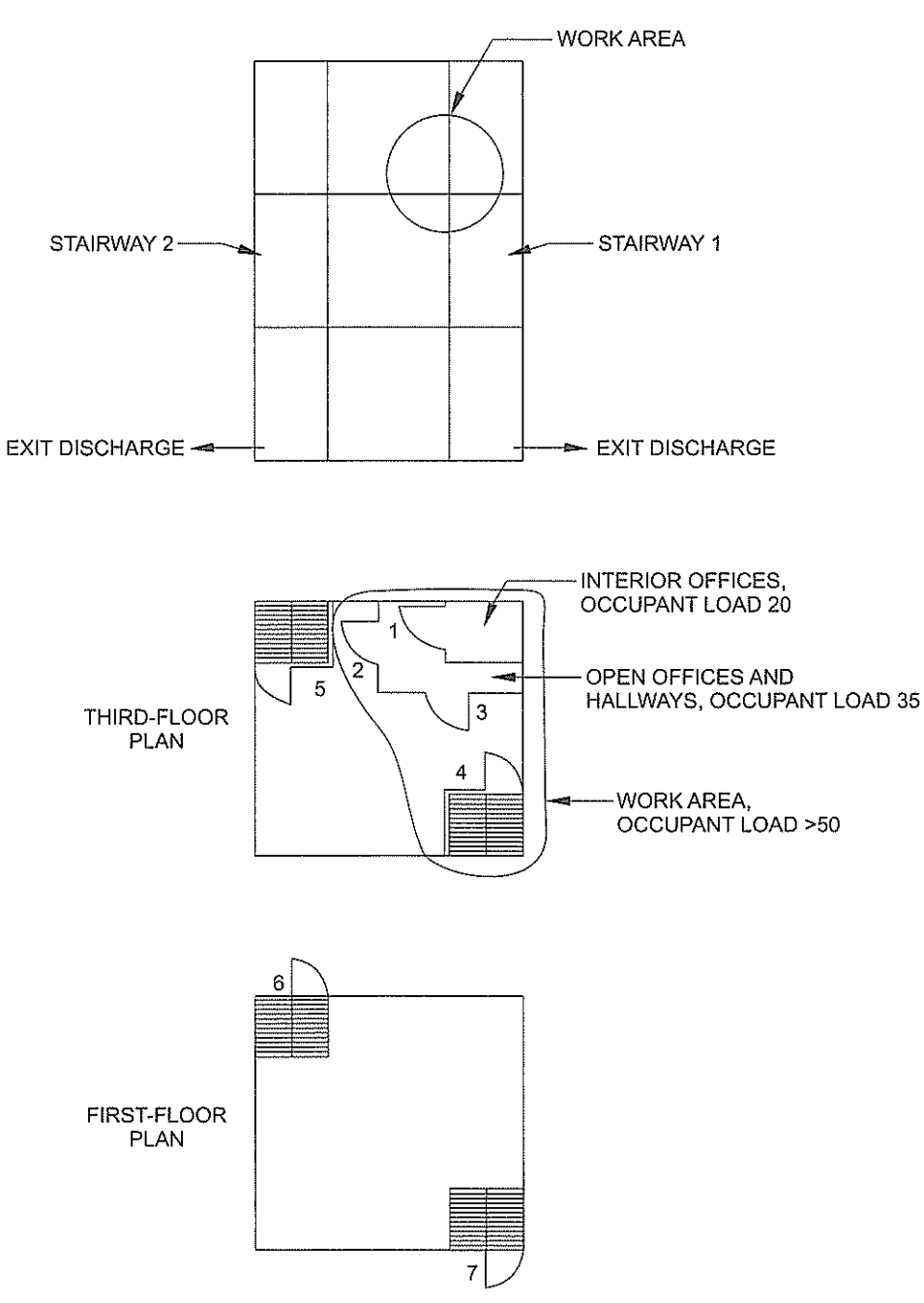


Figure 705.4.2
DOOR SWING

705.4.2.1 Supplemental requirements for door swing. Where the *work area* exceeds 50 percent of the floor area, door swing shall comply with Section 705.4.2 throughout the floor.

Exception: Means of egress within or serving only a tenant space that is entirely outside the *work area*.

❖ Door swings in the entire floor, except doors that are within a tenant space located entirely outside the work area, must swing in the direction of egress travel if the work area on that floor exceeds 50 percent of the area of that floor and if the occupant load they serve is greater than 50. Accordingly, all doors along the means of egress to the exit discharge must also swing in the direction of egress.

Example 705.4.2.1:

An existing two-story building has three tenants on the third floor as shown in Figure 705.4.2.1. The owner plans some alterations of the second floor. The work area will be more than 50 percent of the second floor area.

Q: Which doors must be brought into compliance with the door swing in the direction of egress travel?

A: Doors 4, 5, 6, 7, 10, 11, 12 and 13 in Figure 705.4.2.1 must swing in the direction of egress travel. Doors 6, 7 and 10 serve an occupant load of more than 50 and are in the work area. Door 11 serves an occupant load of more than 50 and is outside of the work area; however, because the work area is greater than 50 percent of the second-floor area, this door must also swing in the direction of egress. Doors 4, 5, 12 and 13 are on the egress path from the work area to exit discharge.

Doors 1, 2, 3, 8 and 9 are not required to change their swing to the direction of egress if they currently swing inward. Doors 1, 2 and 3 serve an occupant load greater than 50, but are in a tenant space completely outside of the work area and fall under the exception. Door 8 serves an occupant load less than 50, and door 9 is a convenience door, connecting the two parts of tenant 3 (see Figure 705.4.2.1).

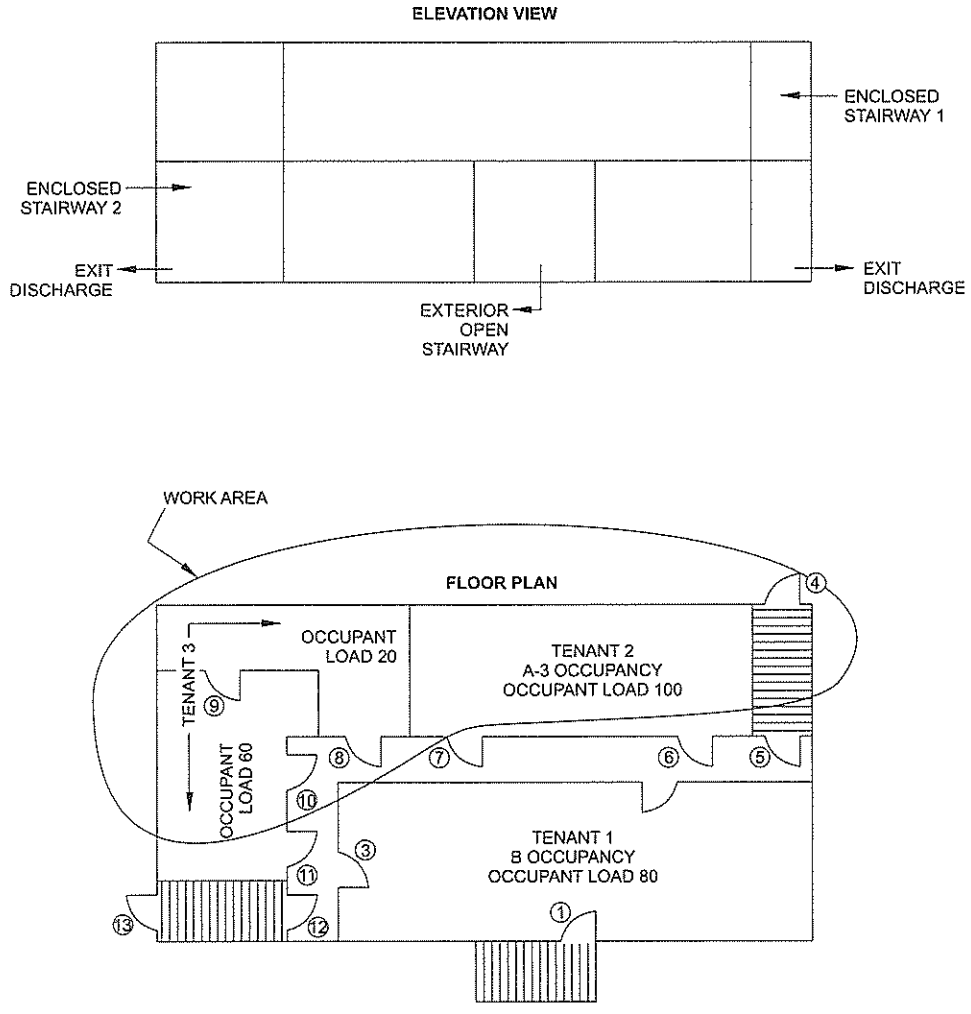


Figure 705.4.2.1
SUPPLEMENTAL REQUIREMENTS FOR DOOR SWING

705.4.3 Door closing. In any *work area*, all doors opening onto an exit passageway at grade or an exit stair shall be self-closing or automatically closing by listed closing devices.

Exceptions:

1. Where exit enclosure is not required by the *International Building Code*.
2. Means of egress within or serving only a tenant space that is entirely outside the *work area*.

❖ The same concepts discussed for door swing in the work area and beyond the work area when supplemental provisions are applicable are true for door closings. Doors opening into exit passageways and exit stair enclosures are required to be self-closing or automatic closing by means of listed devices.

705.4.3.1 Supplemental requirements for door closing. Where the *work area* exceeds 50 percent of the floor area, doors shall comply with Section 705.4.3 throughout the exit stair from the *work area* to, and including, the level of exit discharge.

❖ If the work area on the floor exceeds 50 percent of the area of that floor and if the occupant load it serves is greater than 50, all doors along the means of egress including the level of exit discharge must also be self-closing or automatic closing.

705.4.4 Panic hardware. In any *work area*, and in the egress path from any *work area* to the exit discharge, in buildings or portions thereof of Group A assembly occupancies with an occupant load greater than 100, all required exit doors equipped with latching devices shall be equipped with approved panic hardware.

❖ The panic hardware provisions are only applicable to Group A occupancies and are much the same as Section 1008.1.10 of the IBC. The triggers for requiring panic hardware are the presence of latching devices on the door and the occupant load of the assembly occupancy being greater than 100. The panic hardware requirements are required in the work areas and the path of egress from the work area to the exit discharge. Panic hardware requirements could be applicable in other parts of the space or building beyond the work area and the path of egress when the supplemental provisions apply.

705.4.4.1 Supplemental requirements for panic hardware. Where the *work area* exceeds 50 percent of the floor area, panic hardware shall comply with Section 705.4.4 throughout the floor.

Exception: Means of egress within a tenant space that is entirely outside the *work area*.

❖ Similar to the supplemental requirements for door swing and door closing, work exceeding 50 percent of the floor area triggers a more restrictive requirement for panic hardware, as well. Except for means of egress within an unaffected tenant space, the 50-percent threshold triggers a requirement for panic hardware throughout the work area floor.

705.4.5 Emergency power source in Group I-3. *Work areas* in buildings of Group I-3 occupancy having remote power unlocking capability for more than 10 locks shall be provided with an emergency power source for such locks. Power shall be arranged to operate automatically upon failure of normal power within 10 seconds and for a duration of not less than 1 hour.

❖ This threshold for emergency power for doors with remote power unlocking equipment is the same as given in Section 408.4.2 of the IBC for Group I-3 facilities.

705.5 Openings in corridor walls. Openings in corridor walls in any *work area* shall comply with Sections 705.5.1 through 705.5.4.

Exception: Openings in corridors where such corridors are not required to be rated in accordance with the *International Building Code*.

❖ This is the charging paragraph for the requirements for openings in corridor walls in Level 2 or 3 alterations. The specific requirements are given in Sections 705.5.1 through 705.5.4, relating the requirements for corridor doors, transoms, corridor openings, such as windows, and supplemental requirements. The protections prescribed in these four sections are required only if the corridor under consideration is required to be a fire-resistance-rated corridor in accordance with the IBC. The overall goal is to eliminate certain unsuitable doors and openings within the rated corridors located in a Level 2 or 3 work area, even if there was no intention by the scope of the alteration work to do anything to these elements.

705.5.1 Corridor doors. Corridor doors in the *work area* shall not be constructed of hollow core wood and shall not contain louvers. All dwelling unit or sleeping unit corridor doors in work areas in buildings of Groups R-1, R-2, and I-1 shall be at least $1^3/_8$-inch (35 mm) solid core wood or approved equivalent and shall not have any glass panels, other than approved wired glass or other approved glazing material in metal frames. All dwelling unit or sleeping unit corridor doors in *work areas* in buildings of Groups R-1, R-2, and I-1 shall be equipped with approved door closers. All replacement doors shall be $1^3/_4$-inch (45 mm) solid bonded wood core or approved equivalent, unless the existing frame will accommodate only a $1^3/_8$-inch (35 mm) door.

Exceptions:

1. Corridor doors within a dwelling unit or sleeping unit.
2. Existing doors meeting the requirements of *HUD Guideline on Fire Ratings of Archaic Materials and Assemblies* (IEBC Resource A) for a rating of 15 minutes or more shall be accepted as meeting the provisions of this requirement.
3. Existing doors in buildings protected throughout with an approved automatic sprinkler system shall be required only to resist smoke, be reasonably tight fitting, and shall not contain louvers.
4. In group homes with a maximum of 15 occupants and that are protected with an approved automatic detection system, closing devices may be omitted.

5. Door assemblies having a fire-protection rating of at least 20 minutes.

❖ In cases where doors are being replaced, these provisions require that a certain level of fire or smoke protection be provided. As such, no hollow core wood doors and no louvers are allowed within a rated corridor in the work area. In addition to this prohibition, if the occupancy of the building undergoing alteration is Group B-1, R-1, R-2 or and the corridor under consideration serves the dwelling or sleeping units of these occupancies, all doors within the rated corridors must be equipped with approved closers and be at least $1^3/_8$-inch (35 mm) solid core wood or an approved equivalent. Further, these doors cannot contain any glass panels unless tested assemblies or approved wired glass is used. Approved wired glass is generally considered to be $^1/_4$-inch (6.4 mm) wired glass.

Once the doors that are to be replaced have been identified, then the replacement doors must be at least $1^3/_4$-inch (45 mm) solid-bonded wood core or an approved equivalent. One-and-three-eighths-inch (35 mm) solid wood doors are allowed for such replacement doors if the existing frame can only accommodate a $1^3/_8$-inch-thick (35 mm) door. Five exceptions have been provided for corridor door requirements that are self-explanatory. The replacement doors have a greater protection requirement compared to those doors that are not being replaced but happen to be in the work area because it is unreasonable to require every existing door that provides a certain level of protection to be replaced within the entire work area, even though they provide a certain level of protection with a $1^3/_8$-inch (35 mm) solid core door or equivalent.

705.5.2 Transoms. In all buildings of Group I-1, R-1, and R-2 occupancy, all transoms in corridor walls in work areas shall either be glazed with $^1/_4$-inch (6.4 mm) wired glass set in metal frames or other glazing assemblies having a fire-protection rating as required for the door and permanently secured in the closed position or sealed with materials consistent with the corridor construction.

❖ Transoms in corridors are specifically regulated only in Group I-1, R-1 and R-2 occupancies. It should be noted again that the applicability here is only in corridors that would be required to be rated. The IBC requires that glass sidelites and transoms perform the same as fire windows and does not consider these elements part of the door assembly. Based on this approach, sidelites and transoms in occupancies other than Group I-1, R-1 and R-2 would be covered in Section 705.5.3, which addresses sash, grilles and windows. There are three options in dealing with transoms:

1. Use $^1/_4$-inch (6.4 mm) wired glass in metal frame,
2. A minimum of 20-minute fire-resistant-protected glazing fixed assembly, or
3. Do away with the transom and seal it with wall construction similar to the existing corridor wall.

705.5.3 Other corridor openings. In any *work area*, any other sash, grille, or opening in a corridor and any window in a corridor not opening to the outside air shall be sealed with materials consistent with the corridor construction.

❖ Openings other than doors, such as sash, grille, louver and windows, that open into a fire-resistance-rated corridor and that do not open to the outside air must be covered and sealed the same as the existing corridor wall construction. This is required for the protection of the corridor from the potential of smoke contamination from adjacent rooms. The reference to such openings "not opening to the outside air" is consistent with Section 709.5 of the IBC that allows corridor exterior walls and their openings to comply with the fire-resistance rating based primarily on proximity to property lines, otherwise known as "fire separation distance." Two questions arising from this provision are why windows in a rated corridor are required to be sealed with a wall construction, and is there a way to allow such windows to remain in place and not be covered with wall construction. The code in this section intends to improve the safety and protection of corridors and does not intend to necessarily eliminate all windows opening into a corridor. As such, if it is desired for such windows to remain, then the window and its glazing must comply with the fire window and fire-protection-rated glazing requirements of Section 715.5 of the IBC. It must be clarified that sidelites and transoms are not considered part of the door assembly and are regulated by this section. If the total area of windows exceeds 25 percent of the area of a common wall within any room, then some of the area of such windows must be sealed to bring the total percentage of openings to below 25 percent (see Section 715.5.8.2 of the IBC).

705.5.3.1 Supplemental requirements for other corridor opening. Where the *work area* exceeds 50 percent of the floor area, Section 705.5.3 shall be applicable to all corridor windows, grills, sashes, and other openings on the floor.

Exception: Means of egress within or serving only a tenant space that is entirely outside the *work area*.

❖ The supplemental provisions, where the work area exceeds 50 percent of the floor area, are the same here as they are in all previous sections discussed. As in all other areas, the 50-percent threshold brings a more serious concern regarding the alteration and, thus, more restrictive requirements are applied throughout the floor, even in areas where no alteration is being performed. For other corridor openings, however, the tenant spaces that are unaffected do not require these alterations.

705.5.4 Supplemental requirements for corridor openings. Where the *work area* on any floor exceeds 50 percent of the floor area, the requirements of Sections 705.5.1 through 705.5.3 shall apply throughout the floor.

❖ The supplemental provisions, where the work area exceeds 50 percent of the floor area, are the same here as they are in all previous sections discussed. As in all other areas, the 50-percent threshold brings a more

serious concern regarding the alteration and, thus, more restrictive requirements are applied throughout the floor, even in areas where no alteration is being performed. This paragraph does not exclude tenant spaces that are unaffected by the alterations; therefore, the doors, openings and transoms must be modified according to the applicable section. This paragraph supersedes the exception given in Section 705.5.3.1.

705.6 Dead-end corridors. Dead-end corridors in any *work area* shall not exceed 35 feet (10 670 mm).

Exceptions:

1. Where dead-end corridors of greater length are permitted by the *International Building Code*.
2. In other than Group A and H occupancies, the maximum length of an existing dead-end corridor shall be 50 feet (15 240 mm) in buildings equipped throughout with an automatic fire alarm system installed in accordance with the *International Building Code*.
3. In other than Group A and H occupancies, the maximum length of an existing dead-end corridor shall be 70 feet (21 356 mm) in buildings equipped throughout with an automatic sprinkler system installed in accordance with the *International Building Code*.
4. In other than Group A and H occupancies, the maximum length of an existing, newly constructed, or extended dead-end corridor shall not exceed 50 feet (15 240 mm) on floors equipped with an automatic sprinkler system installed in accordance with the *International Building Code*.

❖ The dead-end corridor limitations are only applicable where more than one exit or exit access doorway is required. The typical existing dead-end length allowed is 35 feet (10 670 mm) with exceptions that allow lengths up to 70 feet (21 336 mm). Existing dead ends in Group A and H occupancies are limited to 35 feet (10 670 mm), unless Exception 3 of Section 1018.4 of the IBC could apply. This is the exception that allows unlimited dead-end length as long as the length of the corridor is less than two and one-half times the least width of the dead-end corridor.

The installation of an automatic fire alarm system would increase the allowed length of an existing dead end to as much as 50 feet (15 240 mm), and the installation of an automatic sprinkler system throughout the building would increase the allowed length to 70 feet (21 336 mm). These two allowances are only applicable to existing corridors that happen to be longer in length than allowed by the IBC and are intended to encourage the installation of fire alarms and fire sprinklers throughout the building where such a corridor exists. Existing dead-end corridors must be brought into compliance with the 35-foot (10 670 mm) length limitation if these exceptions are not used.

705.7 Means-of-egress lighting. Means-of-egress lighting shall be in accordance with this section, as applicable.

❖ This is the charging paragraph for the requirements for means-of-egress lighting in Level 2 or 3 alterations. The specific requirements are given in Sections 705.7.1 and 705.7.2, relating the requirements for artificial lighting and supplemental requirements, respectively.

705.7.1 Artificial lighting required. Means of egress in all work areas shall be provided with artificial lighting in accordance with the requirements of the *International Building Code*.

❖ The means of egress in the work area and beyond the work area in the entire floor, if the work area exceeds 50 percent of the floor area, must be illuminated in accordance with the requirements of the IBC. This illumination must be provided by artificial lighting and must be a minimum of 1- foot candle (11 lux) at the floor level. There are some exceptions to this requirement that can be found in Sections 1006.1 and 1006.2 of the IBC, which would apply here.

705.7.2 Supplemental requirements for means-of-egress lighting. Where the *work area* on any floor exceeds 50 percent of that floor area, means of egress throughout the floor shall comply with Section 705.7.1.

Exception: Means of egress within or serving only a tenant space that is entirely outside the *work area*.

❖ The supplemental provisions, where the work area exceeds 50 percent of the floor area, are the same here as they are in all previous sections discussed. As in all other areas, the 50-percent threshold brings a more serious concern regarding the alteration and, thus, more restrictive requirements are applied throughout the floor, even in areas where no alteration is being performed. However, the tenant spaces that are unaffected do not require these alterations.

705.8 Exit signs. Exit signs shall be in accordance with this section, as applicable.

❖ This is the charging paragraph for the requirements for exit signs in Level 2 or 3 alterations. The specific requirements are given in Sections 705.8.1 and 705.8.2.

705.8.1 Work areas. Means of egress in all work areas shall be provided with exit signs in accordance with the requirements of the *International Building Code*.

❖ Exit signs are a critical element of directing occupants to safety outside the building. Exit signs must be installed in all Level 2 or 3 alteration work areas and beyond, where supplemental rules apply, in accordance with the IBC as if this was new construction. The exit sign provisions of the IBC are found in Section 1011, and it is important to note that such requirements as illumination and power source would apply to exit signs being installed in an alteration.

705.8.2 Supplemental requirements for exit signs. Where the *work area* on any floor exceeds 50 percent of that floor area, means of egress throughout the floor shall comply with Section 705.8.1.

Exception: Means of egress within a tenant space that is entirely outside the *work area*.

❖ The supplemental provisions, where the work area exceeds 50 percent of the floor area, are the same here as they are in all previous sections discussed. As in all other areas, the 50-percent threshold brings a more serious concern regarding the alteration and, thus, more restrictive requirements are applied throughout the floor, even in areas where no alteration is being performed. However, the tenant spaces that are unaffected do not require these alterations.

705.9 Handrails. The requirements of Sections 705.9.1 and 705.9.2 shall apply to handrails from the *work area* floor to, and including, the level of exit discharge.

❖ This is the charging paragraph for the requirements for handrails in Level 2 or 3 alterations. The specific requirements are given in Sections 705.9.1 and 705.9.2, relating the minimum requirements for handrails and design requirements, respectively.

705.9.1 Minimum requirement. Every required exit stairway that is part of the means of egress for any *work area* and that has three or more risers and is not provided with at least one handrail, or in which the existing handrails are judged to be in danger of collapsing, shall be provided with handrails for the full length of the run of steps on at least one side. All exit stairways with a required egress width of more than 66 inches (1676 mm) shall have handrails on both sides.

❖ Complying handrails must be installed in all required exit stairways that serve a work area. If additional stairways are provided that are not required by the IBC as an element of means of egress, then the handrail provisions of this section are not applicable to such stairways. The degree of compliance required is limited to a handrail on one side of the stairway only until the occupant load served is so high that the required width of the stairway would be a minimum of 66 inches (1676 mm). At this level of occupant load, complying handrails must be provided on both sides of the stairway. Intermediate handrails are not required as an improvement criteria under the code. This section intends to require complying handrails for those stairs that have three or more risers. This trigger level is an attempt to be compatible with an exception in some of the legacy building codes that did not require a handrail for stairways containing less than four risers in certain occupancies. The handrail requirement is applicable to required exit stairways that serve the work area, starting at the work area all the way to the level of exit discharge, including the exit discharge itself.

705.9.2 Design. Handrails required in accordance with Section 705.9.1 shall be designed and installed in accordance with the provisions of the *International Building Code*.

❖ Once a handrail is required by this section, its structural strength, height, continuity and other design features must comply with the IBC.

Example 705.9.2:

An existing two-story office building has two enclosed stairways: one convenience stairway, a mezzanine stair and a stair outside the building as shown in Figure 705.9.2. Stairs either have no handrails or have handrails that are not in compliance with the IBC.

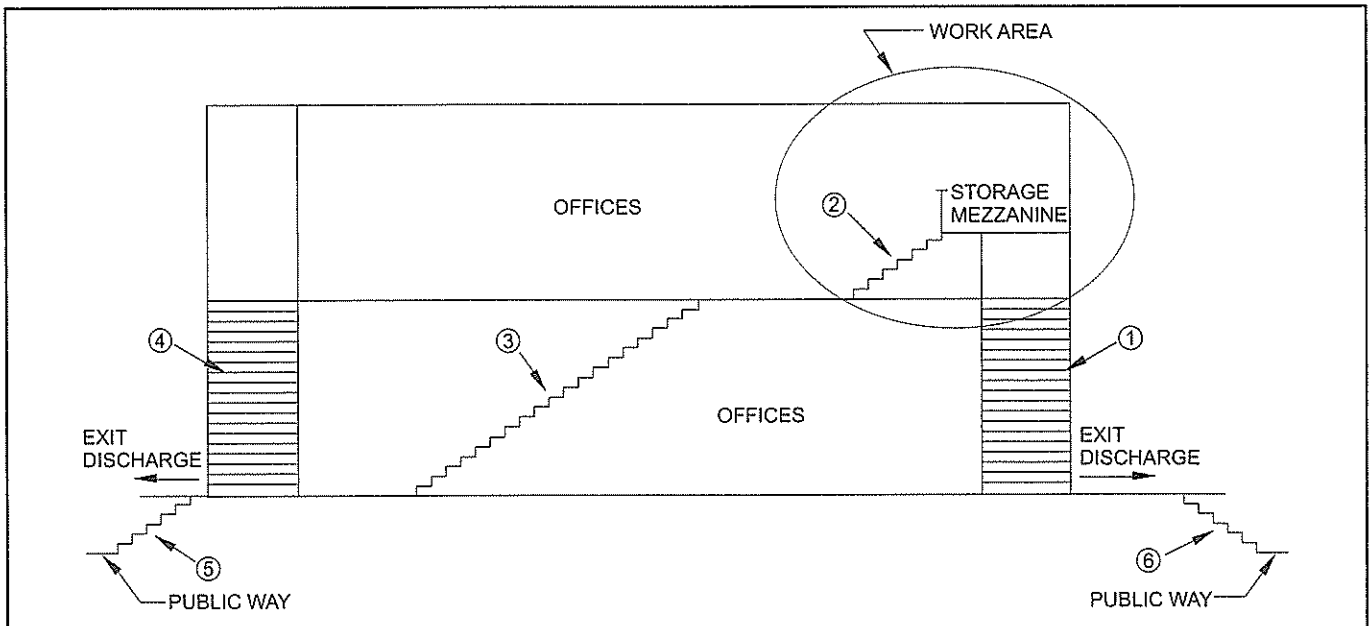


Figure 705.9.2
HANDRAILS

Q: Which stairs must be provided with new complying handrails to bring the current handrails up to the IBC requirements?

A: Stairs 1 and 2 must be provided with new complying handrails to bring their existing handrails up to the IBC requirements. These stairs serve the work area and are both part of the required means-of-egress pathway (see Figure 705.9.2).

705.10 Guards. The requirements of Sections 705.10.1 and 705.10.2 shall apply to guards from the *work area* floor to, and including, the level of exit discharge but shall be confined to the egress path of any *work area*.

❖ This is the charging paragraph for the requirements for guards in Level 2 or 3 alterations. The specific requirements are given in Sections 705.10.1 and 705.10.2, relating the minimum location and design requirements for guards, respectively.

705.10.1 Minimum requirement. Every open portion of a stair, landing, or balcony that is more than 30 inches (762 mm) above the floor or grade below and is not provided with guards, or those portions in which existing guards are judged to be in danger of collapsing, shall be provided with guards.

❖ The criteria and triggers for guards are much the same as those for handrails. Along the path of egress from the work area to and including the level of exit discharge, anywhere at stairs, landings or balconies where an elevation difference of more than 30 inches (762 mm) exists and a complying guard is not present, then a guard complying with the details and structural requirements of the IBC must be installed.

705.10.2 Design. Guards required in accordance with Section 705.10.1 shall be designed and installed in accordance with the *International Building Code*.

❖ Once a guard is required by this section, its structural strength, height, size of openings and other design features must comply with the IBC.

SECTION 706
ACCESSIBILITY

706.1 General. A building, facility, or element that is altered shall comply with Section 605.

❖ A Level 2 or 3 alteration would include the reconfiguration of space, while a Level 1 alteration would not. Therefore, alterations covered under this section would have all accessibility requirements in Section 605, as well as two additional requirements that address the reconfiguration in a structure.

706.2 Stairs and escalators in existing buildings. In alterations where an escalator or stair is added where none existed previously, an accessible route shall be provided in accordance with Sections 1104.4 and 1104.5 of the *International Building Code*.

❖ If a stair or escalator is added as part of an alteration in a location where one did not previously exist, the alteration must also include an accessible route between the same two levels. If an accessible route is already available between the two levels, this requirement is not applicable. If the stair or escalator is replacing an existing stair or escalator, this requirement is not applicable. In conjunction with Section 605.1.14, if the requirement for the accessible route would be in excess of what is required for new construction, such as an accessible route to an area that was exempted by Section 1103.2, 1104, 1107 or 1108 of the IBC, this requirement is not applicable. The intent is that if a route is provided between accessible levels for a nondisabled person to use, it is reasonable to also expect an accessible route.

706.3 Accessible dwelling units and sleeping units. Where Group I-1, I-2, I-3, R-1, R-2 or R-4 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for accessible units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of spaces being added.

❖ This section sets forth the rate for providing accessible dwelling or sleeping units in Groups I-1, I-2, I-3, R-1, R-2 and R-4 when such facilities are altered. Assuming that the required number of accessible units are not already provided, the number of accessible units to be incorporated into each alteration or change of occupancy (see Section 912.8) is based on the number being added or altered. For example, if a nursing home was being altered a portion at a time, 50 percent of the units being altered or added each time would be required to be wheelchair accessible. It is not the intent that all units being altered or added are required to be accessible units until 50 percent of the units in the entire facility are accessible units. The total number of Accessible units in the facility is not required to exceed that required for new construction, as indicated in Section 605.1.14. It is unreasonable to require a greater level of accessibility in an existing building than is required in new construction. The technical criteria for Accessible units is found in ICC A117.1, Chapters 3 through 9. This section also references the visible and audible alarm requirements in Chapter 9 of the IBC. Sleeping accommodations in Groups I-1 and R-1 are required to have visible alarms in accordance with Table 907.5.2.3.3 of the IBC. Section 907.5.2.3.4 of the IBC also contains requirements for alarms within Group R-2 units. In a repair or Level 1 alterations, if the alarm system is not part of the alteration, it is not the intent of this section to require the fire alarm system to be upgraded. In Level 2 and 3 alterations, which involve a change of occupancy and additions, an upgrade of the system may be required.

706.4 Type A dwelling or sleeping units. Where more than 20 Group R-2 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for Type A units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being added.

❖ This section sets forth the rate for providing Type A dwelling or sleeping units in Group R-2 when such facilities are altered. Assuming that the required number

of Type A units are not already provided, and that the alteration or change of occupancy (see Section 912.8) includes more than 20 dwelling or sleeping units, the number of Type A units to be incorporated into each alteration is based on the number being altered or added. For example, if 24 units within a Group R-2 apartment building are being altered, 2 percent of the 24 units being altered would be required to be designed to conform to Type A unit requirements. The technical criteria for Type A units is found in ICC A117.1, Chapter 10. This section also references visible and audible alarm requirements in Chapter 9 of the IBC. Section 907.5.2.3.4 of the IBC contains requirements for alarms within Group R-2 units.

706.5 Type B dwelling or sleeping units. Where four or more Group I-1, I-2, R-1, R-2, R-3 or R-4 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for Type B units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being added.

❖ This section sets forth the rate for providing Type B dwelling or sleeping units in Groups I-1, I-2, I-3, R-1, R-2 and R-4 when such facilities are altered. Assuming that the required number of Type B units are not already provided, the number of Type B units to be incorporated into each alteration or change of occupancy (see Section 912.8) is based on the number being added or altered. For example, if a nursing home was altering six sleeping units or undergoing a change of occupancy to add six sleeping units that were intended to be occupied as a residence, those six units would be required to meet Type B requirements. The balance of the dwelling or sleeping units that are not to be altered do not need to meet Type B requirements. The technical criteria for Type B units is found in ICC A117.1, Chapter 10. This section also references visible and audible alarm requirements in Chapter 9 of the IBC. Sleeping accommodations in Groups I-1 and R-1 are required to have visible alarms in accordance with Table 907.5.2.3.3 of the IBC. Section 907.5.2.3.4 of the IBC also contains requirements for alarms within Group R-2 units. In a repair or Level 1 alterations, if the alarm system is not part of the alteration, it is not the intent of this section to require the fire alarm system to be upgraded. In Level 2 and 3 alterations, which involve a change of occupancy and additions, an upgrade of the system may be required.

SECTION 707
STRUCTURAL

707.1 General. Structural elements and systems within buildings undergoing Level 2 alterations shall comply with this section.

❖ This section directs the code user to the requirements contained within Sections 707.2 through 707.6. These structural requirements apply to alterations involving the addition of equipment or where a reconfiguration of building space results in an increased minimum live load required by Section 1607 of the IBC. Note that the structural requirements for Level 1 alterations in Section 606 are also applicable according to Section 404.2.

707.2 New structural elements. New structural elements in alterations, including connections and anchorage, shall comply with the *International Building Code*.

❖ Any new structural element that is added in the course of alteration work, including its connections to the existing structure, must comply with the IBC requirements for new construction. There is no exception to this requirement.

707.3 Minimum design loads. The minimum design loads on existing elements of a structure that do not support additional loads as a result of an *alteration* shall be the loads applicable at the time the building was constructed.

❖ Unless an alteration adds loads to an existing structural member, there is no need to reevaluate it against current code-loading criteria. This is in contrast to the treatment of existing members that have increased loading in accordance with Section 707.4. The applicable loads of the code at the time the building was built apply.

707.4 Existing structural elements carrying gravity loads. Alterations shall not reduce the capacity of existing gravity load-carrying structural elements unless it is demonstrated that the elements have the capacity to carry the applicable design gravity loads required by the *International Building Code*. Existing structural elements supporting any additional gravity loads as a result of the alterations, including the effects of snow drift, shall comply with the *International Building Code*.

Exceptions:

1. Structural elements whose stress is not increased by more than 5 percent.
2. Buildings of Group R occupancy with not more than five dwelling or sleeping units used solely for residential purposes where the *existing building* and its *alteration* comply with the conventional light-frame construction methods of the *International Building Code* or the provisions of the *International Residential Code*.

❖ In the course of reconfiguring building spaces, it is often necessary to relocate or add equipment. Further, sometimes a change in use (without actually changing the occupancy classification) necessitates use of a higher design live load. Consequently, existing structural members that are subjected to increased loads must comply with the requirements in this section for gravity loads. This section requires the evaluation of these additional loads, including the effects of snow drift, to determine if these loads decrease the capacity of the existing structural elements. Where the alterations result in a net increase in the gravity load that is supported by the existing structure, including the effects of snow drift, the affected structural components must be checked to verify they satisfy the requirements of the IBC for a new structure. There are two ex-

ceptions to full compliance with the IBC. One permits smaller Group R buildings and their alterations that comply with either the *International Residential Code*® (IRC®) or the conventional light-frame construction provisions of the IBC. Another exception allows additional gravity loads that do not increase stresses in affected structural elements by more than 5 percent. Allowing overstresses of up to 5 percent in existing structural members has been a long-standing rule of thumb used by structural engineers. This exception does not specifically address the cumulative affects from successive alterations, but it would be prudent to limit cumulative increases under this exception to a total of 5 percent unless it is clearly documented that a structure has additional capacity.

707.5 Existing structural elements resisting lateral loads. Any existing lateral load-resisting structural element whose demand-capacity ratio with the *alteration* considered is more than 10 percent greater than its demand-capacity ratio with the *alteration* ignored shall comply with the structural requirements specified in Section 807.4. For purposes of calculating demand-capacity ratios, the demand shall consider applicable load combinations with design lateral loads or forces in accordance with Sections 1609 and 1613 of the *International Building Code*. For purposes of this section, comparisons of demand-capacity ratios and calculation of design lateral loads, forces and capacities shall account for the cumulative effects of *additions* and alterations since original construction.

❖ When the demand-capacity ratio of an existing lateral-load-resisting element, with a proposed alteration considered, exceeds 10 percent its demand-capacity ratio with the alteration ignored, the requirements for Level 3 alterations apply. Requiring these ratios to include applicable load combinations and design lateral loads, as well as to account for the cumulative effects of work that has taken place since the original construction of the building, will more reflect the actual increase in percentage change of capacity.

707.6 Voluntary improvement of the seismic force-resisting system. Alterations to existing structural elements or additions of new structural elements that are not otherwise required by this chapter and are initiated for the purpose of improving the performance of the seismic force-resisting system of an existing structure or the performance of seismic bracing or anchorage of existing nonstructural elements shall be permitted, provided that an engineering analysis is submitted demonstrating the following:

1. The altered structure and the altered nonstructural elements are no less conforming with the provisions of this code with respect to earthquake design than they were prior to the alteration.
2. New structural elements are detailed and connected to the existing structural elements as required by Chapter 16 of the *International Building Code*.
3. New or relocated nonstructural elements are detailed and connected to existing or new structural elements as required by Chapter 16 of the *International Building Code*.
4. The alterations do not create a structural irregularity as defined in ASCE 7 or make an existing structural irregularity more severe.

Voluntary alterations to the seismic force-resisting system in accordance with the applicable chapters of Appendix A of this code shall be permitted.

❖ This section addresses the issue of upgrading a building's lateral-force-resisting system voluntarily for improved resistance to wind and seismic forces. It does not apply in situations where other code sections require compliance with the IBC or other specific minimum wind or seismic design loads. This section allows an owner to initiate an improvement to the lateral-force-resisting system to the extent it is viable to do so and provided the requisite engineering analysis is furnished. Since no minimum load requirement is established by the code, the building owner and the design professional have the latitude to establish performance goals and objectives. Thus, an owner can do something to mitigate the hazard of future earthquakes or wind storms in an existing building without being discouraged from doing so by incurring prohibitive costs.

The retrofit of an existing building for improved performance in an earthquake, for example, to a level of resistance less than that required for a new building considers the overall benefit of hazard mitigation. It is an often used approach to managing risk in areas that are susceptible to frequent earthquakes. This is the thrust of program's such as Federal Emergency Management Agency's (FEMA) Project Impact. The *Guidelines for the Seismic Retrofit of Existing Buildings* (GSREB) in Appendix A and the other referenced standards for seismic evaluation and rehabilitation have been developed for this purpose, and this section of the code recognizes their use. A voluntary seismic upgrade of a building structure can, therefore, consider the full range of rehabilitation objectives available under ASME 41, for instance (see commentary, Section 101.5.4).

SECTION 708
ELECTRICAL

708.1 New installations. All newly installed electrical equipment and wiring relating to work done in any *work area* shall comply with the materials and methods requirements of Chapter 5.

Exception: Electrical equipment and wiring in newly installed partitions and ceilings shall comply with all applicable requirements of NFPA 70.

❖ In the course of alterations that involve the reconfiguration of space, there is sometimes a need to do certain rewiring of electrical equipment or fixtures, or a need for the replacement of such equipment or fixtures. Depending on whether the electrical work is taking place in existing walls, partitions, ceilings or floors, or in new walls, partitions, ceilings or floors, the re-

quirements are slightly different. In the case of new walls, partitions and other elements, all electrical equipment, fixtures and all electrical work must comply with the provisions of NFPA 70. This is reasonable since the building element, being a wall, ceiling or other element is new, and all the electrical-related equipment and wiring in it is new. For example, in such situations, the required separation of outlets from sinks, maximum separation of outlets, minimum or maximum distances from the floor, and all related wiring methods, wiring materials and wire gauge must completely comply with NFPA 70. On the other hand, if such electrical work is taking place in existing walls, partitions, ceilings and floors, then only the materials and methods of NFPA 70 must be complied with. In such a case, for example, where the number of outlets, their proximity to wet locations and other dimensional criteria do not meet the current electrical code, then the replacement and rewiring of such outlets is allowed at these same locations as long as the equipment, wiring and wiring methods are in compliance with NFPA 70.

708.2 Existing installations. Existing wiring in all work areas in Group A-1, A-2, A-5, H, and I occupancies shall be upgraded to meet the materials and methods requirements of Chapter 5.

❖ Faulty and damaged wiring or electrical wiring that might not be suitable for certain applications are contributors to many fires that might have electrical origins. To reduce the risk of such fires, this section requires upgrading electrical wiring in high occupant load, hazardous and institutional occupancies. The electrical wiring in the entire work area, in Group A-1, A-2, A-5, H and I occupancies, must be examined and, where such wiring does not comply with the materials and methods provisions of NFPA 70, it must be upgraded to comply. It should be noted that electrical wiring in partitions and other elements that are not being altered or relocated must also comply as long as they are within the work area. The wiring materials and methods are mostly covered in Chapter 3 of NFPA 70.

708.3 Residential occupancies. In Group R-2, R-3, and R-4 occupancies and buildings regulated by the *International Residential Code*, the requirements of Sections 708.3.1 through 708.3.7 shall be applicable only to work areas located within a dwelling unit.

❖ This is the charging paragraph for the requirements for electrical work in residential occupancies in Level 2 or 3 alterations. The specific requirements are given in Sections 708.3.1 through 708.3.7.

The work areas within a dwelling unit in Group R-2, R-3 and R-4 occupancies are required to meet a certain minimum number of receptacle outlets, ground-fault circuit interruptors (GFCI) and lighting outlets. This is true regardless of whether the listed occupancies are being regulated by the IBC or IRC. Kitchens, laundry areas, sleeping rooms, study rooms or other similar rooms are required to provide at least one or two duplex receptacle outlets.

Closets, storage areas, hallways, garages and basements are exempt from this requirement, even if they are within the work area. Even though receptacle outlets are needed and used in these areas, their use is not as frequent or as necessary compared to areas that are required to provide such receptacles under this section.

Where new receptacle outlets are installed, and if NFPA 70 requires GFCI for the location under consideration, then such GFCI must also be installed.

Detached garages that are served by electric power, attached garages, bathrooms, hallways, stairways, utility rooms, basements used for storage or mechanical equipment, exits and outdoor entrances that are within the work area must be provided with lighting outlets.

Example 708.3:

Q: A home owner wishes to do some remodeling that includes the reconfiguration of some interior spaces including a bathroom, laundry and the living room. There is currently no light fixture outside the front door. Is a light fixture required to be installed outside of the front door?

A. Yes. Even though the exterior wall at the front door is not being reconfigured, it is located at the wall, which is part of the alteration work area and, as such, is required to be provided with a light fixture (see Figure 708.3).

Electrical service equipment that is located within the work area and within the dwelling unit must be adjusted, relocated or its surrounding obstructions removed or relocated such that the minimum clearances required by NFPA 70 are provided. Providing this clearance in compliance with NFPA 70 addresses the safety of repair personnel.

708.3.1 Enclosed areas. All enclosed areas, other than closets, kitchens, basements, garages, hallways, laundry areas, utility areas, storage areas, and bathrooms shall have a minimum of two duplex receptacle outlets or one duplex receptacle outlet and one ceiling or wall-type lighting outlet.

❖ See the commentary to Section 708.3.

708.3.2 Kitchens. Kitchen areas shall have a minimum of two duplex receptacle outlets.

❖ See the commentary to Section 708.3.

708.3.3 Laundry areas. Laundry areas shall have a minimum of one duplex receptacle outlet located near the laundry equipment and installed on an independent circuit.

❖ See the commentary to Section 708.3.

708.3.4 Ground fault circuit interruption. Newly installed receptacle outlets shall be provided with ground fault circuit interruption as required by NFPA 70.

❖ See the commentary to Section 708.3.

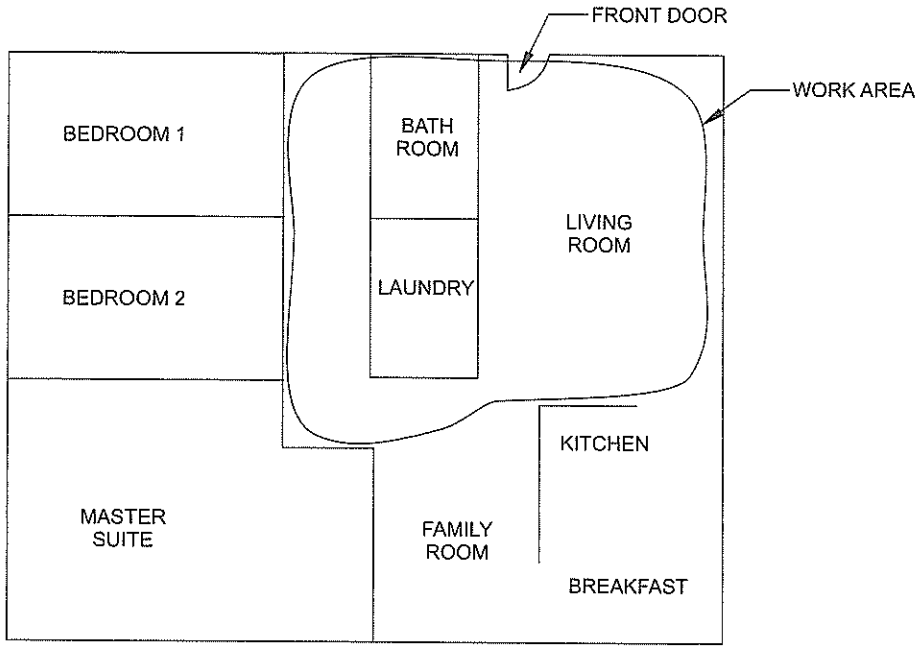


Figure 708.3
RESIDENTIAL OCCUPANCY ELECTRICAL

708.3.5 Minimum lighting outlets. At least one lighting outlet shall be provided in every bathroom, hallway, stairway, attached garage, and detached garage with electric power, and to illuminate outdoor entrances and exits.

❖ See the commentary to Section 708.3.

708.3.6 Utility rooms and basements. At least one lighting outlet shall be provided in utility rooms and basements where such spaces are used for storage or contain equipment requiring service.

❖ See the commentary to Section 708.3.

708.3.7 Clearance for equipment. Clearance for electrical service equipment shall be provided in accordance with the NFPA 70.

❖ See the commentary to Section 708.3.

SECTION 709
MECHANICAL

709.1 Reconfigured or converted spaces. All reconfigured spaces intended for occupancy and all spaces converted to habitable or occupiable space in any *work area* shall be provided with natural or mechanical ventilation in accordance with the *International Mechanical Code.*

Exception: Existing mechanical ventilation systems shall comply with the requirements of Section 709.2.

❖ This section is consistent with the basic premise for new building elements and materials given in Chapter 6, Section 602—that replacing elements is required to comply with the applicable code for new construction. The amount of mechanical ventilation must be provided in accordance with the IMC as required for new construction. This could be that air-moving equipment would need to be altered, as well. However, the exception allows special minimum provisions for existing mechanical equipment that would not require increasing the capacities for existing air-moving equipment, as long as minimum ventilation rates are provided.

709.2 Altered existing systems. In mechanically ventilated spaces, existing mechanical ventilation systems that are altered, reconfigured, or extended shall provide not less than 5 cubic feet per minute (cfm) (0.0024 m^3/s) per person of outdoor air and not less than 15 cfm (0.0071 m^3/s) of ventilation air per person; or not less than the amount of ventilation air determined by the Indoor Air Quality Procedure of ASHRAE 62.

❖ This section essentially gives alternative minimum requirements to the IBC for ventilation in work areas of Level 2 or 3 alterations. However, this does not really reduce the amount of engineering work that needs to be done in an altered space. The referenced ASHRAE 62 must be consulted for the overarching ventilation requirements, and then the minimums stated in this section must be provided. Therefore, even in a situation where the intent was not to change the air-moving equipment, but only the configuration of the ductwork or air channels, the minimum requirements could require changes to air-moving equipment capabilities.

709.3 Local exhaust. All newly introduced devices, equipment, or operations that produce airborne particulate matter, odors, fumes, vapor, combustion products, gaseous contaminants, pathogenic and allergenic organisms, and microbial contaminants in such quantities as to affect adversely or impair

health or cause discomfort to occupants shall be provided with local exhaust.

❖ This is a straightforward, common-sense requirement that will readily be observed, and probably already dealt with in the manufacturer's installation instructions for mechanical equipment. However, the code official should carefully review the particular details for all such equipment to ensure that appropriate measures are taken for local exhaust.

SECTION 710
PLUMBING

710.1 Minimum fixtures. Where the occupant load of the story is increased by more than 20 percent, plumbing fixtures for the story shall be provided in quantities specified in the *International Plumbing Code* based on the increased occupant load.

❖ Alterations involving the reconfiguration of spaces could, at times, result in an increased occupant load. The minimum number of plumbing fixtures is not affected and does not need to be reviewed or revised as long as the increased occupant load is 20 percent or less than the existing occupant load. This criteria is applied story by story and not to the building as a whole, because in most cases building occupants normally use the toilet facilities on the floor where they work or live and rarely travel to another floor to use the plumbing facilities. Once the 20-percent increased occupant load threshold is passed, then the entire occupant load of the story after alterations must be considered and the minimum plumbing fixtures, as required by the IPC, must be provided.

Example 710.1:

An existing mixed occupancy building as shown in Figure 710.1 is to undergo alterations to reconfigure certain areas and increase the occupant load as shown. There are four water closets currently provided in each restroom.

Q: What is the impact of the alterations on the required number of water closets?

A: Current occupant load is 650 (based on Table 2902.1 of the IBC).

Offices: 100 occupant load, two water closets for male and two for female.

Restaurant: 300 occupant load, two water closets for male and two for female.

Retail: 250 occupant load, one water closet for male and one for female.

Total number of water closets in each restroom is five.

Case 1:

Office occupant load (100) + restaurant (375) + 292 = 767

Percent change of occupant load for the story = (767 - 650)/650 = 18 percent

The number of water closets does not need to be increased; there can remain four water closets in each male and female restroom.

Case 2:

Office occupant load (100) + restaurant (395) + 292 = 787

Percent change of occupant load for the story = (787 - 650)/650 = 21 percent

The number of water closets needs to be increased:

Offices: 100 occupant load, two water closets for male and two for female.

Restaurant: 395 occupant load, three water closets for male and three for female.

Retail: 292 occupant load, one water closet for male and one for female.

The number of water closets must be increased to six in each male and female restroom (see Figure 710.1).

SECTION 711
ENERGY CONSERVATION

711.1 Minimum requirements. Level 2 *alterations* to existing buildings or structures are permitted without requiring the entire building or structure to comply with the energy requirements of the *International Energy Conservation Code* or *International Residential Code*. The *alterations* shall conform to the energy requirements of the *International Energy Conservation Code* or *International Residential Code* as they relate to new construction only.

❖ A building that undergoes Level 2 alterations is required to meet a certain level of energy compliance. The level of compliance depends on the extent of the alterations taking place. As Level 2 alterations are those alterations where the reconfiguration of space takes place, new doors or windows are installed, or where existing systems are extended, then any such new element is required to meet the applicable energy provisions of the *International Energy Conservation Code*® (IECC®) or the IRC in the case of buildings that fall under the scoping of the IRC. Elements within the building that are not being affected do not need to be evaluated and do not need to comply with the energy provisions. Essentially, the entire building is not required to meet the energy provisions; only a degree of possible improvement in the energy performance of the building is intended to be achieved by making the new elements meet the IECC or IRC requirements. In certain cases where the reconfiguration of space might have resulted in the creation of new spaces, the newly created space should be evaluated as a whole for compliance with the energy provisions, even though some of the elements within the space might actually not have been altered. Likewise, in a case where an existing mechanical system is being extended to other areas or new ductwork is being installed to reconfigure and reroute the ducts to various spaces, it is only required to have the new elements meet the energy provisions and

not the entire system. The language in this section is intended to be consistent with the requirements in the IECC and the IRC for alterations.

Bibliography

The following resource materials are referenced in this chapter or are relevant to the subject matter addressed in this chapter.

ASHRAE 62-04, *Ventilation for Acceptable Indoor Air Quality*. Atlanta, GA: American Society of Heating, Refrigerating and Air Conditioning Engineers, 2004.

ASTM 41-07, *Test Method for Surface-burning Characteristics of Building Materials*. West Conshohocken, PA: ASTM International, 2007.

ASTM E 84-07, *Test Method for Surface-burning Characteristics of Building Materials*. West Conshohocken, PA: ASTM International, 2007.

FEMA 356, *Prestandard and Commentary for the Seismic Rehabilitation of Buildings*. Washington, DC: Federal Emergency Management Agency, 2000.

IBC-09, *International Building Code*. Washington, DC: International Code Council, 2009.

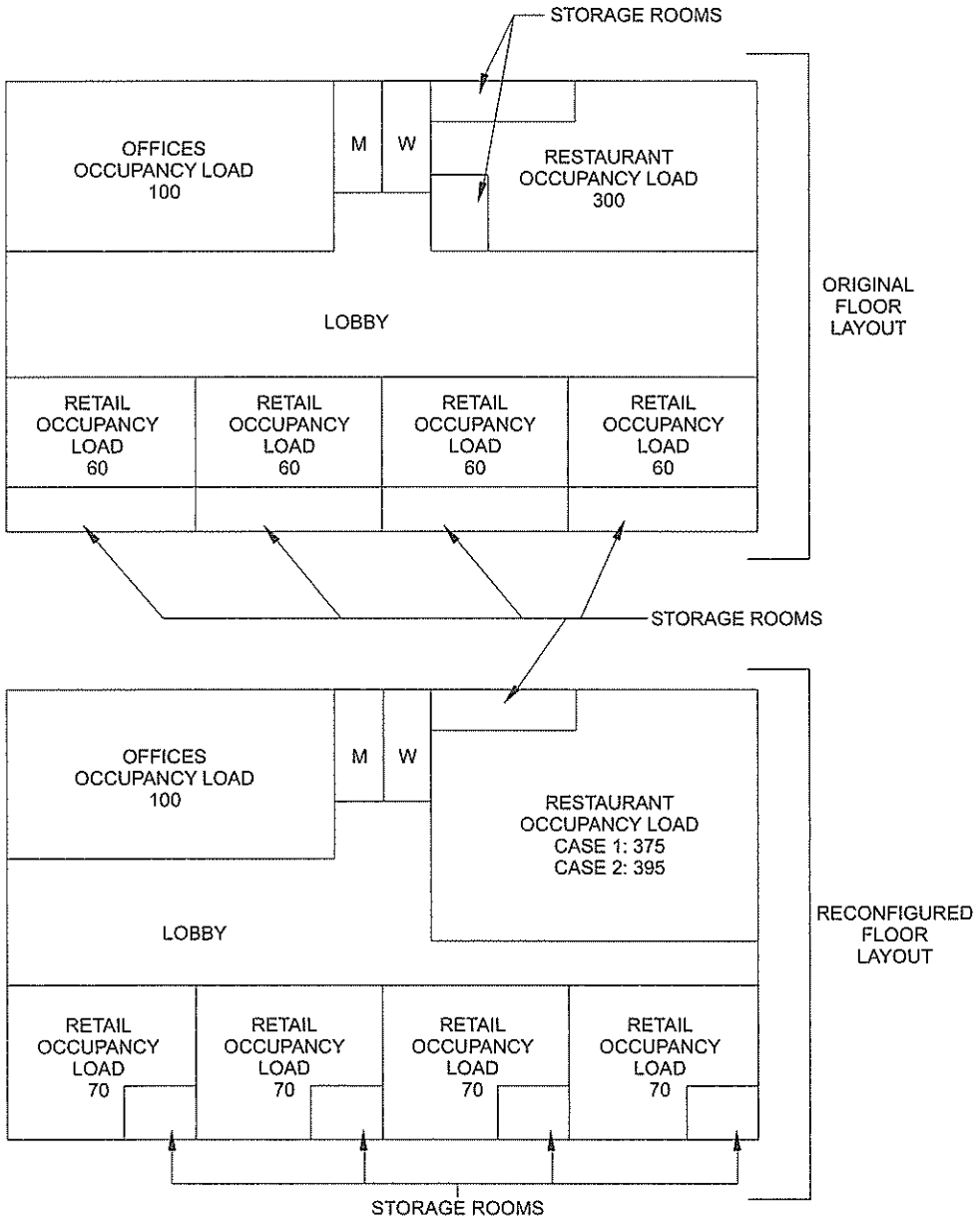


Figure 710.1
MINIMUM PLUMBING FIXTURES

ICC/A117.1-03, *Accessible and Usable Buildings and Facilities*. Washington, DC: International Code Council, 2003.

IECC-09, *International Energy Conservation Code.* Washington, DC: International Code Council, 2009.

IFC-09, *International Fire Code*. Washington, DC: International Code Council, 2009.

IMC-09, *International Mechanical Code*. Washington, DC: International Code Council, 2009.

IPC-09, *International Plumbing Code.* Washington, DC: International Code Council, 2009.

IRC-09, *International Residential Code.* Washington, DC: International Code Council, 2009.

NFPA 13-07, *Installation of Sprinkler Systems*. Quincy, MA: National Fire Protection Association, 2007.

NFPA 13R-07, *Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height*. Quincy, MA: National Fire Protection Association, 2007.

NFPA 70-08, *National Electric Code*. Quincy, MA: National Fire Protection Association, 2008.

NFPA 72-07, *National Fire Alarm Code*. Quincy, MA: National Fire Protection Association, 2007.

NFPA 101-09, *Life Safety Code*. Quincy, MA: National Fire Protection Association, 2009.

Chapter 8: Alterations—Level 3

General Comments

This chapter provides the technical requirements for those existing buildings that undergo Level 3 alterations. Reference is made to Level 3 alterations as described in Section 405, which includes any alteration that involves more than 50 percent of the aggregate area of the building.

This chapter, similar to other chapters of the code, covers all building-related subjects, such as structural, means of egress, accessibility and energy conservation, as well as the fire and life safety issues when the alterations are classified as Level 3. Sections 801, 802 and 803 are related to scoping, special use and occupancy, and building elements and materials. In the interest of being brief and avoiding the presentation of materials that are repetitive in nature in various chapters, Section 801.2 requires that Level 3 alterations comply not only with Chapter 8, but also with Chapters 6 and 7. As such, any alteration work that is classified as Level 3 is assumed to include everything related to Level 1 and 2 alterations plus the provisions of this chapter. Section 803, Building Elements and Materials, covers, in detail, elements such as existing shafts and vertical openings, including when such openings might be required to be enclosed, fire partitions and interior finishes. The remainder of the chapter is related to fire protection, means of egress, accessibility, structural, electrical, mechanical and plumbing provisions. The means of egress, Section 805, requires additional means of egress lighting and exit signs beyond what is required already based upon Chapter 6 requirements for means of egress. Keep in mind that Section 605 covers a wide range of means of egress subjects, such as the minimum number of exits, fire escape requirements and construction details, corridor openings and exit signs, which are also applicable here. The structural provisions for Level 3 alterations are contained in Section 807.

The decision to divide the level typically known as "alterations" in the *International Building Code*® (IBC®) and previous legacy building codes into three parts of Level 1, Level 2 and Level 3 was based on the fact that minor alterations that do not include space reconfiguration and extensive alterations that might range from relocation of walls and partitions in various floors or in the entire building should be treated differently and with different threshold levels for requiring upgrades or improvements to the building or spaces within the building.

Purpose

The purpose of this chapter is to provide detailed requirements and provisions to identify the required improvements in the existing building elements, building spaces and building structural system. This chapter is distinguished from Chapters 6 and 7 by involving alterations that cover 50 percent of the aggregate area of the building. In contrast, Level 1 alterations do not involve space reconfiguration and Level 2 alterations involve extensive space reconfiguration that do not exceed 50 percent of the building area. Depending on the nature of alteration work, its location within the building and whether it encompasses one or more tenants, improvements and upgrades could be required for the open-floor penetrations, sprinkler system or the installation of additional means of egress, such as stairs or fire escapes. At times and under certain situations, this chapter also intends to improve the safety of certain building features beyond the work area and in other parts of the building where no alteration work might be taking place.

SECTION 801 GENERAL

801.1 Scope. Level 3 alterations as described in Section 405 shall comply with the requirements of this chapter.

❖ Any alteration work that results in reconfiguration of space or otherwise falls under the classification of Level 3 alterations, as described in Section 405, must comply with Chapter 8. The exception of Section 801.2 is intended to encourage existing buildings to improve the accessibility for the disabled by allowing any such alterations (which are solely for compliance with the accessibility provisions of Section 605) to only comply with Chapter 6 provisions as if no space reconfiguration has taken place. This is an advantage for improving the accessibility of buildings since Chapter 6 is related to alterations that do not encompass any space reconfiguration and, as such, has a lower level of compliance requirement and lower threshold for triggering other improvements.

801.2 Compliance. In addition to the provisions of this chapter, work shall comply with all of the requirements of Chapters 6 and 7. The requirements of Sections 703, 704, and 705 shall apply within all work areas whether or not they include exits and corridors shared by more than one tenant and regardless of the occupant load.

Exception: Buildings in which the reconfiguration of space affecting exits or shared egress access is exclusively the result of compliance with the accessibility requirements of Section 605.2 shall not be required to comply with this chapter.

❖ Chapters 7 and 8 have cascading effects by requiring that each level of alteration must comply with the chapter for

the lower level of alteration. Accordingly, an alteration project that is classified as Level 2 must comply with Chapter 7, as well as with Chapter 6. Similarly, an alteration project classified as Level 3 must comply with Chapters 6, 7 and 8. This is to eliminate the repetition of various requirements from Chapter 6 in Chapters 7 and 8, and from Chapter 7 in Chapter 8, as a Level 2 alteration, in general, includes various aspects of a Level 1 alteration, and a Level 3 alteration, in general, includes various aspects of Level 1 and 2 alterations. The code drafting committee decided to make reference to these chapters rather than repeat all such provisions again.

Keep in mind that Section 701.3 is applicable in this chapter, as well. Section 701.3 requires that new elements, components and spaces created as a result of Level 2 alteration work must comply with the IBC or other applicable codes, just as Section 101.4 of the IBC makes reference to other *International Codes*® (I-Codes®) such as the *International Plumbing Code*® (IPC®), *International Mechanical Code*® (IMC®) and *International Fire Code*® (IFC®). Please review the requirements and commentary in Section 701.3, including the exceptions, which also apply.

SECTION 802
SPECIAL USE AND OCCUPANCY

802.1 High-rise buildings. Any building having occupied floors more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access shall comply with the requirements of Sections 802.1.1 and 802.1.2.

❖ This is the charging paragraph for high-rise requirements. The specific requirements contained herein pertain to the recirculating or exhausting of air (see Section 802.1.1), or elevators (see Section 802.1.2). A high-rise building is defined as a building having an occupied floor located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access, which is the same as the IBC criteria for identifying a high-rise building. In high-rise buildings undergoing a Level 3 alteration, the subjects of recirculating air and elevators must specifically be addressed. All other provisions of Chapter 8 still apply to high-rise buildings, but these two are specific only to highrises. The notable difference between this section and Section 403 of the IBC, is that Section 403.1 of the IBC has five exceptions. The five exceptions are buildings that do not fall under the high-rise provisions of Section 403 of the IBC. The code does not contain any of these five exceptions. So whether or not the building under consideration is an airport traffic control tower (see IBC Section 403.1, Exception 1, of the IBC), an open parking garage (see IBC Section 403.1, Exception 2, of the IBC), a Group A-5 occupancy (see IBC Section 403.1, Exception 3, of the IBC), a low-hazard special industrial occupancy (see Section 403.1, Exception 4, of the IBC) or a Group H-1, H-2 or H-3 occupancy (see Section 403.1, Exception 5, of the IBC), the recirculating air and elevator recall requirements of Section 802.1.1 and 802.1.2 are applicable. Even though this appears to be more restrictive than the IBC, it really is not, because in most buildings the five exceptions in Section 403.1 of the IBC have a special section within the IBC that they must comply with (see Sections 406.3, 412 and 415 of the IBC).

802.1.1 Recirculating air or exhaust systems. When a floor is served by a recirculating air or exhaust system with a capacity greater than 15,000 cubic feet per minute (701 m^3/s), that system shall be equipped with approved smoke and heat detection devices installed in accordance with the *International Mechanical Code*.

❖ This section applies to a high-rise building undergoing a Level 3 alteration as described in Section 405, that has a floor served by a recirculating air or exhaust system with a capacity of greater than 15,000 cubic feet per minute (701 m^3/s). Such a system is required to be equipped with approved smoke and heat detection devices. This is clearly a condition where large mechanical devices have the potential of spreading products of combustion quickly through a particular floor and beyond. Over the years, it has been recognized that many injuries and deaths in high-rise fires have been the result of smoke inhalation due to smoke penetrating the floors above the floor of fire origin. The smoke and heat detection devices that are required to be installed in accordance with the IMC are intended to shut down the mechanical circulating air or exhaust system and to reduce the potential spread of smoke.

802.1.2 Elevators. Where there is an elevator or elevators for public use, at least one elevator serving the *work area* shall comply with this section. Existing elevators with a travel distance of 25 feet (7620 mm) or more above or below the main floor or other level of a building and intended to serve the needs of emergency personnel for fire-fighting or rescue purposes shall be provided with emergency operation in accordance with ASME A17.3. New elevators shall be provided with Phase I emergency recall operation and Phase II emergency in-car operation in accordance with ASME A17.1.

❖ The elevator recall provisions found in this section are taken from the IFC and are intended to accommodate the needs of emergency personnel for fire-fighting or rescue purposes. Elevators are often used by emergency responders to access a buildings various floor levels when responding to fires and other emergencies. Due to these needs, the elevators must be capable of providing certain functions, such as recall and emergency operation.

Existing elevators that travel 25 feet (7620 mm) or more above or below the main level should, as a minimum, be equipped with emergency operation capabilities that comply with ASME A17.3. New elevator installations are held to more restrictive requirements and must have both emergency recall and emergency in-car operation to comply with ASME A17.1 for any amount of travel distance. The ASME A17 standards are safety codes for elevators and escalators: ASME A17.3 is for existing elevators and ASME A17.1 is for new elevator installations.

802.2 Boiler and furnace equipment rooms. Boiler and furnace equipment rooms adjacent to or within the following facilities shall be enclosed by 1-hour fire-resistance-rated construction: day nurseries, children's shelter facilities, residential childcare facilities, and similar facilities with children below the age of $2^1/_2$ years or that are classified as Group I-2 occupancies, shelter facilities, residences for the developmentally disabled, group homes, teaching family homes, transitional living homes, rooming and boarding houses, hotels, and multiple dwellings.

Exceptions:

1. Furnace and boiler equipment of low-pressure type, operating at pressures of 15 pounds per square inch gauge (psig) (103.4 KPa) or less for steam equipment or 170 psig (1171 KPa) or less for hot water equipment, when installed in accordance with manufacturer recommendations.
2. Furnace and boiler equipment of residential R-3 type with 200,000 British thermal units (Btu) (2.11 × 108 J) per hour input rating or less is not required to be enclosed.
3. Furnace rooms protected with automatic sprinkler protection.

❖ The boiler and furnace room separation requirements are based on the separation concept of Section 508.2.5 of the IBC, but the trigger mechanism is different from that of the IBC. The IBC requires any boiler or furnace room with a single piece of equipment larger than 400,000 Btu per hour (117 200 watts) input be separated from the main areas by a fire barrier, whereas the code requires any such room with high-pressure-type equipment be separated from certain uses. High pressure is considered 15 pounds per square inch gauge (psig) (103.4 kPa) for steam equipment and 170 psig (1171 kPa) for hot water equipment. The uses from which the separation is required are those that are occupied by infants, certain institutional-type facilities, hotels and multiple-family occupancies. Furnace rooms protected with an automatic sprinkler system are not required to be separated.

802.2.1 Emergency controls. Emergency controls for boilers and furnace equipment shall be provided in accordance with the *International Mechanical Code* in all buildings classified as day nurseries, children's shelter facilities, residential childcare facilities, and similar facilities with children below the age of $2^1/_2$ years or that are classified as Group I-2 occupancies, and in group homes, teaching family homes, and supervised transitional living homes in accordance with the following:

1. Emergency shutoff switches for furnaces and boilers in basements shall be located at the top of the stairs leading to the basement; and
2. Emergency shutoff switches for furnaces and boilers in other enclosed rooms shall be located outside of such room.

❖ The boiler and furnace equipment must have emergency controls in accordance with the IMC.

SECTION 803
BUILDING ELEMENTS AND MATERIALS

803.1 Existing shafts and vertical openings. Existing stairways that are part of the means of egress shall be enclosed in accordance with Section 703.2.1 from the highest *work area* floor to, and including, the level of exit discharge and all floors below.

❖ This section addresses the enclosure of existing stairways only. Other shafts and floor openings are regulated exactly the same as under Level 2 alterations. The code user is referred to Section 703.2.1 for stairway enclosure methods and triggers. Such enclosures, though, must be provided from the highest work area floor all the way to the level of exit discharge and all the floors below the level of exit discharge. Note that these enclosure requirements would also include the level of exit discharge. This requirement is only applicable to stairways that are part of the means of egress and not other stairways used for convenience, attending equipment or those that have other specific purposes.

803.2 Fire partitions in Group R-3. Fire separation in Group R-3 occupancies shall be in accordance with Section 803.2.1.

❖ This is the charging paragraph for fire separations between dwelling units in Group R-3 occupancies, sending the code user to Section 803.2.1. It should be noted that the title of this section is somewhat misleading, referring to "fire partitions," which are defined and detailed specifically in the IBC. However, the regulatory text describes the required separation between the dwelling units, never actually requiring construction of fire partitions as described in the IBC.

803.2.1 Separation required. Where the *work area* is in any attached dwelling unit in Group R-3 or any multiple single family dwelling (townhouse), walls separating the dwelling-units that are not continuous from the foundation to the underside of the roof sheathing shall be constructed to provide a continuous fire separation using construction materials consistent with the existing wall or complying with the requirements for new structures. All work shall be performed on the side of the dwelling unit wall that is part of the *work area.*

Exception: Where *alterations* or *repairs* do not result in the removal of wall or ceiling finishes exposing the structure, walls are not required to be continuous through concealed floor spaces.

❖ The separation of dwelling units in duplex and townhouse buildings is found in Chapter 3 of the *International Residential Code*® (IRC®) for new construction. The code in this section addresses the vertical separation aspect only. If the alteration includes the removal of wall or ceiling finishes that expose the wall structure, then the separation wall must be evaluated for continuity from the foundation to roof deck. The existing wall construction is allowed to remain and be continued to the roof deck even if it does not provide the IRC's required 1-hour fire-resistance rating.

It is intended that this requirement not create a burden for the residents of adjacent dwellings if they are not involved in the alteration project; as such, it is allowed that the extension of such walls to the roof deck be placed on the side where an alteration project is taking place and not intrude in the neighboring units.

803.3 Interior finish. Interior finish in exits serving the *work area* shall comply with Section 703.4 between the highest floor on which there is a *work area* to the floor of exit discharge.

❖ The interior finish materials in Level 3 alterations are regulated the same as Level 2 alterations. The reader is referred to Section 703.4 where the code requires interior finishes in exits and corridors serving the work area to comply with the IBC interior finish requirements of the IBC. The only additional requirement in Level 3 alterations is the extent of coverage. Exits serving the work area must comply with the interior finish requirements of Section 703.4 starting at the highest floor where there is any work area to the floor of exit discharge. Any corridors within the work area must also comply with Section 703.4, as Section 801.2 requires all Level 3 alterations to comply with Chapters 6, 7 and 8.

SECTION 804
FIRE PROTECTION

804.1 Automatic sprinkler systems. Automatic sprinkler systems shall be provided in all work areas when required by Section 704.2 or this section.

❖ Automatic sprinkler requirements are referenced by Section 704.2 where the requirements for various occupancies, mixed uses and windowless stories are provided. This section has specific requirements for high-rise buildings, and rubbish and linen chutes. When Section 704.2 requires an automatic sprinkler system for a Level 2 alteration, the system would also be required for a Level 3 alteration throughout the work area.

804.1.1 High-rise buildings. In high-rise buildings, work areas shall be provided with automatic sprinkler protection where the building has a sufficient municipal water supply system to the site. Where the *work area* exceeds 50 percent of floor area, sprinklers shall be provided in the specified areas where sufficient municipal water supply for design and installation of a fire sprinkler system is available at the site.

❖ Where there is sufficient municipal water supply to the site to provide an automatic sprinkler system, then all

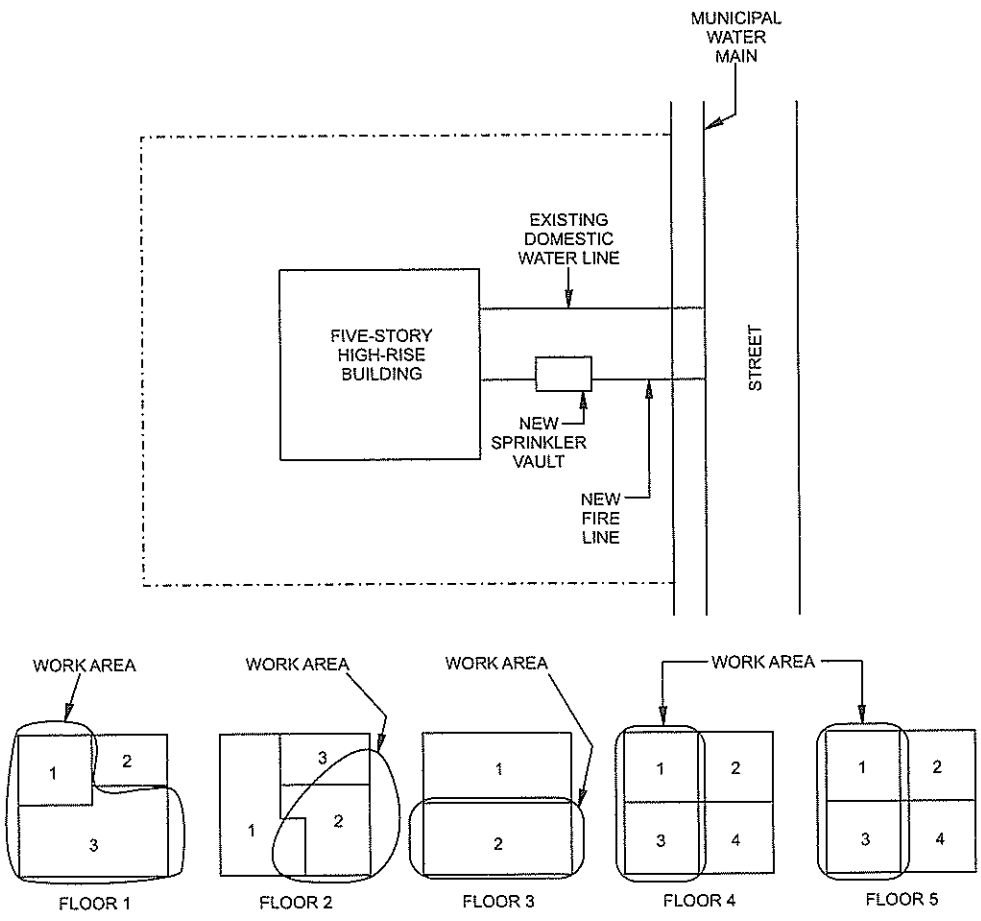


Figure 804.1.1
HIGH-RISE BUILDINGS

of the work areas within the high-rise building must be sprinklered. "Available to the site" refers to the availability of water at the property line and not at the building itself. In certain high-rise, Level 3 alteration projects, this could have the effect of requiring the design and installation of a new fire line main and associated vaults, valves and other related components from the municipal water main to the building. Sprinklers could be required beyond the work areas on any floor where the work area exceeds 50 percent of that floor area. This extension of sprinklers is not required in tenant spaces that are entirely outside of the work area (see Figure 804.1.1).

Example:

Sprinklers required in:

Level 1: Tenants 1 and 3 (more than 50 percent of floor—tenant 2 is entirely outside the work area).

Level 2: Parts of tenants 1, 2 and 3 that are within the work area (work areas only—less than 50 percent of floor area).

Level 3: Tenant 2 (work area not more than 50 percent—tenant 1 is entirely outside of work area).

Level 4: Tenants 1, 2, 3 and 4 (work area is more than 50 percent of floor area—tenants 2 and 4 are not entirely outside the work area).

Level 5: Tenants 1, 2, 3 and 4 (work area is more than 50 percent of the area—tenants 2 and 4 are not entirely outside the work area).

804.1.2 Rubbish and linen chutes. Rubbish and linen chutes located in the *work area* shall be provided with sprinklered protection or an approved fire suppression system where protection of the rubbish and linen chute would be required under the provisions of the *International Building Code* for new construction.

❖ In any building undergoing a Level 3 alteration, the rubbish and linen chutes within the work areas must be provided with sprinklers in accordance with the IBC. The IBC requires an automatic sprinkler system at the top and in the terminal rooms of the rubbish and linen chutes; and when chutes extend through three or more floors, additional sprinkler heads are required at alternate floors. Accordingly, in a four-story building where there is a linen chute from the fourth floor to the first and there are alterations on all floors, the code sprinkler requirement for the chute will be exactly the same as the IBC. Chute sprinklers must be available for servicing (see Figure 804.1.2).

804.2 Fire alarm and detection systems. Fire alarm and detection systems complying with Sections 704.4.1 and 704.4.3 shall be provided throughout the building in accordance with the *International Building Code*.

❖ This section refers back to Chapter 7, Sections 704.4.1 and 704.4.3, except that the significant phrase in this section is "throughout the building." The code user is referred to Sections 704.4.1 and 704.4.3 for the fire alarm and detection system requirements, where the triggering mechanism for various occupancies are provided. Section 704.4.2, Supplemental Fire Alarm System Requirements, is not referenced because in Level 3 alterations the alarm system installation is not limited just to the work areas; rather, it is required throughout the building.

804.2.1 Manual fire alarm systems. Where required by the *International Building Code*, a manual fire alarm system shall be provided throughout the *work area*. Alarm notification appliances shall be provided on such floors and shall be automatically activated as required by the *International Building Code*.

Exceptions:

1. Alarm-initiating and notification appliances shall not be required to be installed in tenant spaces outside of the *work area*.
2. Visual alarm notification appliances are not required, except where an existing alarm system is upgraded or replaced or where a new fire alarm system is installed.

❖ Manual fire alarm systems are required throughout the work areas in any occupancy where the IBC requires a manual fire alarm system. Section 907.2 of the IBC, for example, requires a manual fire alarm system in Group A, B, E and M occupancies that exceed certain thresholds. This is required within the work areas on any floor regardless of the size of the work area on a particular floor. There are two exceptions for this requirement. Exception 1 addresses the typical exception that has been seen in many sections of the code, which is an exemption for tenant spaces that are completely outside of the work area. Exception 2 is an exemption for visual alarm notification when upgrading of an existing system or installation of a new system are not involved.

804.2.2 Automatic fire detection. Where required by the *International Building Code* for new buildings, automatic fire detection systems shall be provided throughout the *work area*.

❖ Section 907.2 and its subsections of the IBC requires automatic fire detection systems for certain occupancies and in certain locations within a building, such as smoke detector requirements in mechanical equipment, electrical, transformer, telephone equipment and similar rooms. In some instances, sprinkler protection or other protective measures can substitute for such automatic fire detection systems. The provisions of this section allow existing buildings that are not equipped with an automatic sprinkler system, automatic fire detection system or other specific safety equipment to undergo Level 3 alterations as long as some improvement in the life safety systems of the building is achieved. For example, an existing Group I-2 nursing home undergoing a Level 3 alteration will be required to be equipped with an automatic fire detection system in the corridors and other spaces that are permitted to be open to such corridors, in accordance with Section 907.2.6.2 of the IBC.

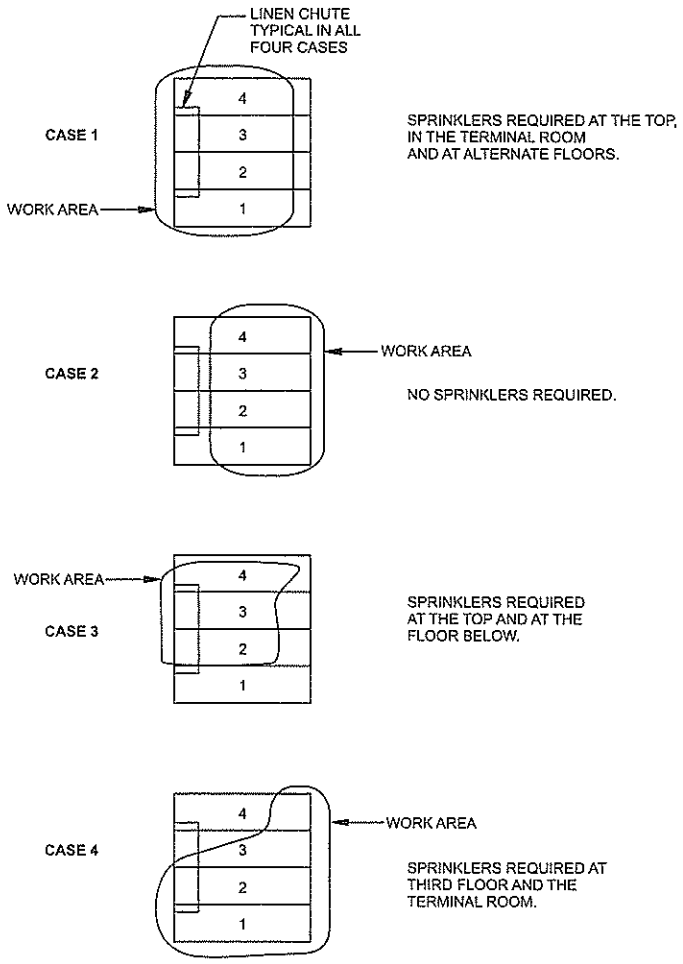


Figure 804.1.2
RUBBISH AND LINEN CHUTES

SECTION 805
MEANS OF EGRESS

805.1 General. The means of egress shall comply with the requirements of Section 705 except as specifically required in Sections 805.2 and 805.3.

❖ The means of egress requirements for Level 3 alterations are exactly the same as the Level 2 alterations found in Section 705, with the exception that the means of egress lighting and exit signs must meet an additional criterion.

805.2 Means-of-egress lighting. Means of egress from the highest *work area* floor to the floor of exit discharge shall be provided with artificial lighting within the exit enclosure in accordance with the requirements of the *International Building Code*.

❖ The additional criteria for means of egress lighting requires that within exit enclosures, illumination be provided from the highest floor where there is any work area down to the level of exit discharge. The intensity of illumination, emergency power and performance of the system is required based on the IBC.

805.3 Exit signs. Means of egress from the highest *work area* floor to the floor of exit discharge shall be provided with exit signs in accordance with the requirements of the *International Building Code*.

❖ The additional criteria for exit signs requires that the means of egress from the highest floor where there is any work area to the level of exit discharge be provided with exit signs. The location, height, illumination and other requirements of such exit signs must comply with the IBC.

SECTION 806
ACCESSIBILITY

806.1 General. A building, facility or element that is altered shall comply with Sections 605 and 706.

❖ Alterations covered under this section are required to meet all accessibility requirements in Section 605, as

well as two additional requirements covered in Section 706.

SECTION 807
STRUCTURAL

807.1 General. Where buildings are undergoing Level 3 alterations including structural alterations, the provisions of this section shall apply.

❖ These structural requirements apply to alterations where the work area exceeds 50 percent of the aggregate area of the building. Note that the structural requirements for Level 1 and 2 alterations in Sections 606 and 707, respectively, are also applicable to Level 3 alterations according to Section 405.2.

807.2 New structural elements. New structural elements shall comply with Section 707.2.

❖ Any new structural element that is added in the course of alteration work, including its connections to the existing structure, is required to comply with Section 707.2. Section 707.2 requires new structural elements to comply with the requirements of the IBC. There is no exception to this requirement.

807.3 Existing structural elements carrying gravity loads. Existing structural elements carrying gravity loads shall comply with Section 707.4.

❖ Existing gravity load-carrying elements are required to comply with Section 707.4. Section 707.4 requires the evaluation of these additional loads, including the effects of snow drift, to determine if these loads decrease the capacity of existing structural elements. See the commentary to Section 707.4 for further discussion of the specific requirements.

807.4 Structural alterations. All structural elements of the lateral-force-resisting system in buildings undergoing Level 3 structural alterations or buildings undergoing Level 2 alterations as triggered by Section 707.5 shall comply with this section.

Exceptions:

1. Buildings of Group R occupancy with no more than five dwelling or sleeping units used solely for residential purposes that are altered based on the conventional light-frame construction methods of the *International Building Code* or in compliance with the provisions of the *International Residential Code*.
2. Where such *alterations* involve only the lowest story of a building and the *change of occupancy* provisions of Chapter 9 do not apply, only the lateral-force-resisting components in and below that story need comply with this section.

❖ This section applies to all Level 3 alterations. This section also applies to Level 2 alterations where the demand-capacity ratio of an existing lateral-load-resisting element, with a proposed alteration considered, exceeds 10 percent its demand-capacity ratio with the alteration ignored. Where this occurs, it is necessary to have an engineering evaluation of the building. The loading criteria to be used in the evaluation is dependent upon the extent of the alteration work that is undertaken. The code assumes that the structural members were properly designed for the applicable loads at the time of construction.

The seismic base shear depends on several variables, such as the mapped spectral accelerations at the site, the site soil coefficients, the importance factor based on the nature of the occupancy, as well as the structure's effective seismic weight and response modification factor. For work that is considered an alteration, it is primarily the structure's effective seismic weight that is of interest, as the other variables would likely remain fixed. The effective seismic weight (W) used to determine the base shear consists of the total weight of the structure, all equipment and other permanently attached items, as well as a percentage of the design live load for storage uses. It reflects the weight of all dead loads and contents that might reasonably be expected to be attached to the structure at the time the design earthquake occurs.

While equipment weight and some gravity loads are calculable to a 5-percent margin, seismic loads and response characteristics of existing materials are not realistically calculable with that precision and, as such, the trigger for possible seismic upgrades of Sections 707.6 and 807.4 is set at a rational 10-percent increase in seismic base shear or decrease in seismic base shear capacity. As it is possible that various alterations over the years might increase the seismic base shear or decrease the seismic base shear capacity in a cumulative manner beyond the 10-percent trigger level, the code makes it explicitly clear that the 10- percent threshold is calculated relative to the original building construction and not the latest alteration. Exceptions 1 and 2 are related to the evaluation requirement, one of which permits smaller Group R buildings that are altered to comply with either the IRC or the conventional light-frame construction provisions of the IBC. Exception 2 pertains to multiple-story buildings, where alterations are made to only the lowest story. This permits compliance with the IBC's wind and seismic criteria to be limited to the lateral-force-resisting elements in that story and below. While the impact of wind and seismic loading contributed by the stories above must be considered, no evaluation of those stories is required. The code assumes the upper stories have been designed for wind and earthquakes according to the code in effect at the time of construction.

807.4.1 Evaluation and analysis. An engineering evaluation and analysis that establishes the structural adequacy of the altered structure shall be prepared by a registered design professional and submitted to the *code official*.

❖ A building undergoing alterations that result in a seismic base shear increase greater than 10 percent and that also exceed the area threshold established in this section requires an engineering evaluation of the structure as described in this section. The evaluation

must demonstrate that the altered structure complies with the IBC wind-loading criteria and with reduced IBC seismic forces in Section 101.5.4.2. The latter permits the use of the *Guidelines for Seismic Retrofit of Existing Buildings* (GSREB) in Appendix A of the code, ASCE 31 and ASCE 41 (see commentary, Section 101.5.4).

807.4.2 Substantial structural alteration. Where more than 30 percent of the total floor and roof areas of the building or structure have been or are proposed to be involved in structural *alteration* within a 12-month period, the evaluation and analysis shall demonstrate that the altered building or structure complies with the *International Building Code* for wind loading and with reduced *International Building Code* level seismic forces as specified in Section 101.5.4.2 for seismic loading. For seismic considerations, the analysis shall be based on one of the procedures specified in Section 101.5.4. The areas to be counted toward the 30 percent shall be those areas tributary to the vertical load-carrying components, such as joists, beams, columns, walls and other structural components that have been or will be removed, added or altered, as well as areas such as mezzanines, penthouses, roof structures and in-filled courts and shafts.

❖ The area threshold of 30 percent of the floor and roof areas would likely include all Level 3 alterations, since Section 405.1 establishes that these are in excess of 50 percent of the aggregate area of the building. Level 2 alterations that exceed the 30-percent threshold are also covered by this section. The additional stipulation that all structural alterations occurring over a 12-month period must be considered prevents a building owner from breaking a large alteration project into a series of smaller alterations in hopes of complying with less-stringent requirements. The clarification of exactly which areas contribute to meeting the area threshold is important. For instance, mezzanines complying with Section 505 of the IBC do not contribute to the building area.

807.4.3 Limited structural alteration. Where not more than 30 percent of the total floor and roof areas of the building are involved in structural *alteration* within a 12-month period, the evaluation and analysis shall demonstrate that the altered building or structure complies with the loads applicable at the time of the original construction or of the most recent substantial structural *alteration* as defined by Section 807.4.2. Any existing structural element whose seismic demand-capacity ratio with the *alteration* considered is more than 10 percent greater than its demand-capacity ratio with the *alteration* ignored shall comply with the reduced *International Building Code* level seismic forces as specified in Section 101.5.4.2.

❖ A building undergoing alterations not exceeding the threshold established in Section 807.4.2, but resulting in a seismic base shear increase greater than 10 percent, needs to be evaluated for the loads applicable at the time the building was originally constructed or for the loads at the time of the substantial structural alterations rather than current code requirements. The loads at the time of the most recent substantial structural alterations are allowed to be used since the seismic upgrades required for substantial structural alterations are considered, in general, to have brought the building to an acceptable level of seismic safety. The intent of the requirements within the last sentence to this section is to require altered elements to, at a minimum, satisfy the reduced IBC level seismic forces of Section 101.5.4.2. This provision applies to the altered element, not the entire building as required for substantial structural alterations.

SECTION 808
ENERGY CONSERVATION

808.1 Minimum requirements. Level 3 alterations to existing buildings or structures are permitted without requiring the entire building or structure to comply with the energy requirements of the *International Energy Conservation Code* or *International Residential Code*. The alterations shall conform to the energy requirements of the *International Energy Conservation Code* or *International Residential Code* as they relate to new construction only.

❖ A building that undergoes Level 3 alterations is required to meet a certain level of energy compliance. The level of compliance depends on the extent of the alterations taking place. As Level 3 alterations are those alterations where reconfiguration of space takes place in more than 50 percent of the building aggregate area, then any new element within the work area, as defined in Chapter 2, is required to meet the applicable energy provisions of the *International Energy Conservation Code*® (IECC®) or the IRC in the case of buildings that fall under the scoping of the IRC. Elements within the building that are not being affected do not need to be evaluated and do not need to comply with the energy provisions. Essentially, the entire building is not required to meet the energy provisions, but only improvement in the energy performance of the building is intended to be achieved by making the new elements meet the IECC or IRC requirements. In those cases where the reconfiguration of space might have resulted in the creation of new spaces, the newly created spaces should be evaluated as a whole for compliance with the energy provisions, even though some of the elements within the space might actually not have been altered. Likewise, in a case where an existing mechanical system is being extended to other areas or new duct work is being installed to reconfigure and reroute the ducts to various spaces, it is only required to have the new elements meet the energy provisions and not the entire system. Newly installed systems must meet the energy provisions of the IECC or the IRC for buildings under the scoping of the IRC. The language in this section is intended to be consistent with the requirements in the IECC and IRC for alterations.

Bibliography

The following resource materials are referenced in this chapter or are relevant to the subject matter addressed in this chapter.

ASCE 7-02, *Minimum Design Loads for Buildings and Other Structures*. Reston, VA: American Society of Civil Engineers, 2002.

ASCE 31-03, *Seismic Evaluation of Exisitng Buildings*, Reston, VA: American Society of Civil Engineers, 2003.

ASCE 41-06, *Seismic Rehabilitation of Existing Buildings,* Reston, VA: American Society of Civil Engineers, 2006.

ASME A17.1/CSA B44-2007, *Safety Code for Elevators and Escalator.* Reston, VA: American Society of Mechanical Engineers, 2007.

ASME A17.3-2005, *Safety Code for Existing Elevators and Escalators.* New York: American Society of Mechanical Engineers, 2005.

FEMA 368, *NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures, Part 1*. Washington, DC: Federal Emergency Management Agency, 2001.

FEMA 369, *NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures Commentary, Part 2 Commentary*. Washington, DC: Federal Emergency Management Agency, 2001.

IBC-09, *International Building Code*. Washington, DC: International Code Council, 2009.

IECC-09, *International Energy Conservation Code*. Washington, DC: International Code Council, 2009.

IFC-09, *International Fire Code*. Washington, DC: International Code Council, 2009.

IMC-09, *International Mechanical Code*. Washington, DC: International Code Council, 2009.

IPC-09, *International Plumbing Code*. Washington, DC: International Code Council, 2009.

IRC-09, *International Residential Code*. Washington, DC: International Code Council, 2009.

NBC-99, *BOCA National Building Code.* Country Club Hills, IL: Building Officials & Code Administrators International, Inc., 1999.

SBC-99, *Standard Building Code.* Birmingham, AL: Southern Building Code Congress International, 1999.

UBC-97, *Uniform Building Code*. Whittier, CA: International Conference of Building Officials, 1997.

Chapter 13: Performance Compliance Methods

General Comments

Neither the designer nor the code official can physically inspect and evaluate every aspect of an existing building or structure, because many of its features may be concealed within the construction. It is, therefore, necessary to emphasize those items that can be evaluated. There are 19 critically important elements that can be quantified and evaluated to determine the level of safety for an existing building.

This type of analysis provides the designer and the code official with a rational basis for establishing the safety of an existing building or structure without having physical access to every part of the building, documentation of the original design or the construction history of the building.

Purpose

A large number of existing buildings and structures do not comply with the current building code requirements for new construction. Although many of these buildings are potentially salvageable, rehabilitation is often cost prohibitive because they may not be able to comply with all the requirements for new construction. At the same time, it is necessary to regulate construction in existing buildings that undergo additions, alterations, renovations, extensive repairs or changes of occupancy. Such activity represents an opportunity to ensure that new construction complies with the current building codes and that existing conditions are maintained, at a minimum, to their current level of compliance or are improved as required. To accomplish this objective, and to make the rehabilitation process easier, this chapter allows for a controlled departure from full compliance with the technical codes, without compromising the minimum standards for fire prevention and life safety features of the rehabilitated building.

SECTION 1301 GENERAL

1301.1 Scope. The provisions of this chapter shall apply to the *alteration*, *repair*, *addition* and *change of occupancy* of existing structures, including historic and moved structures, as referenced in Section 101.5.3. The provisions of this chapter are intended to maintain or increase the current degree of public safety, health and general welfare in existing buildings while permitting *repair*, *alteration*, *addition* and *change of occupancy* without requiring full compliance with Chapters 4 through 12, except where compliance with other provisions of this code is specifically required in this chapter.

❖ This section states the scope of Chapter 13 and references alternative methods of code compliance for alteration, repair, addition and change of occupancy of existing structures. Chapter 13 also describes the responsibilities for maintenance, repairs, compliance with other codes and periodic testing.

1301.1.1 Compliance with other methods. *Alterations*, *repairs*, *additions* and *changes of occupancy* to existing structures shall comply with the provisions of this chapter or with one of the methods provided in Section 101.5.

❖ This section references Section 101.5 for the options available to deal with alterations, repairs, additions and changes of occupancy to existing structures. The following briefly describes the options available, other than compliance with this chapter:

1. Subject to the approval of the code official, repairs and alterations can comply with the requirements of the code at the time the building was built.
2. Repairs, alterations, additions and changes of occupancy can comply with the prescriptive compliance method found in Chapter 3. These provisions are duplicated from Sections 3403 through 3411 of the *International Building Code*® (IBC®).
3. Repairs, alterations, additions and changes of occupancy can comply with the proportional approach where upgrades are triggered by the type and extent of the work. These requirements are found in Chapters 4 through 12.

Please note that these options are seperate and distinct and must not be combined in any way.

[B] 1301.2 Applicability. Structures existing prior to [DATE TO BE INSERTED BY THE JURISDICTION. Note: it is recommended that this date coincide with the effective date of building codes within the jurisdiction], in which there is work involving *additions*, *alterations* or *changes of occupancy* shall be made to conform to the requirements of this chapter or the provisions of Chapters 4 through 12. The provisions of Sections 1301.2.1 through 1301.2.5 shall apply to existing occupancies that will

continue to be, or are proposed to be, in Groups A, B, E, F, M, R, and S. These provisions shall not apply to buildings with occupancies in Group H or I.

❖ The adopting jurisdiction is to insert the desired date for applicability as indicated in this section; therefore, Chapter 13 applies only to structures existing prior to the established date. The date that construction was first regulated through a comprehensive building code in the jurisdiction is recommended because buildings predating any building regulation are often not equipped with the types of systems and features that modern codes require. Newer buildings are more likely to be in closer compliance with contemporary code requirements for new construction. These older buildings are assumed to face more difficulty in achieving a minimum level of life safety and are more likely to need the greater flexibility provisions of Chapter 13. The occupancies that qualify for the provisions of Chapter 13 are listed in Section 1301.2. Chapter 13 does not apply to Groups H (High hazard) and I (Institutional).

[B] 1301.2.1 Change in occupancy. Where an *existing building* is changed to a new occupancy classification and this section is applicable, the provisions of this section for the new occupancy shall be used to determine compliance with this code.

❖ When a building undergoes a change of occupancy classification and Chapter 13 is applied, the evaluation method in Chapter 13 must be applied to the new occupancy for determining whether the existing building meets the compliance alternative in the code. This recognizes that it is the proposed conditions and relative hazards that will exist and must be determined to be acceptable. It is also consistent with how changes of occupancy are regulated in the absence of the Chapter 13 alternative.

[B] 1301.2.2 Partial change in occupancy. Where a portion of the building is changed to a new occupancy classification and that portion is separated from the remainder of the building with fire barriers or horizontal assemblies having a fire-resistance rating as required by Table 508.4 of the *International Building Code* or Section R317 of the *International Residential Code* for the separate occupancies, or with approved compliance alternatives, the portion changed shall be made to conform to the provisions of this section.

Where a portion of the building is changed to a new occupancy classification and that portion is not separated from the remainder of the building with fire barriers or horizontal assemblies having a fire-resistance rating as required by Table 508.4 of the *International Building Code* or Section R317 of the *International Residential Code* for the separate occupancies, or with approved compliance alternatives, the provisions of this section which apply to each occupancy shall apply to the entire building. Where there are conflicting provisions, those requirements which secure the greater public safety shall apply to the entire building or structure.

❖ Where a portion of the building is changed to a new occupancy classification, the following options may be employed, dependent upon the fire separation of the portion of the building from the remainder of the existing building.

Where a portion of the building is changed to a new occupancy classification and that portion is separated from the remainder of the building by a fire barrier that complies with the requirements for new construction, the new occupancy portion must be evaluated with the existing or proposed building design to be in full compliance with the provisions of Chapter 13. The remainder of the existing building must also be evaluated in accordance with Chapter 13. The mandatory safety scores for the new occupancy portion of the building and the existing occupancy are obtained from those listed in Table 1301.8 and are incorporated in the building's final evaluation score (see Table 1301.7).

Where a portion of the building is changed to a new occupancy classification and that portion is not separated by a fire barrier that complies with the requirements for new construction, the provisions of Chapter 13 for each occupancy must apply to the entire building. The requirements offering the greater public safety are applied to the entire building. Any proposed or existing building attributes and modifications must be reviewed in light of these requirements. See the examples described in Sections 1301.6.16 and 1301.9.1 for mixed occupancies.

[B] 1301.2.3 Additions. Additions to existing buildings shall comply with the requirements of the *International Building Code*, *International Residential Code*, and this code for new construction. The combined height and area of the *existing building* and the new *addition* shall not exceed the height and area allowed by Chapter 5 of the *International Building Code*. Where a fire wall that complies with Section 706 of the *International Building Code* is provided between the *addition* and the *existing building*, the *addition* shall be considered a separate building.

❖ Additions effectively represent new construction and it is, therefore, reasonable to require additions to comply with the code requirements for new construction. There are not assumed to be any existing conditions or other factors that would make full compliance impractical or difficult.

The requirements in this section are applied in the same way as those in Section 1301.1. This section is included in Chapter 13 so that provisions for additions are included for both optional methods of code compliance indicated in Section 1301.1 (see the commentary to Section 1301.1 for a discussion of these options).

The evaluation method in Chapter 13 may be used for an existing building that has been modified by an addition, provided that it meets the applicability requirements of Section 1301.2.

[B] 1301.2.4 Alterations and repairs. An *existing building* or portion thereof that does not comply with the requirements of this code for new construction shall not be altered or repaired in such a manner that results in the building being less safe or sanitary than such building is currently. If, in the *alteration* or *repair*, the current level of safety or sanitation is to be reduced, the portion altered or repaired shall conform to the require-

ments of Chapters 2 through 12 and Chapters 14 through 33 of the *International Building Code*.

❖ An existing building that is altered or repaired may be designed and evaluated in accordance with Chapter 13, provided it meets the applicability provisions of Section 1301.2.

When an existing building is altered or repaired, materials or methods consistent with the original construction must be used. This is described in Chapter 4. The alteration or repair must not cause the building to be less safe or sanitary than it is currently; that is, before the alterations are undertaken. This is true even if the existing condition exceeds the minimum requirements of the code under which it was originally built. Should the alteration or repair cause a reduction in safety or sanitation, the resulting condition must meet the requirements of Chapters 2 through 12 and Chapters 14 through 33 of the IBC. This effectively allows existing conditions that exceed new construction requirements to be reduced to, but not below, new construction requirements.

[B] 1301.2.5 Accessibility requirements. All portions of the buildings proposed for *change of occupancy* shall conform to the accessibility provisions of Section 308.

❖ Any building or part of a building that has a change of occupancy must meet the requirements for accessibility in existing buildings found Section 308. This basically requires full accessibility in the portion of the building undergoing a change of occupancy and, in addition, may require some work improving the accessible route to that space, and the bathrooms and drinking fountains that serve that space (see commentary, Section 308).

[B] 1301.3 Acceptance. For repairs, alterations, additions, and changes of occupancy to existing buildings that are evaluated in accordance with this section, compliance with this section shall be accepted by the *code official*.

❖ The *International Codes*® (I-Codes®) regulate safety in existing buildings by establishing the appropriate minimum levels of safety and sanitation deemed necessary for the safe occupancy of buildings. This is accomplished in several different portions of the family of I-Codes. The *International Fire Code*® (IFC®) addresses fire safety issues in existing buildings and the *International Property Maintenance Code*® (IPMC®) addresses matters of health and sanitation in existing buildings and sites. Codes traditionally give broad authority to the code official to abate unusually hazardous conditions or operations that may be encountered in existing buildings. Although these fire safety, health and sanitation requirements are addressed in different codes, they together make up the package of requirements that represent the minimum conditions that any existing building must meet to be considered acceptable for occupancy under the I-Codes. Chapter 13 works in conjunction with the other codes in the family of I-Codes that regulate existing buildings by requiring compliance with those same minimum provisions. Without such references, Chapter 13 would be incomplete as an alternative tool for regulating existing buildings because it would otherwise allow conditions to exist that would not be permitted for any other existing building.

When an owner or designer of an existing building decides to apply Chapter 13 and complies with all the provisions of the chapter, including the applicability requirements in Section 1301.2, the code official must accept for review the proposed work or change of occupancy.

[B] 1301.3.1 Hazards. Where the *code official* determines that an unsafe condition exists as provided for in Section 116, such unsafe condition shall be abated in accordance with Section 116.

❖ When the code official finds an unsafe condition in the building that is not being corrected by the proposed work, he or she must order the abatement or correction of the unsafe condition or hazard just as would be ordered in an existing building that is not being renovated, as stipulated by Section 116. This section sets forth a required comprehensive performance objective of abating any condition that is unsafe, insanitary, illegal or of improper occupancy, egress deficient, fire hazardous, poorly maintained or otherwise dangerous to human life or the public welfare. Guidelines for abatement are provided in the code and in Chapter 1 of both the IPMC (see Sections 108 and 110) and the IFC.

[B] 1301.3.2 Compliance with other codes. Buildings that are evaluated in accordance with this section shall comply with the *International Fire Code* and *International Property Maintenance Code*.

❖ This section requires an existing building that is subjected to the evaluation scoring process of Section 1301.6 to also comply with the IFC and the IPMC. Those codes provide minimum requirements for health and safety that all existing buildings are expected to meet, regardless of whether there are any changes being made to the building or occupancy. Regardless of an existing building's final safety scores, the requirements of these referenced codes must be followed so occupants are safeguarded from the hazards addressed by those codes. This provision is similar to the requirements of Section 101.4.2.

[B] 1301.3.3 Compliance with flood hazard provisions. In flood hazard areas, buildings that are evaluated in accordance with this section shall comply with Section 1612 of the *International Building Code* if the work covered by this section constitutes *substantial improvement*.

❖ Regardless of how compliance with the provisions of this code are evaluated, buildings that are in flood hazard areas must meet the flood-resistant provisions of the IBC if the proposed work is determined to be a substantial improvement.

[B] 1301.4 Investigation and evaluation. For proposed work covered by this chapter, the building owner shall cause the

existing building to be investigated and evaluated in accordance with the provisions of Sections 1301.4 through 1301.9.

❖ This section and the subsequent subsections address what must be done by the owner/designer who elects to employ Chapter 13 for a proposed rehabilitation program and the corresponding action by the code official to assess the program objectively for approval or disapproval. The following actions must be taken:

- Fully investigate the building using both on-site inspections and research of all available building construction documents;
- Evaluate the building for conformance to Sections 1301.4 through 1301.9;
- Perform the required structural analysis of the structure;
- Determine whether the existing building, proposed work or change of occupancy complies with the accessibility provisions of Section 1301.2.5 (see commentary, Section 1301.5); and
- Submit to the code official documented results of the investigation and evaluation plus any proposed compliance alternatives.

Thus, the election and implementation of Chapter 13 by the designer or owner is part of a code compliance option that may be used for existing buildings that the code official has the responsibility to review and assess. A proper and satisfactorily prepared submission by the owner/designer offering qualitative and quantitative data requires review by the code official for approval. If the submission is disapproved, the code official must specifically cite any deficiencies and violations.

The owner is required to have an existing building and any proposed work therein investigated and evaluated for compliance with the 19 parameters of the evaluation process as specified in Section 1301.6.

[B] 1301.4.1 Structural analysis. The owner shall have a structural analysis of the *existing building* made to determine adequacy of structural systems for the proposed *alteration*, *addition* or *change of occupancy*. The analysis shall demonstrate that the building with the work completed is capable of resisting the loads specified in Chapter 16 of the *International Building Code*.

❖ The owner is required to have a complete structural analysis of the building performed to ensure that it can support the required loads. This requires that all interior loads meet the minimum load requirements of Chapter 16 of the IBC. Through this analysis, existing and altered buildings must be shown to be capable of supporting the expected loading. Any existing exterior member not affected by either interior loading or additional exterior loading need not be evaluated, provided that the structural member has, over a period of time, proven its ability to withstand the forces that normally create stress. Loads imposed on existing structural members by alterations, additions or a changes of occupancy must be shown to sustain the requirements of Chapter 16 of the IBC, as stated in Sections 1301.2 through 1301.2.2. This structural analysis provides the owner and the code official with reasonable assurance that the building is structurally safe.

[B] 1301.4.2 Submittal. The results of the investigation and evaluation as required in Section 1301.4, along with proposed compliance alternatives, shall be submitted to the *code official*.

❖ The results of the investigation, including the structural analysis and evaluation, must be submitted to the code official. If alternative methods, materials or equivalency concepts are proposed, these must also be submitted to the code official for review and approval.

[B] 1301.4.3 Determination of compliance. The *code official* shall determine whether the *existing building*, with the proposed *addition*, *alteration*, or *change of occupancy*, complies with the provisions of this section in accordance with the evaluation process in Sections 1301.5 through 1301.9.

❖ When the results of the investigation and evaluation are submitted to the code official, he or she must determine whether the proposed work conforms to the provisions of Chapter 13 and whether the evaluation was performed in accordance with Sections 1301.5 through 1301.9.

[B] 1301.5 Evaluation. The evaluation shall be comprised of three categories: fire safety, means of egress, and general safety, as defined in Sections 1301.5.1 through 1301.5.3.

❖ This section and the subsequent subsections address three general areas of safety to be evaluated: fire safety (FS), means of egress (ME) and general safety (GS). Section 1301.6 and the subsequent subsections address 19 safety parameters that reflect on those areas. Each of the 19 safety parameters indicated in Sections 1301.6.1 through 1301.6.19 must be carefully reviewed and assigned a numerical value that signifies the degree of safety influence on the three overall general safety categories. The overall evaluation is divided into three categories or areas, which are defined in Sections 1301.5.1 through 1301.5.3.

[B] 1301.5.1 Fire safety. Included within the fire safety category are the structural fire resistance, automatic fire detection, fire alarm, and fire-suppression system features of the facility.

❖ A partial list of the items used to evaluate fire safety in a building is given in this section.

[B] 1301.5.2 Means of egress. Included within the means of egress category are the configuration, characteristics, and support features for means of egress in the facility.

❖ The means-of-egress features that are evaluated by Chapter 13 fall into the general areas of configuration, characteristics and support features. The specific features include travel distance, dead ends, emergency lighting and exit capacity and number.

[B] 1301.5.3 General safety. Included within the general safety category are the fire safety parameters and the means-of-egress parameters.

❖ This category includes every item that is used in either the fire safety or means-of-egress evaluation.

[B] 1301.6 Evaluation process. The evaluation process specified herein shall be followed in its entirety to evaluate existing buildings. Table 1301.7 shall be utilized for tabulating the results of the evaluation. References to other sections of this code indicate that compliance with those sections is required in order to gain credit in the evaluation herein outlined. In applying this section to a building with mixed occupancies, where the separation between the mixed occupancies does not qualify for any category indicated in Section 1301.6.16, the score for each occupancy shall be determined, and the lower score determined for each section of the evaluation process shall apply to the entire building.

Where the separation between the mixed occupancies qualifies for any category indicated in Section 1301.6.16, the score for each occupancy shall apply to each portion of the building based on the occupancy of the space.

❖ This section is the key to understanding the entire evaluation process. The first sentence of this section clearly states that every one of the 19 safety parameters indicated in Sections 1301.6.1 through 1301.6.19 must be evaluated and nothing may be omitted. Although the evaluation process does not specifically evaluate all of the many issues that are regulated by the IBC for new construction, these 19 safety parameters have been determined to be the most critical factors related to the minimum degree of life safety and property protection needed in an existing building. The 19 safety parameters that must be evaluated are:

- Building height (see Section 1301.6.1);
- Building area (see Section 1301.6.2);
- Compartmentation (see Section 1301.6.3);
- Tenant and dwelling unit separations (see Section 1301.6.4);
- Corridor walls (see Section 1301.6.5);
- Vertical openings (see Section 1301.6.6);
- HVAC systems (see Section 1301.6.7);
- Automatic fire detection (see Section 1301.6.8);
- Fire alarm systems (see Section 1301.6.9);
- Smoke control (see Section 1301.6.10);
- Means-of-egress capacity and number (see Section 1301.6.11);
- Dead ends (see Section 1301.6.12);
- Maximum exit access travel distance to an exit (see Section 1301.6.13);
- Elevator control (see Section 1301.6.14);
- Means-of-egress emergency lighting (see Section 1301.6.15);
- Mixed occupancies (see Section 1301.6.16);
- Automatic sprinklers (see Section 1301.6.17);
- Standpipes (see Section 1301.6.18); and
- Incidental accessory occupancy (see Section 1301.6.19).

The assigning of numerical values to each of the 19 safety parameters establishes a measurable quantity of what each of the parameters contributes to the overall safety of the building. Some evaluated parameters have a negative influence; others have a positive one. In total, the parameters may or may not result in an acceptable building score. The evaluation will determine whether the existing building has enough positive parameters to overcome the negative parameters, or will indicate the negative factors that must be overcome. Modifications can be made to any aspect of the building that will accrue sufficient additional positive points to achieve the mandatory safety scores in each of the three evaluation categories. In other words, if, for example, -10 points was scored because of the absence of a mixed occupancy separation under Section 1301.6.16.1 (assume, for example, purposes that the evaluation failed by 10 points in the fire safety category), it does not necessarily mean that a fire barrier must be constructed to separate the mixed occupancies. While that would be an acceptable solution, modifications could be made that accrue at least 10 additional points in any one or more of the other parameters in the fire safety category.

After the 19 safety parameters have been evaluated and assigned a numerical value, the values are entered in Table 1301.7. The values must be tabulated to obtain the building score for each of the three evaluation categories.

Some of the 19 safety parameters listed require mandatory compliance with other sections of the code and establish the foundation for determining a proper evaluation of those parameters, regardless of whether the result is positive or negative. This involves a coordination of mandatory basic requirements with the respective existing building conditions to arrive at the numerical evaluations prescribed in Sections 1301.6.1 through 1301.6.19.

Section 1301.6.16 also addresses how mixed occupancies are handled in the evaluation. To apply this section, it is necessary to understand Section 508 of the IBC. When mixed occupancies in an existing building are not separated by fire barriers or fire walls complying with the requirements for new construction, the entire evaluation must be based on the occupancy with the most restrictive requirements. The evaluation process considers the score for the various occupancies and applies the lowest score to the entire building. When the mixed occupancies are separated by fire barriers in compliance with Section 508.4 of the IBC, they are to be evaluated separately and the score for each occupancy will apply to each portion based on its occupancy classification. If there are four different occupancies in the building, the values must be computed for each of the four occupancies. Each occupancy is required to meet the applicable mandatory building score for its occupancy classification. When mixed occupancies are separated by fire walls complying with the requirements of Section 706 of the IBC, separate buildings are created and must be evaluated separately for all 19 safety parameters. See the

commentary to Sections 1301.2.2 and 1301.6.16 for a further discussion of the application of the evaluation procedure for mixed occupancies.

[B] 1301.6.1 Building height. The value for building height shall be the lesser value determined by the formula in Section 1301.6.1.1. Chapter 5 of the *International Building Code*, including allowable increases due to automatic sprinklers as provided for in Section 504.2 of the *International Building Code*, shall be used to determine the allowable height of the building. Subtract the actual building height from the allowable height and divide by $12^1/_2$ feet (3810 mm). Enter the height value and its sign (positive or negative) in Table 1301.7 under Safety Parameter 1301.6.1, Building Height, for fire safety, means of egress, and general safety. The maximum score for a building shall be 10.

❖ As a starting point for the actual evaluation process, this section and Section 1301.6.1.1 define, in detail, how to perform the building height evaluation. The exact values are to be computed and compared against the mandatory safety scores. The values are not to be rounded. For calculation purposes, two decimal places would be appropriate. It is not necessary to build in any inaccuracy that occurs through the rounding process.

The maximum number of points that can be scored for a building, regardless of the building's allowable height as compared to its actual height, is 10. Building height, as well as building area, which is covered in Section 1301.6.2, determines the type of construction classification. Limiting the number of positive points that can be scored for height limits the weight that the type of classification could otherwise have on the overall evaluation. A low-rise building that is built of a high type of construction could accrue a disproportionately high number of points for height as compared to the number of points that are counted for other safety parameters. The intent is to avoid a situation in which many deficiencies in other critical safety parameters can be overcome simply by a high type of construction classification.

[B] 1301.6.1.1 Height formula. The following formulas shall be used in computing the building height value.

$$\text{Height value, feet} = \frac{(AH)-(EBH)}{125} \times CF \qquad \textbf{(Equation 13-1)}$$

$$\text{Height value, stories} = (AS - EBS) \times CF \qquad \textbf{(Equation 13-2)}$$

where:

AH = Allowable height in feet (mm) from Table 503 of the *International Building Code*.

EBH = Existing building height in feet (mm).

AS = Allowable height in stories from Table 503 of the *International Building Code*.

EBS = Existing building height in stories.

CF = 1 if *(AH) – (EBH)* is positive.

CF = Construction-type factor shown in Table 1301.6.6(2) if *(AH) – (EBH)* is negative.

Note: Where mixed occupancies are separated and individually evaluated as indicated in Section 1301.6, the values *AH, AS, EBH,* and *EBS* shall be based on the height of the occupancy being evaluated.

❖ Two height formulas for calculating the score to be entered in Table 1301.7 are given. One formula determines a height value based on the height in feet and the other formula determines a height value in number of stories. Both are based on the height limitations from Table 503 in the IBC and the height of the existing building. The denominator in the formula for height in feet, 12.5, represents an average story height in feet. Both formulas must be calculated and the lesser of the two calculated values is the value that must be used in the evaluation.

The actual story height and the overall existing building height are to be directly compared to Table 503 of the IBC. Table 503 of the IBC serves as a datum level that allows for establishing a numerical height value for the existing building by comparing its actual height and its type of construction as represented by a construction factor (*CF*). If the existing building's actual height in feet is less than or equal to the allowable height of Table 503 of the IBC, then the construction factor value is 1 (no negative or positive multiplier is factored in to the calculation). If the actual height exceeds the Table 503 of the IBC allowable height, the building is not in compliance with Table 503 of the IBC and represents a safety deficiency. A deficiency rating is assigned that is dependent on the type of construction. The construction factors to establish this negative value are given in Table 1301.6.6(2). When a building is not in compliance with Table 503 of the IBC, it is considered less safe than a building that does comply with Table 503. As a result, deficiency points are assessed. Additional safeguards must be provided to compensate for this condition. This is the primary reason that a different construction factor must be used for buildings not in compliance. The construction factor is the equivalent deficiency that must be overcome by providing additional protection in other areas that are to be evaluated.

Example 1:

A six-story building of Type IB construction is 60 feet (18 288 mm) tall. The building is not sprinklered. It contains a Group B business occupancy.

The allowable height from Table 503 of the IBC is 11 stories, 160 feet (48 800 mm).

AH = 160 feet

AS = 11 stories

EBH = 60 feet

EBS = 6 stories

CF = 1 from Table 1301.6.6(2) (because 160 - 60 is a positive number)

The governing building height value is 5, because it is the lesser of the two height values.

Example 2:

A seven-story building of Type IIIB construction is 80 feet (24 400 mm) tall. The building is sprinklered. It contains a Group M mercantile occupancy.

The allowable height from Table 503 of the IBC is four stories, 55 feet (16 775 mm).

AH = 55 + 20 (for sprinklers) = 75 feet

AS = 4 + 1 (for sprinklers) = 5 stories

EBS = 7 stories

EBH = 80 feet

CF = 3.5 from Table 1301.6.6(2) (because 75 - 80 is a negative number)

The governing building height value is -7, because it is the lesser of the two height values.

The values in the examples determine the entries for the Summary Sheet of Table 1301.7 for the Safety Parameter of Building Height on line 1301.6.1.

In Example 1, the height value of 5 is entered into the columns for fire safety (FS), means of egress (ME) and general safety (GS).

In Example 2, the height value of -7 is entered into the columns for fire safety (FS), means of egress (ME) and general safety (GS).

The assessed height value parameter is only one of the 19 safety parameters that need to be evaluated. Example 1 shows a positive contribution; however, this may not be enough to result in a sufficient overall building score. Similarly, the negative value in Example 2 may not in itself result in an overall insufficient building score.

[B] 1301.6.2 Building area. The value for building area shall be determined by the formula in Section 1301.6.2.2. Section 503 of the *International Building Code* and the formula in Section 1301.6.2.1 shall be used to determine the allowable area of the building. This shall include any allowable increases due to frontage and automatic sprinklers as provided for in Section 506 of the *International Building Code*. Subtract the actual building area from the allowable area and divide by 1,200 square feet (112 m²). Enter the area value and its sign (positive or negative) in Table 1301.7 under Safety Parameter 1301.6.2, Building Area, for fire safety, means of egress and general safety. In determining the area value, the maximum permitted positive value for area is 50 percent of the fire safety score as listed in Table 1301.8, Mandatory Safety Scores.

❖ In this section, the code user is shown how to calculate the building score for the building area. This section also requires the maximum score of a building in this category. The maximum value is 50 percent of just the fire safety score listed in Table 1301.8 (see commentary, Section 1301.6.2.2). This maximum score is applicable and equal for the three building score categories—fire safety, means of egress and general safety. The positive score is limited to prevent this one parameter from providing enough points to unjustifiably overcome too many deficiencies in other parameters.

[B] 1301.6.2.1 Allowable area formula. The following formula shall be used in computing allowable area:

$$A_a = \left(1 + l_f + l_s\right) \times A_t \qquad \textbf{(Equation 13-3)}$$

where:

A_a = Allowable area.

A_t = Tabular area per story in accordance with Table 503 (square feet) of the *International Building Code*.

l_s = Area increase factor for sprinklers (Section 506.3 of the *International Building Code*).

l_f = Area increase factor for frontage (Section 506.2 of the *International Building Code*).

❖ The formula used to calculate the allowable area of the building is a direct correlation of the area increases and reductions allowed for new buildings in Section 506 in the IBC. The use of these increases and reductions is addressed in Chapter 5 of the IBC.

[B] 1301.6.2.2 Area formula. The following formula shall be used in computing the area value. Determine the area value for each occupancy floor area on a floor-by-floor basis. For each occupancy, choose the minimum area value of the set of values obtained for the particular occupancy.

$$\text{Area value}_i = \frac{\text{Allowable area}_i}{1200 \text{ square feet}} \left[1 - \left(\frac{\text{Actual area}_1}{\text{Allowable area}_i} + \ldots + \frac{\text{Actual area}_n}{\text{Allowable area}_n} \right) \right] \qquad \textbf{(Equation 13-4)}$$

where:

i = Value for an individual separated occupancy on a floor.

n = Number of separated occupancies on a floor.

❖ The area formula provides a numerical value for the actual building area to be entered in Table 1301.7 for the Safety Parameter Building Area on line 1301.6.2. If the area of the existing building is less than the allowable area, it is considered to be safer and the building receives a positive score. If the area of the existing building is larger than the allowable area, it represents a condition that is judged to be less safe and the building receives a negative score.

To use the formula for existing buildings that contain mixed occupancies, an area value must be determined for each story of a building. If a building contains just one occupancy or just one occupancy on a particular floor separated from other floors, the formula simply reduces to the allowable area minus the actual area divided by the constant of 1,200. The formula is

also applicable to a story containing several separated occupancies. In such a situation, the formula requires each actual area to be divided by its respective allowable area. The resulting fractions are added together, subtracted from the constant of 1 and multiplied by the ratio of the allowable area of the particular use divided by the constant 1,200. This method of determining area values for several occupancies that are separated on a story is directly comparable to the unity formula in Section 508.2.4 of the IBC.

Example 1:

Figure 1301.6.2.2(1) illustrates a Group B building of Type IIA construction.

The building is five stories in height, unsprinklered.

The overall building area is 200 feet (60 960 mm) by 200 feet (60 960 mm).

$$\text{Area value} = \frac{75{,}000}{1{,}200}\left[1 - \left(\frac{40{,}000}{75{,}000}\right)\right]$$

$$= 62.5\,(1 - 0.533)$$

$$= 29.2$$

Allowable = 75,000 square feet area

Actual area = 40,000 square feet

In Table 1301.7, enter the following values for the Safety Parameter of Building Area on line 1301.6.2:

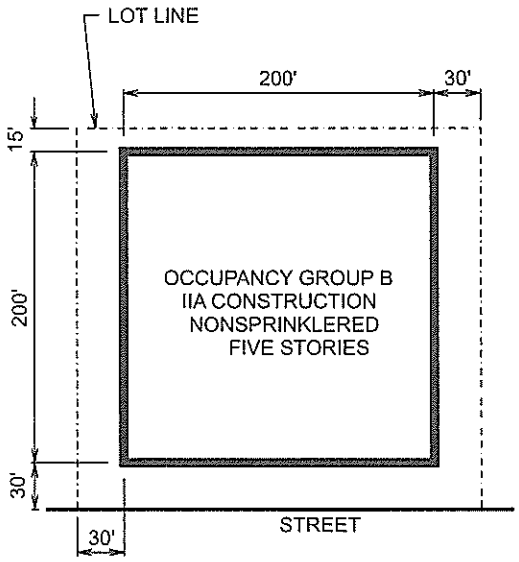
Fire safety (FS) = 15

Means of egress (ME) = 15

General safety (GS) = 15

These values are equal to 50 percent of the value in Table 1301.8 for the mandatory fire safety (MFS) score of 30 for a Group B occupancy. This is the maximum value credit permitted for the building area parameter of Section 1301.6.2, even though the area value has been computed as 29.2 in Section 1301.6.2.2.

The positive values entered in Table 1301.7 for the Safety Parameter of Building Area on line 1301.6.2 (FS = 15, ME = 12 and GS = 12) represents the evaluation for only one of the 19 safety parameters that must be assessed in arriving at the overall building score evaluation of Table 1301.7. As previously described for the building height parameter values for line 1301.6.1 of



ACTUAL AREA = 200' × 200' = 40,000 SQ.FT.

Allowable sprinkler increase = 0 (FROM SECTION 506.3)
Allowable open perimeter increase = 100% (FROM SECTION 506.2)
ALLOWABLE AREA IN TABLE 503 = 37,500 SQ.FT.

$$\text{Allowable building area per story} = \frac{(0 + 100 + 100) \times 37{,}500}{100} = \frac{200 \times 37{,}500}{100} = 75{,}000 \text{ SQ.FT.}$$

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2.

Figure 1301.6.2.2(1)
ALLOWABLE AREA—SINGLE OCCUPANCY BUILDING

Table 1301.7, a single parameter of the total 19 safety parameters to be assessed does not, in itself, determine the ultimate acceptable building score.

Example 2:

Figure 1301.6.2.2(2) illustrates a separated mixed occupancy building (Groups B, M and S-1) of Type IIIB construction.

The building is two stories in height, fully sprinklered.

The overall building area is 100 feet (30 480 mm) by 200 feet (60 960 mm).

Actual area for Group M on first story = 20,000 square feet (1858 m²).

Actual area for Group M on second story = 4,400 square feet (409 m²).

Actual area for Group B on second story = 10,000 square feet (929 m²).

Actual area for Group S-1 on second story = 5,600 square feet (520 m²).

SP = 200 percent (from Section 506.3 of the IBC)

OP = 16.7 percent (from Section 506.2 of the IBC)

Tabular areas from Table 503 of the IBC:

Group B = 19,000 square feet

Group M = 12,500 square feet

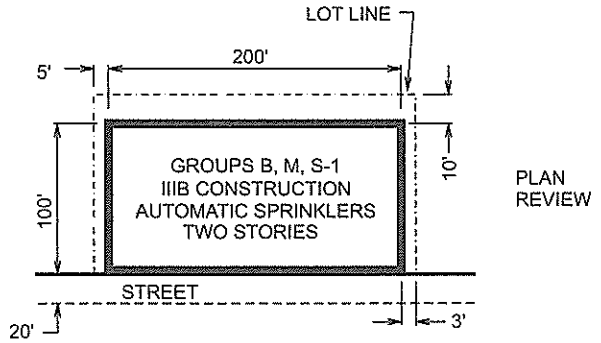
Group S-1 = 17,500 square feet

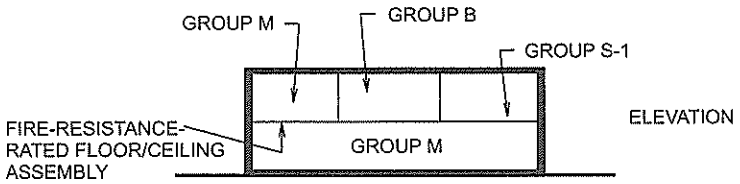
Allowable areas (AA):

$$AA = \frac{(200 + 16.7 + 100) \times \text{Tabular Area}}{100}$$

AA for Group B = 60,173 square feet

AA for Group M = 39,587 square feet





ACTUAL AREA = 100' × 200'
= 20,000 SQ.FT.

Allowable sprinkler increase = 200% (FROM SECTION 506.3 of the IBC)
Allowable open perimeter increase = 16.7% (FROM SECTION 506.2 of the IBC)
ALLOWABLE AREA IN TABLE 503 of the IBC (GROUP B) = 19,000 SQ.FT.
ALLOWABLE AREA IN TABLE 503 of the IBC (GROUP M) = 12,500 SQ.FT.
ALLOWABLE AREA IN TABLE 503 of the IBC (GROUP S-1) = 17,500 SQ.FT.

$$\text{Allowable building area per story GROUP B} = \frac{(200 + 16.7 + 100) \times 19{,}000}{100} = 60{,}173 \text{ SQ.FT.}$$

$$\text{Allowable building area per story GROUP M} = \frac{(200 + 16.7 + 100) \times 12{,}500}{100} = 39{,}587 \text{ SQ.FT.}$$

$$\text{Allowable building area per story GROUP S-1} = \frac{(200 + 16.7 + 100) \times 17{,}500}{100} = 55{,}422 \text{ SQ.FT.}$$

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m².

Figure 1301.6.2.2(2)
ALLOWABLE AREA—MIXED OCCUPANCY BUILDING

AA for Group S-1 = 55,422 square feet

Area values:

For Group M, first story:

$$\text{Area value} = \frac{39{,}587}{1{,}200}\left[1 - \left(\frac{20{,}000}{39{,}587}\right)\right]$$

$$= 33\,(1 - 0.5.5)$$

$$= 16.3$$

For Group B, second story:

$$\text{Area value} = \frac{60{,}173}{1{,}200}\left[1 - \left(\frac{10{,}000}{60{,}173} + \frac{4{,}400}{39{,}587} + \frac{5{,}600}{55{,}422}\right)\right]$$

$$= 50\,(1 - 0.5.5)$$

$$= 50\,(1 - 0.378)$$

$$\text{Area value} = 31$$

For Group M, second story:

$$\text{Area value} = \frac{39{,}587}{1{,}200}(1 - 0.378)$$

$$= 32.9(1 - 0.378)$$

$$\text{Area value} = 20.4$$

For Group S-1, second story:

$$\text{Area value} = \frac{55{,}422}{1{,}200}(1 - 0.378)$$

$$= 46(1 - 0.378)$$

$$\text{Area value} = 28.6$$

Since these mixed occupancies are being separated so that one of the categories indicated in Section 1301.6.16 is applicable, a separate score must be computed for each occupancy.

In this example, the area value for the Group B occupancy is calculated to be 31, but the maximum area value permitted is 50 percent of the MFS score listed in Table 1301.8. For a Group B occupancy, the MFS score is 30; therefore, the maximum positive value that can be entered into Table 1301.7 is 15.

When an occupancy is located in more than one story, a separate area value must be calculated for each story. For input into Table 1301.7, the area value to be used is the lesser of all the individual area values for that occupancy group, but not greater than 50 percent of the MFS score. In Figure 1301.6.2.2(2), there is an area classified as a Group M occupancy on both the first and second stories. The area value for the Group M occupancy on the first story is 16.3, and the area value for the second story is 20.4. For a Group M occupancy, the MFS score is 23; therefore, the maximum positive value that can be entered into Table 1301.7 is 11.5.

The area value for the Group S-1 occupancy portion of the building is 28.6. This value, just as the values for the other occupancies in this example, exceeds the 50-percent maximum permitted by the MFS score. For a Group S-1 occupancy, the MFS score is 19; therefore, the maximum positive value that can be entered into Table 1301.7 is 19.

[B] 1301.6.3 Compartmentation. Evaluate the compartments created by fire barriers or horizontal assemblies which comply with Sections 1301.6.3.1 and 1301.6.3.2 and which are exclusive of the wall elements considered under Sections 1301.6.4 and 1301.6.5. Conforming compartments shall be figured as the net area and do not include shafts, chases, stairways, walls, or columns. Using Table 1301.6.3, determine the appropriate compartmentation value (CV) and enter that value into Table 1301.7 under Safety Parameter 1301.6.3, Compartmentation, for fire safety, means of egress, and general safety.

❖ This section establishes and evaluates the compartments contained within an existing building by the effectiveness of the enclosing fire barrier walls and fire-resistant floor/ceiling assemblies. Larger compartments are considered to be a greater safety risk than smaller compartments because the entire compartment is assumed to be involved when a fire incident occurs in the compartment and, therefore, a single fire incident affects a greater portion of the building at one time.

Fire barriers must comply with Sections 1301.6.3.1 and 1301.6.3.2. Fire barriers are exclusive of the other separations or enclosures that are evaluated in Sections 1301.6.4 and 1301.6.5.

The evaluation of the compartments contained within an existing building is a linear function allowing interpolation between the various categories. This approach allows the compartmentation value to increase or decrease consistent with the actual changes in compartment sizes. Such an adjustment removes the previously built-in bias against smaller-sized buildings. Higher compartmentation values are assigned to buildings with smaller compartments.

TABLE 1301.6.3. See page 13-11.

❖ Table 1301.6.3 contains compartment values based on the group and the square footage of individual compartments. The value increase as the size of the compartment decreases in order to recognize the safety benefit of fire resistance rated compartmentation.

If the existing floor construction inherently complies with Section 1301.6.3.2, creating compartments by constructing fire barriers in accordance with Section 1301.6.3.1 could be a cost-effective way to increase the buildings safety score.

[B] 1301.6.3.1 Wall construction. A wall used to create separate compartments shall be a fire barrier conforming to Section 707 of the *International Building Code* with a fire-resistance rating of not less than 2 hours. Where the building is not divided into more than one compartment, the compartment size shall be taken as the total floor area on all floors. Where there is more than one compartment within a story, each compartmented area on such story shall be provided with a horizontal exit conforming to Section 1025 of the *International*

Building Code. The fire door serving as the horizontal exit between compartments shall be so installed, fitted, and gasketed that such fire door will provide a substantial barrier to the passage of smoke.

❖ This section states that the walls determining the boundary of the compartment need to have fire barrier ratings of not less than 2 hours. These assemblies must be constructed in accordance with Section 707 of the IBC. For an existing building, this may need to be evaluated by both analyzing available plans and on-site investigations with a professional engineering determination of the required 2-hour fire-resistance rating. If the fire-resistance rating is less than 2 hours or cannot be reasonably determined, such walls should not be considered as creating a compartment. The entire story of an existing building must then be considered the compartment. If 2-hour-rated floor/ceiling assemblies are not present, the compartment size becomes the total area on all stories.

Opening protection and continuity requirements of Section 707 of the IBC must be followed to maintain the integrity of the fire-resistance-rated wall assemblies and thus the compartments. Horizontal exits and their fire doors must comply with Section 1025 of the IBC.

The evaluation of an existing door condition requires an investigation of available engineering data and on-site inspections. Any uncertainty as to the performance of such doors may result in the openings being considered unprotected, which results in a larger assumed compartment area or requires modification of the door to meet the current requirements of Section 1025.3 of the IBC.

[B] 1301.6.3.2 Floor/ceiling construction. A floor/ceiling assembly used to create compartments shall conform to Section 712 of the *International Building Code* and shall have a fire-resistance rating of not less than 2 hours.

❖ The building features that provide the horizontal boundaries of the compartment need to provide effective fire-resistant integrity between floors. The existing floor/ceiling assemblies must be rated for 2 hours and need to be tight against exterior walls. Penetrations in the floor/ceiling assemblies must be protected in accordance with Section 712 of the IBC to maintain their fire-resistant integrity. The floor/ceiling assemblies must conform to all of the requirements of Section 712 of the IBC to create the level of compartmentation required for this evaluation parameter.

[B] 1301.6.4 Tenant and dwelling unit separations. Evaluate the fire-resistance rating of floors and walls separating tenants, including dwelling units, and not evaluated under Sections 1301.6.3 and 1301.6.5. Under the categories and occupancies in Table 1301.6.4, determine the appropriate value and enter that value in Table 1301.7 under Safety Parameter 1301.6.4, Tenant and Dwelling Unit Separation, for fire safety, means of egress, and general safety.

❖ This parameter is used to evaluate partitions in an existing building other than those used for the creation of compartments in Section 1301.6.3 or the enclosure of corridors in Section 1301.6.5. This section examines the level of separation between tenant spaces and dwelling units. The listed categories specifically reference Sections 707, 709 and 712 of the IBC not only for fire-resistance ratings, but also for continuity and opening protection purposes. Further credit is provided for existing buildings that have a 2-hour-rated separation between adjacent tenant spaces or dwelling units, which exceeds the requirement for new construction.

TABLE 1301.6.4
SEPARATION VALUES

OCCUPANCY	CATEGORIES				
	a	b	c	d	e
A-1	0	0	0	0	1
A-2	-5	-3	0	1	3
R	-4	-2	0	2	4
A-3, A-4, B, E, F, M, S-1	-4	-3	0	2	4
S-2	-5	-2	0	2	4

❖ Table 1301.6.4 provides values for tenant space and dwelling unit separations. The rationale for considering a nonfire-resistance-rated or incomplete separation as a safety deficiency is that even though the assembly may have some limited fire-resistant capability,

TABLE 1301.6.3
COMPARTMENTATION VALUES

OCCUPANCY	CATEGORIES				
	a Compartment size equal to or greater than 15,000 square feet	b Compartment size of 10,000 square feet	c Compartment size of 7,500 square feet	d Compartment size of 5,000 square feet	e Compartment size of 2,500 square feet or less
A-1, A-3	0	6	10	14	18
A-2	0	4	10	14	18
A-4, B, E, S-2	0	5	10	15	20
F, M, R, S-1	0	4	10	16	22

For SI: 1 square foot = 0.0929 m^2.

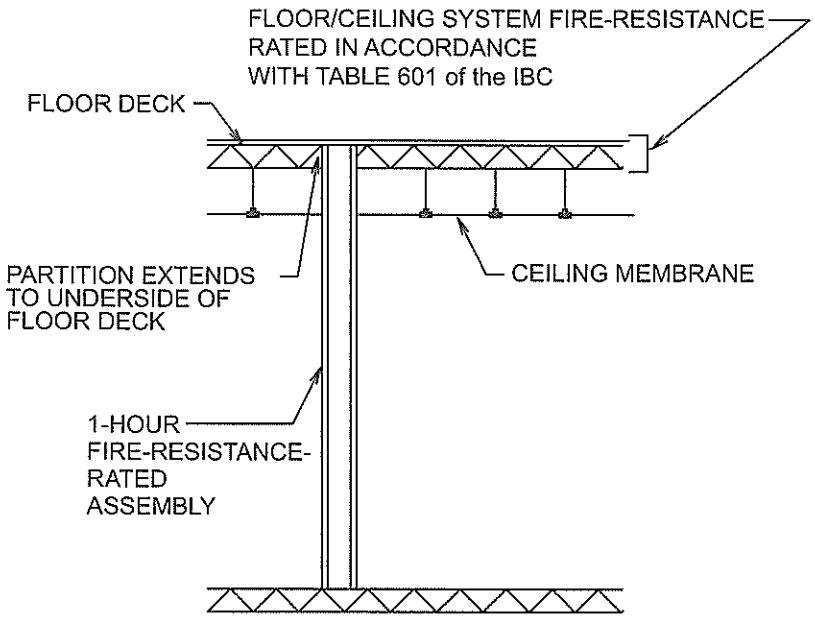
it cannot be assumed to provide the level of fire performance expected of a fully complying assembly. Buildings containing Group R occupancies have separation values based on the assumption that dwelling unit separations are more critical than tenant separations in other occupancies.

[B] 1301.6.4.1 Categories. The categories for tenant and dwelling unit separations are:

1. Category a—No fire partitions; incomplete fire partitions; no doors; doors not self-closing or automatic closing.
2. Category b—Fire partitions or floor assembly less than 1-hour fire-resistance rating or not constructed in accordance with Section 709 or 712 of the *International Building Code*, respectively.
3. Category c—Fire partitions with 1-hour or greater fire-resistance rating constructed in accordance with Section 709 of the *International Building Code* and floor assemblies with 1-hour but less than 2-hour fire-resistance rating constructed in accordance with Section 712 of the *International Building Code* or with only one tenant within the floor area.
4. Category d—Fire barriers with 1-hour but less than 2-hour fire-resistance rating constructed in accordance with Section 707 of the *International Building Code* and floor assemblies with 2-hour or greater fire-resistance rating constructed in accordance with Section 712 of the *International Building Code*.
5. Category e—Fire barriers and floor assemblies with 2-hour or greater fire-resistance rating and constructed in accordance with Sections 707 and 712 of the *International Building Code*, respectively.

❖ Tenant space and dwelling unit separations are categorized by the partitions being evaluated. The values of each category are listed in Table 1301.6.4 by occupancy classifications. Typical illustrations of the types of partitions are shown in Figures 1301.6.4.1(1) and 1301.6.4.1(2). The listed categories provide a graduated level of separation when compared to new construction requirements.

Category a addresses the situation where there is



- APARTMENTS, OCCUPANCY GROUP R-2
- FLOOR SYSTEM COMPLIES WITH TABLE 601 of the IBC
- SUSPENDED CEILING MEMBRANE IS PART OF RATED FLOOR/CEILING ASSEMBLY
- FLOOR-TO-DECK PARTITIONS

- CLASSIFICATION = CATEGORY c
- SCORE FROM TABLE 1301.6.4
- ENTER 0 IN TABLE 1301.7

Figure 1301.6.4.1(1)
DWELLING UNIT SEPARATION

no separation or there are gaps in the separation provided between tenant spaces or dwelling units.

Category b accounts for those tenant spaces or dwelling units that are separated from one another with less than a 1-hour rating.

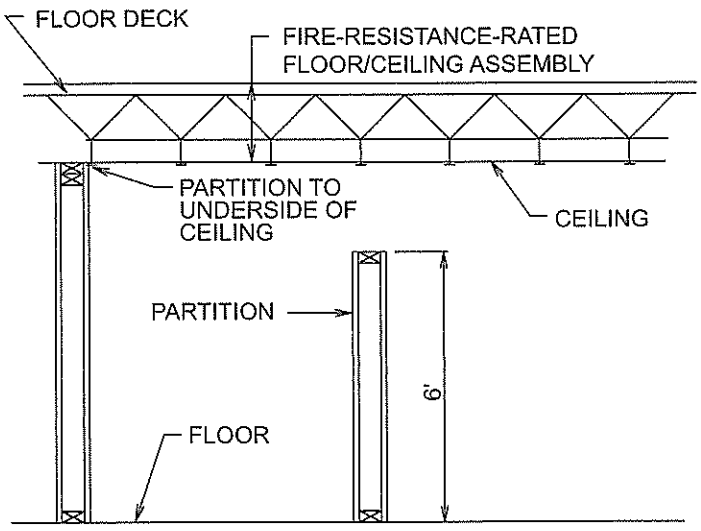
Category c represents what is required for new construction for tenant space and dwelling unit separation. An existing building meeting this level of compliance gains no benefit or penalty and, therefore, the separation value is zero.

Category d is given additional credit because the tenant space or dwelling unit separation has a fire-resistance rating that marginally exceeds the minimum required for new construction. Additionally, the walls are required to meet the fire barrier requirements of Section 707 of the IBC.

Category e provides increased credit for existing buildings that have walls and floor/ceiling assemblies with fire-resistance ratings exceeding the new construction requirement by at least 1 full hour. This increased level of fire-resistant separation in an existing building is credited accordingly with high separation values.

[B] 1301.6.5 Corridor walls. Evaluate the fire-resistance rating and degree of completeness of walls which create corridors serving the floor and that are constructed in accordance with Section 1018 of the *International Building Code*. This evaluation shall not include the wall elements considered under Sections 1301.6.3 and 1301.6.4. Under the categories and groups in Table 1301.6.5, determine the appropriate value and enter that value into Table 1301.7 under Safety Parameter 1301.6.5, Corridor Walls, for fire safety, means of egress, and general safety.

❖ Corridor walls are evaluated as fire partitions possessing an adequate fire-resistance rating and completeness to restrict the spread of fire into the corridor. Various categories require compliance with prescribed requirements in Sections 709.4, 715 and 1018 of the IBC. Existing corridor walls require investigation and analysis to determine the equivalency to code requirements. Figures 1301.6.5.1(1) and 1301.6.5.1(2) illustrate various corridor wall values. Corridor walls contrast with the compartmentation and tenant dwelling unit separations of Sections 1301.6.3 and 1301.6.4 by requiring an appropriate fire-resistance rating and continuity (see commentary, Section 709.4 of the IBC). The corridor wall evaluations do not include partitions required to establish a compartment (see Section 1301.6.3) or tenant and dwelling unit separations (see Section 1301.6.4). If a corridor walls serves as more than one of these elements, for example where it is both a corridor wall and it defines a compartment under Sec-



- FOOD COURT RESTAURANTS, OCCUPANCY GROUP A-3
- SOME PARTITIONS EXTEND TO CEILING OF FIRE-RESISTANCE-RATED FLOOR/CEILING ASSEMBLY
- NO CLOSERS ON DOORS BETWEEN ADJACENT TENANT SPACES
- SOME 6' PRIVACY PARTITIONS (PARTIAL PARTITIONS)

- CLASSIFICATION = CATEGORY a
- SCORE FROM TABLE 1301.6.4
- ENTER -4 IN TABLE 1301.7

For SI: 1 foot = 304.8 mm.

Figure 1301.6.4.1(2)
TENANT SEPARATION

tion 1301.6.3 and a corridor under this subsection, it may be evaluated under either one parameter or the other at the designer's option, but not both.

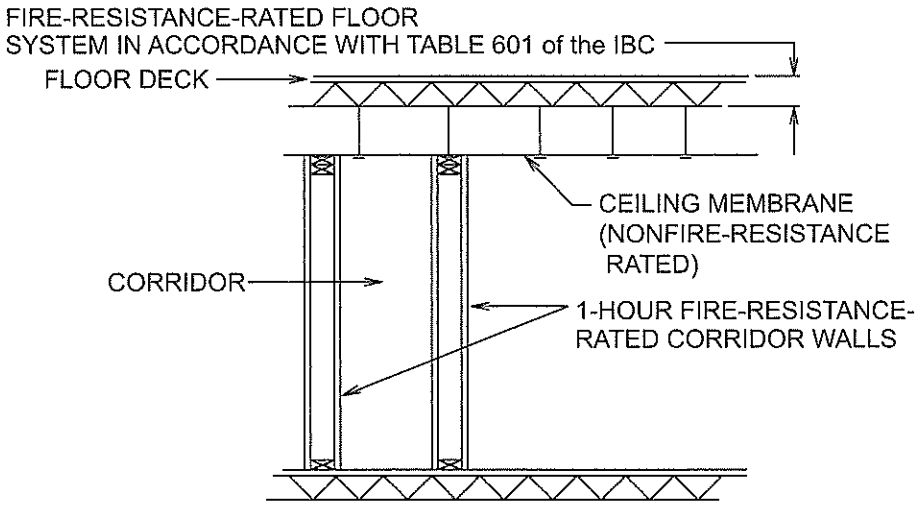
TABLE 1301.6.5
CORRIDOR WALL VALUES

OCCUPANCY	CATEGORIES			
	a	b	c[a]	d[a]
A-1	-10	-4	0	2
A-2	-30	-12	0	2
A-3, F, M, R, S-1	-7	-3	0	2
A-4, B, E, S-2	-5	-2	0	5

a. Corridors not providing at least one-half the travel distance for all occupants on a floor shall use Category b.

❖ Table 1301.6.5 assigns values to the various occupancies based on the fire-resistance rating and continuity of the corridor wall construction. Since corridors are enclosed (confined) spaces subject to the rapid buildup of smoke and heat, a degree of protection of the exit access route is necessary for occupants. The table reflects this emphasis through substantial negative scores in buildings without properly enclosed corridors. Both Section 1301.6.5 and this table place an emphasis on corridor walls that differs from that expressed elsewhere in the code. For example, Chapter 11 does not require corridors to be provided except in Group I-2 occupancies. The emphasis here is that when corridors are already present, they must provide a minimum level of protection because of the confined path of travel that they create. The table is an assessment of the relative risk represented by the corridor.

Note a to the table further controls the application of Categories c and d to existing buildings with certain means-of-egress arrangements. Although an existing building may have corridors with significant fire-resistance ratings and protected openings, little credit can be granted when the building occupants are protected for only a short period of time. Very short corridors in large floor plans or corridors located in just one tenant space of a floor plan provide a benefit to only a portion of the occupant load for a small portion of the overall exit access travel and, thus, do not accrue any positive points. Unless rated corridors are available for all occupants of that particular floor or they provide a pro-

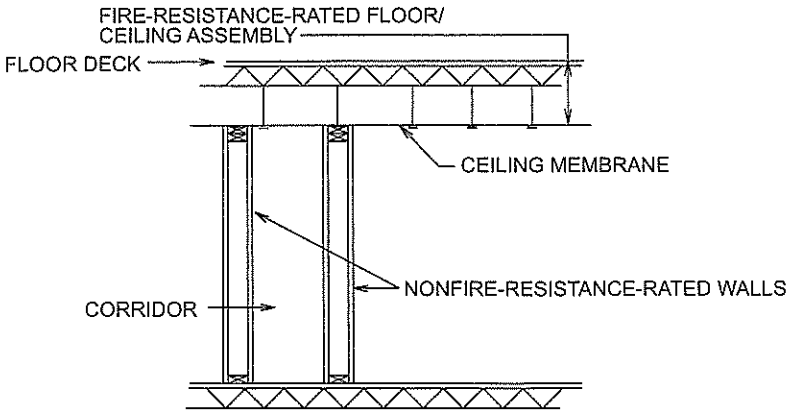


- OCCUPANCY GROUP B
- NO CLOSERS ON DOORS
- FLOOR SYSTEM COMPLIES WITH TABLE 601 of the IBC
- SUSPENDED CEILING MEMBRANE IS NONFIRE-RESISTANCE RATED
- CORRIDOR WALLS ARE 1-HOUR FIRE-RESISTANCE RATED

NOTE: THESE CONDITIONS PRODUCE A CATEGORY a BECAUSE OF BOTH INCOMPLETE FIRE PARTITIONS AND NO SELF-CLOSING DOORS

- CLASSIFICATION = CATEGORY a
- SCORE FROM TABLE 1301.6.5 = -5
- ENTER -5 IN TABLE 1301.7

Figture 1301.6.5.1(1)
CORRIDOR WALL VALUES—CATEGORY A



- OCCUPANCY GROUP B
- CLOSERS ON DOORS
- FIRE-RESISTANCE-RATED FLOOR/CEILING ASSEMBLY
- CORRIDOR WALLS ARE NONFIRE-RESISTANCE RATED
- PARTITIONS EXTEND TO UNDERSIDE OF CEILING MEMBRANE

NOTE: THESE CONDITIONS PRODUCE A CATEGORY b AS THE PARTITIONS HAVE LESS THAN A 1-HOUR RATING

- CLASSIFICATION = CATEGORY b
- SCORE FROM TABLE 1301.6.5 = -2
- ENTER -2 IN TABLE 1301.7

Figure 1301.6.5.1(2)
CORRIDOR WALL VALUES—CATEGORY b

tected path of travel for at least one-half of the occupants' overall travel length, negative corridor wall values are assigned. In existing buildings with very short or limited-use corridors, the code user is directed to use Category b, regardless of the corridors' fire-resistance ratings and opening protectives.

[B] 1301.6.5.1 Categories. The categories for corridor walls are:

1. Category a—No fire partitions; incomplete fire partitions; no doors; or doors not self-closing.
2. Category b—Less than 1-hour fire-resistance rating or not constructed in accordance with Section 709.4 of the *International Building Code*.
3. Category c—1-hour to less than 2-hour fire-resistance rating, with doors conforming to Section 715 of the *International Building Code* or without corridors as permitted by Section 1018 of the *International Building Code*.
4. Category d—2-hour or greater fire-resistance rating, with doors conforming to Section 715 of the *International Building Code*.

❖ Corridor walls are categorized by the partitions being evaluated. The values of each category are listed in Table 1301.6.5 by occupancy classification.

[B] 1301.6.6 Vertical openings. Evaluate the fire-resistance rating of exit enclosures, hoistways, escalator openings, and other shaft enclosures within the building, and openings between two or more floors. Table 1301.6.6(1) contains the appropriate protection values. Multiply that value by the construction type factor found in Table 1301.6.6(2). Enter the vertical opening value and its sign (positive or negative) in Table 1301.7 under Safety Parameter 1301.6.6, Vertical Openings, for fire safety, means of egress, and general safety. If the structure is a one-story building or if all the unenclosed vertical openings within the building conform to the requirements of Section 708 of the *International Building Code*, enter a value of 2. The maximum positive value for this requirement shall be 2.

❖ Verical openings are used to evaluate the fire-resistance ratings of openings between floors of a building and between shaft enclosures, such as stairs, elevator hoistways and escalator openings. This section also gives the formula for determining the score to be entered in Table 1301.7. This section does not apply to any building element that conforms to the requirements of Section 708.2 of the IBC, which requires all floor openings connecting two or more stories to be protected by a shaft enclosure complying with Section 708 of the IBC; however, Section 708.2 of the IBC includes a number of exceptions to these requirements, such as Section 404 of the IBC on atriums; a floor opening connecting no more than two floors that is not a means of egress and an escalator opening complying with Section 708.2 of the IBC. In new construction, unenclosed floor openings in the circumstances addressed in the exceptions do not present an undue fire safety risk and, therefore, need not accrue negative points in this evaluation method.

TABLE 1301.6.6(1)
VERTICAL OPENING PROTECTION VALUE

PROTECTION	VALUE
None (unprotected opening)	-2 times number of floors connected
Less than 1 hour	-1 times number of floors connected
1 to less than 2 hours	1
2 hours or more	2

❖ Table 1301.6.6(1) assigns relative protection values based on the fire-resistance ratings of the vertical openings in a building. The lower the fire-resistance rating, the greater the hazard to the rest of the building. The table also reflects the varying levels of impact to an existing building based on the number of stories that are connected by unprotected openings. The greater the number of floors that are interconnected by unprotected openings, the greater the number of negative points assessed in the existing building's evaluation scores. The closer the building comes to meeting new construction requirements for shaft protection, the greater the number of positive points that can be accrued. Noncomplying, unenclosed vertical openings consistently show up as contributing factors in unsuccessful fires. Consequently, a substantial number of points are at risk in this parameter, which is intended to be an incentive to bring noncomplying situations into compliance with new construction requirements.

TABLE 1301.6.6(2)
CONSTRUCTION-TYPE FACTOR

FACTOR	TYPE OF CONSTRUCTION								
	IA	IB	IIA	IIB	IIIA	IIIB	IV	VA	VB
	1.2	1.5	2.2	3.5	2.5	3.5	2.3	3.3	7

❖ Relative values for each type of construction are assigned in Table 1301.6.6(2). These represent the relative degree for fire hazard of each type of construction when compared to other types of construction. Similar factors were considered in the original development of Table 503 of the IBC for height and area limitations. When one building has two different opening circumstances that individually result in different values, the lower value must be used.

[B] 1301.6.6.1 Vertical opening formula. The following formula shall be used in computing vertical opening value.

$$VO = PV \times CF \qquad \textbf{(Equation 13-5)}$$

where:

VO = Vertical opening value.

PV = Protection value from Table 1301.6.6.(1).

CF = Construction type factor from Table 1301.6.6.(2).

❖ See the commentary to Section 1301.6.6.

[B] 1301.6.7 HVAC systems. Evaluate the ability of the HVAC system to resist the movement of smoke and fire beyond the point of origin. Under the categories in Section 1301.6.7.1, determine the appropriate value and enter that value into Table 1301.7 under Safety Parameter 1301.6.7, HVAC Systems, for fire safety, means of egress, and general safety.

❖ This section evaluates the heating, ventilating and air-conditioning (HVAC) system's potential for resisting the movement and spread of fire and smoke. This section does not address HVAC systems that are used exclusively for smoke control in the building. The systems evaluated in this section are those that use either supply air, return air or exhaust air. For example, a typical building might have supply air ducts or shafts, return air ducts or shafts, toilet exhaust ducts or shafts, and kitchen exhaust ducts or shafts, all of which are considered HVAC systems. All systems in the building are evaluated and the lowest score obtained by any of the systems is the score that must be assigned to the entire building.

These provisions include two other safety aspects that are also applicable for new construction: plenums and air movement in egress elements, such as exit access corridors and exit stairways. These factors can significantly affect the relative safety of the occupants of the existing building in a fire condition. In some cases, these safety aspects can be more important than just the number of stories connected by an HVAC system.

[B] 1301.6.7.1 Categories. The categories for HVAC systems are:

1. Category a—Plenums not in accordance with Section 602 of the *International Mechanical Code*. -10 points.
2. Category b—Air movement in egress elements not in accordance with Section 1018.5 of the *International Building Code*. -5 points.
3. Category c—Both Categories a and b are applicable. -15 points.
4. Category d—Compliance of the HVAC system with Section 1018.5 of the *International Building Code* and Section 602 of the *International Mechanical Code*. 0 points.
5. Category e—Systems serving one story; or a central boiler/chiller system without ductwork connecting two or more stories. +5 points.

❖ The five categories that must be used in the evaluation process are defined in this section, along with their applicable values. The applicable value is entered in Table 1301.7 for the Safety Parameter of HVAC Systems on line 1301.6.7. These values are not occupancy sensitive, since the spread of fire is dependent on the HVAC system present in the existing building, not on its occupancy classification.

Category a requires a value of -10 for existing buildings that contain plenums not in compliance with the requirements of Section 602 of the *International Mechanical Code*® (IMC®). Locations of plenums within the existing buildings the materials they are built of relative to the building's type of construction and the materials exposed to plenum air must all be evaluated.

Category b corresponds to existing buildings that have exit access corridors or exit stairways that are

used to supply, return or exhaust air, or for other ventilation purposes. That type of layout puts the existing building's occupants at greater risk and must, therefore, be penalized with a value of -5.

Category c is applicable when an existing building has both noncomplying plenums and corridors or stairways used for air movement. A value of -15 must be assigned to such a building because the movement of smoke and fire throughout would pose an even greater hazard to the occupants.

Category d represents the base value of zero. A newly constructed building is required to meet all the provisions of Section 1018.5 of the IBC and Section 602 of the IMC. An existing building that complies with these provisions is meeting this same minimum compliance level and, therefore, is neither penalized nor given benefit for that compliance.

Category e specifies a value of 5 points for HVAC systems that serve only one story of a building. The hazards of a fire spreading laterally through a story of a building via the HVAC system are minimal; therefore, the code assigns a positive value. A boiler/chiller system also does not lend itself to fire spread as long as there is no air movement in ducts.

Example 1:

A Group R-2 apartment building is six stories in height. Each apartment has its own HVAC equipment located within the dwelling unit. Bathrooms are ventilated by fans connected to a central exhaust shaft; kitchen exhaust hoods connect to a central exhaust shaft serving all floors. Corridors have a direct outside-supply air system on each floor with no exhaust. The HVAC systems are classified as Category b because the corridors are being used as the makeup air source for the bathroom and kitchen exhausts. A score of -5 is, therefore, entered in Table 1301.7 for the Safety Parameter for the HVAC Systems on line 1301.6.7.

Example 2:

A Group S-2 low-hazard storage occupancy is located in a one-story building. The building is preengineered steel Type IIB construction, and has a suspended gypsum board ceiling. Gypsum board has also been attached to the underside of the ceiling joists to serve as the upper membrane of a return air plenum. The plenum also contains plastic fire sprinkler piping for the automatic fire suppression system that is installed throughout the building.

The plenum is classified as noncombustible in accordance with Section 602 of the IMC. As long as the plastic fire sprinkler piping meets the optical density and flame spread limits, the plenum is in compliance with the code requirements for new construction. Therefore, the HVAC system will be classified as Category d. A value of zero is, therefore, entered in Table 1301.7 for the Safety Parameter of the HVAC Systems on line 1301.6.7.

[B] 1301.6.8 Automatic fire detection. Evaluate the smoke detection capability based on the location and operation of automatic fire detectors in accordance with Section 907 of the *International Building Code* and the *International Mechanical Code*. Under the categories and occupancies in Table 1301.6.8, determine the appropriate value and enter that value into Table 1301.7 under Safety Parameter 1301.6.8, Automatic Fire Detection, for fire safety, means of egress, and general safety.

❖ This section considers the use of smoke detectors in a building. To receive credit for the smoke detectors, they must be connected to audible alarms and installed in accordance with Section 907 of the IBC and Section 606 of the IMC.

TABLE 1301.6.8
AUTOMATIC FIRE DETECTION VALUES

OCCUPANCY	CATEGORIES				
	a	b	c	d	e
A-1, A-3, F, M, R, S-1	-10	-5	0	2	6
A-2	-25	-5	0	5	9
A-4, B, E, S-2	-4	-2	0	4	8

❖ Table 1301.6.8 assigns values for each occupancy. The use of detectors increases the safety in a building by providing early warning of a fire condition to occupants. The lack of detectors and the associated early warning is considered less than optimum for safety in occupancies with high population densities and high combustible loads. Large deficiency points are accrued if adequate detection systems are not provided.

Example:

A four-story Group R-1 hotel has corridors and an elevator lobby on each story. Smoke detectors are installed throughout the corridors, closets, rooms and elevator lobbies. Single-station detectors are installed in the guestrooms. There are smoke detectors in the HVAC return air system and a fire alarm system is provided. An analysis of these building characteristics results in the selection of Category d. To be classified in Category e, guestrooms must have detectors connected to the building's emergency electrical system and annunciated by each room at a constantly attended location, such as the front desk. Additionally, the fire alarm system must be capable of being manually activated by the front desk when a smoke detector operates.

Category d value from Table 1301.6.8 = 2.

Enter 2 in Table 1301.7 for the Safety Parameter 1301.6.8 of Automatic Fire Detection on line 1301.6.8.

[B] 1301.6.8.1 Categories. The categories for automatic fire detection are:

1. Category a—None.
2. Category b—Existing smoke detectors in HVAC systems and maintained in accordance with the *International Fire Code*.
3. Category c—Smoke detectors in HVAC systems. The detectors are installed in accordance with the requirements for new buildings in the *International Mechanical Code*.

4. Category d—Smoke detectors throughout all floor areas other than individual sleeping units, tenant spaces and dwelling units.

5. Category e—Smoke detectors installed throughout the floor area.

❖ The categories are based on the location and completeness of the smoke detection system.

The categories represent a graduation in the levels of smoke detection that ranges from no detectors in Category a to full detection throughout all fire area spaces in Category e.

Category a is a facility that has no automatic smoke detection system.

Category b acknowledges that the IMC currently requires HVAC system detectors in more locations than may have been required in less contemporary model codes. This category, therefore, assumes that there are some smoke detectors in an existing building's HVAC system, but not to the extent required by the IMC for new construction. If the limited HVAC system detectors are maintained in accordance with the IFC, the detection system qualifies as Category b.

Category c addresses existing buildings that have upgraded HVAC systems with duct detectors installed in accordance with the IMC. The detection values for Category c are zero, since this is the level of protection required for new construction.

Category d is the classification for existing buildings that have full detection coverage throughout the public and common use spaces.

Category e has smoke detectors throughout floor areas in compliance with the provisions for new construction.

[B] 1301.6.9 Fire alarm systems. Evaluate the capability of the fire alarm system in accordance with Section 907 of the *International Building Code*. Under the categories and occupancies in Table 1301.6.9, determine the appropriate value and enter that value into Table 1301.7 under Safety Parameter 1301.6.9, Fire Alarm System, for fire safety, means of egress, and general safety.

❖ This section evaluates the capabilities of building fire alarm systems that are separate from the automatic fire detection system evaluated in Section 1301.6.8. A fire alarm system that is manually operated or activated by smoke detectors or sprinkler water-flow devices alerts the occupants to a fire condition. The fire alarm system will notify the occupants with visible or audible alarms so they may begin to take appropriate action. These systems are of particular importance in assembly, business, educational or residential occupancies, which can have large numbers of occupants in rooms with concentrated seating or people who are sleeping.

TABLE 1301.6.9
FIRE ALARM SYSTEM VALUES

OCCUPANCY	CATEGORIES			
	a	b[a]	c	d
A-1, A-2, A-3, A-4, B, E, R	-10	-5	0	5
F, M, S	0	5	10	15

a. For buildings equipped throughout with an automatic sprinkler system, add 2 points for activation by a sprinkler water-flow device.

❖ Table 1301.6.9 gives values for each occupancy and type of fire alarm system provided. It reflects the idea that the presence of an alarm system in a building usually creates a safer condition for the occupants when compared to a building without a fire alarm system.

Deficiency points are assigned to occupancies without a fire alarm system but that have a high occupant load or number of sleeping occupants, such as Groups A-1, A-2, A-3, A-4, B, E and R, which are included in Categories a and b.

Example:

A one-story building with an assembly occupancy has a complete manual fire alarm system, a voice alarm system, a public address system and a fire command station that does not contain status indicators and controls for the air-handling system. The fire command station does not have emergency power or lighting system controls. It also does not have a fire department communication panel. As a result, the building is classified in Category c.

Category c value from Table 1301.6.9 = 0.

Enter 0 in Table 1301.7 for the Safety Parameter of Fire Alarm System on line 1301.6.9.

[B] 1301.6.9.1 Categories. The categories for fire alarm systems are:

1. Category a—None.

2. Category b—Fire alarm system with manual fire alarm boxes in accordance with Section 907.3 of the *International Building Code* and alarm notification appliances in accordance with Section 907.5.2 of the *International Building Code*.

3. Category c—Fire alarm system in accordance with Section 907 of the *International Building Code*.

4. Category d—Category c plus a required emergency voice/alarm communications system and a fire command station that conforms to Section 403.4.5 of the *International Building Code* and contains the emergency voice/alarm communications system controls, fire department communication system controls, and any

other controls specified in Section 911 of the *International Building Code* where those systems are provided.

❖ These categories are defined by the fire alarm system that is provided within the existing building.

Category a means that there is no fire alarm system in the building or it does not conform to all the requirements of Section 907 of the IBC. This includes a system that does not have a secondary power supply in accordance with Section 907 of the IBC or one where the zones of a floor exceed 22,500 square feet (2090 m^2), as noted in Section 907.6.3 of the IBC.

Category b applies when the manual fire alarm boxes comply with Section 907.4.2.1 of the IBC and NFPA 72. The alarm-notification appliances, specifically the audible alarms, are in accordance with Section 907.5.2.1 of the IBC. Location, height and color of the manual fire alarm boxes must be specifically evaluated for compliance, along with the sound levels of the audible alarms when compared to the normal sound levels within the existing building.

Category c requires that the fire alarm system comply with Section 907 of the IBC and NFPA 72. This category indicates that a complete fire alarm system is present in the existing building and that the system complies with all the requirements for new construction.

Category d is applicable for a building that is provided with a fire command station for fire department operations that complies with Section 911 of the IBC. This is a fire command station of a type that is only required in new construction for high-rise buildings (see Section 403.8 of the IBC). However, for purposes of this evaluation parameter, Category d is applicable for any building that provides the fire command station that complies with Section 911 of the IBC, including low-rise buildings. The elements required in the fire command station include:

- The emergency voice/alarm communication system unit;
- The fire department communication unit;
- Fire detection and alarm system annunciator unit;
- An annunciator unit that visually indicates the location of elevators and whether they are operational;
- Status indicators and controls for air-handling systems;
- Fire-fighter's control panel required by Section 909.16 of the IBC, if the building has a smoke control system;
- Controls for unlocking stairway doors simultaneously;
- Sprinkler valve and water-flow detector display panels;
- Emergency and standby power status indicators;
- A telephone for fire department use with controlled access to the public telephone system;
- Fire pump status indicators, if the building has one or more fire pumps;
- Schematic building plans indicating the typical floor plan and detailing the building core, means of egress, fire protection systems, fire-fighting equipment and fire department access;
- A worktable;
- Generator supervision devices, manual start and transfer features if the building has one or more generators; and
- A public address system if such a system is required by other provisions of the code.

[B] 1301.6.10 Smoke control. Evaluate the ability of a natural or mechanical venting, exhaust, or pressurization system to control the movement of smoke from a fire. Under the categories and occupancies in Table 1301.6.10, determine the appropriate value and enter that value into Table 1301.7 under Safety Parameter 1301.6.10, Smoke Control, for means of egress and general safety.

❖ This section is used to evaluate characteristics that could limit smoke migration in the building, including operable windows, mechanical exhaust systems, pressurized stairways or smokeproof enclosures.

TABLE 1301.6.10
SMOKE CONTROL VALUES

OCCUPANCY	CATEGORIES					
	a	b	c	d	e	f
A-1, A-2, A-3	0	1	2	3	6	6
A-4, E	0	0	0	1	3	5
B, M, R	0	2[a]	3[a]	3[a]	3[a]	4[a]
F, S	0	2[a]	2[a]	3[a]	3[a]	3[a]

a. This value shall be 0 if compliance with Category d or e in Section 1301.6.8.1 has not been obtained.

❖ Table 1301.6.10 assigns values for each occupancy and category of smoke control in the building. The table represents the relative benefits to the building occupants of various levels of smoke control methods provided in the building.

There are no negative points accrued under any circumstances, but zero positive points are indicated if no smoke control or only limited smoke control is provided. The table also indicates the value of smoke control in the exit stairs of a building and of automatic sprinkler systems as a means of limiting the volume of smoke production from a fire. Note a of the table assigns zero credit points for Groups B, M, R, F and S unless the building complies with Category d or e in Section 1301.6.8.1, which are the automatic fire detection system requirements.

Example 1:

A Group A-3 church sanctuary is located in a one-story building. It has no operable windows and no smoke control system.

Category a is applicable and the value from Table 1301.6.10 = 0.

Enter 0 in Table 1301.7 for the Safety Parameter of Smoke Control on line1301.6.10, for only means of egress (ME) and general safety (GS) parameters. No entry is made under the fire safety (FS) parameter.

Example 2:

A three-story Group E high school has operable windows throughout the building. The stairways are interior without windows or a pressurization system.

Category b is applicable and the value from Table 1301.6.10 = 0.

Enter 0 in Table 1301.7 for the Safety Parameter 1of Smoke Control on line 1301.6.10, for means of egress (ME) and general safety (GS) parameters.

Example 3:

A two-story Group A-2 nightclub is sprinklered throughout and has a smoke control system that meets the requirements for Category e.

Category e is applicable and the value from Table 1301.6.10 = 6.

Enter 6 in Table 1301.7 for the Safety Parameter of Smoke Control on line 1301.6.10, for means of egress (ME) and general safety (GS) parameters.

Example 4:

A six-story Group B office building has three stairways: one is a smokeproof enclosure conforming to Section 909.20 of the IBC; one is pressurized in accordance with Section 909.20.5 of the IBC; and one has operable exterior windows. The building has smoke detectors throughout all floor spaces and fire areas.

Category f is applicable and the value from Table 1301.6.10 = 4.

Enter 4 in Table 1301.7 for the Safety Parameter 1of Smoke Control on line 1301.6.10, for means of egress (ME) and general safety (GS).

If detectors are omitted from some of the offices of the buildings, then a score of 0 must be entered in Table 1301.7. This is determined from Note a in Table 1301.6.10.

[B] 1301.6.10.1 Categories. The categories for smoke control are:

1. Category a—None.
2. Category b—The building is equipped throughout with an automatic sprinkler system. Openings are provided in exterior walls at the rate of 20 square feet (1.86 m^2) per 50 linear feet (15 240 mm) of exterior wall in each story and distributed around the building perimeter at intervals not exceeding 50 feet (15 240 mm). Such openings shall be readily openable from the inside without a key or separate tool and shall be provided with ready access thereto. In lieu of operable openings, clearly and permanently marked tempered glass panels shall be used.
3. Category c—One enclosed exit stairway, with ready access thereto, from each occupied floor of the building. The stairway has operable exterior windows, and the building has openings in accordance with Category b.
4. Category d—One smokeproof enclosure and the building has openings in accordance with Category b.
5. Category e—The building is equipped throughout with an automatic sprinkler system. Each floor area is provided with a mechanical air-handling system designed to accomplish smoke containment. Return and exhaust air shall be moved directly to the outside without recirculation to other floor areas of the building under fire conditions. The system shall exhaust not less than six air changes per hour from the floor area. Supply air by mechanical means to the floor area is not required. Containment of smoke shall be considered as confining smoke to the floor area involved without migration to other floor areas. Any other tested and approved design that will adequately accomplish smoke containment is permitted.
6. Category f—Each stairway shall be one of the following: a smokeproof enclosure in accordance with Section 1022.9 of the *International Building Code*; pressurized in accordance with Section 909.20.5 of the *International Building Code*; or shall have operable exterior windows.

❖ The six categories to be evaluated are compared to the occupancies to determine the score to be entered in Table 1301.7 for the Safety Parameter of Smoke Control on line1301.6.10.

Category a means there is no method of controlling smoke in the building.

Category b means the existing building is sprinklered and there are exterior windows that can be readily opened without the use of keys or tools. This category recognizes the benefit of manual venting capability taken from the high-rise provisions of the IBC for new construction, which includes automatic sprinkler protection. Operable panels or windows in the exterior walls must be provided at the rate of 20 square feet per 50 lineal feet (1.85 m^2 per 15 240 mm) of exterior wall in each story. The openings must be distributed around the perimeter of the building at intervals not more than 50 feet (15 240 mm) between windows. A story with very high ceilings may have a strip of windows located well above the floor with latches or controls that are not easily reachable. Such openings would not meet Category b standards, even if they are provided and distributed at the required rate.

Category c requires at least one enclosed exit stairway to have operable windows that open to the exterior. Additionally, the building must have operable windows complying with the size and spacing requirements of Category b.

Category d requires a minimum of one smokeproof enclosure and operable windows in the building. These operable windows are the same as those addressed in Category b. By definition, a smokeproof enclosure refers to an enclosed interior exit stairway that conforms to Section 1009 of the IBC as designated in Section 1022 of the IBC.

Section 1022.9 requires stairways to be protected from smoke by one of two methods: a smokeproof enclosure or stairway pressurization design (see Section 909.20.5 of the IBC).

Additional requirements that must be considered when evaluating a smokeproof enclosure are: access

(see Section 909.20.1 of the IBC), construction (see Section 909.20.2 of the IBC), ventilating equipment (see Section 909.20.6 of the IBC) and standby power (see Section 909.20.6.2 of the IBC).

Category e recognizes the use of a mechanical smoke control system designed in accordance with the provisions of the code in a fully sprinklered building. Each fire area within the building must have a mechanical smoke control system. Return and exhaust air from the system must be discharged directly to the exterior to achieve the necessary level of protection. A specific air-change requirement is provided, independent of the fire area's volume or size.

Category f recognizes the merits of smokeproof enclosures, pressurized stairways and stairways with operable exterior windows. To be classified in this category, all stairways in the building must comply with the requirements of any one, or a combination of, the three types of stairways. It is possible for a single building to have a smokeproof enclosure, a pressurized stairway and a stairway with operable exterior windows.

Both the categories and the occupancy of the building are used in determining the score that will be entered in Table 1301.7. This score is determined from Table 1301.6.10. Note a in Table 1301.6.10 can have a significant impact on the scores. The note states that, even if the building has some level of smoke control, it is to receive no credit if it does not have an automatic fire detection system complying with Category d or e in Section 1301.6.8.1.

[B] 1301.6.11 Means-of-egress capacity and number. Evaluate the means-of-egress capacity and the number of exits available to the building occupants. In applying this section, the means of egress are required to conform to the following sections of the *International Building Code*: 1003.7, 1004, 1005.1, 1014.2, 1014.3, 1015.2, 1021, 1025.1, 1027.2, 1027.6, 1028.2, 1028.3, 1028.4 and 1029. [except that the minimum width required by this section shall be determined solely by the width for the required capacity in accordance with Table 1301.6.11(1)]. The number of exits credited is the number that is available to each occupant of the area being evaluated. Existing fire escapes shall be accepted as a component in the means of egress when conforming to Section 705.3.1.2. Under the categories and occupancies in Table 1301.6.11(2), determine the appropriate value and enter that value into Table 1301.7 under Safety Parameter 1301.6.11, Means-of-Egress Capacity, for means of egress and general safety.

❖ This section addresses the exit capacity and number of existing exits available to the building occupants. Before a building can be evaluated in this category, and Chapter 13 in general, it must comply with the sections of the IBC listed.

The means of egress is required to conform to the following IBC sections for new construction before evaluation:

- Section 1003.7 of the IBC establishes that elevators, escalators and moving walks can not be considered as part of the means of egress.
- Section 1004 of the IBC establishes the minimum number of occupants the exit facilities must accommodate.
- Section 1005.1 of the IBC defines the capacity of the means-of-egress by identifying a minimum width of egress component per occupant. This is used to calculate the total capacity of the means-of-egress component. Note that Table 1301.6.11(1) is to be used to determine minimum egress width.
- Section 1014.2 of the IBC establishes requirements for egress through intervening spaces.
- Section 1014.3 of the IBC establishes requirements for common path of egress travel.
- Section 1015.2 of the IBC establishes requirements for the remoteness of exit doors and means-of-egress doors.
- Section 1021 of the IBC establishes requirements for minimum number of exits.
- Sections 1027.1, 1027.2 and 1027.6 of the IBC establish requirements related to the exit discharge.
- Sections 1028.2, 1028.3 and 1028.4 of the IBC establish requirements related to exits and lobbies for assembly occupancies.
- Section 1029 of the IBC establishes requirements for emergency escape and rescue.
- Section 3406.1.2 of the IBC permits the continued use of existing fire escapes in existing buildings only. Evaluation of the means-of-egress capacity involves all egress components, including exit access, exits and exit discharge. This evaluation is correlated to the requirements for the means-of-egress for new construction.

[B] 1301.6.11.1 Categories. The categories for means-of-egress capacity and number of exits are:

1. Category a—Compliance with the minimum required means-of-egress capacity or number of exits is achieved through the use of a fire escape in accordance with Section 305.

2. Category b—Capacity of the means of egress complies with Section 1004 of the *International Building Code*, and the number of exits complies with the minimum number required by Section 1021 of the *International Building Code*.

3. Category c—Capacity of the means of egress is equal to or exceeds 125 percent of the required means-of-egress capacity, the means of egress complies with the minimum required width dimensions specified in the *International Building Code*, and the number of exits complies with the minimum number required by Section 1021of the *International Building Code*.

4. Category d—The number of exits provided exceeds the number of exits required by Section 1021 of the *International Building Code*. Exits shall be located a distance

apart from each other equal to not less than that specified in Section 1015.2 of the *International Building Code*.

5. Category e—The area being evaluated meets both Categories c and d.

❖ Five categories must be considered. These categories and the occupancy of the building will determine the score entered in Table 1301.7.

Category a is applicable to buildings that comply with either the means-of-egress capacity or the number of exits, including the use of fire escapes. Although the code allows fire escapes to be used as an egress element in existing buildings, this is the least desirable option in any type of building. The code requires a building using fire escapes to use Category a and its corresponding negative points.

Category b is applicable to buildings that meet the minimum requirements of Sections 1003 and 1007of the IBC. These represent the code requirements for new construction and, consequently, there are no positive or negative points awarded.

Category c is applicable to buildings that meet the minimum width and number of exits but which exceed the egress capacity requirements for new construction. This category provides small positive points for existing buildings that meet all of the following requirements:

- The capacity of all the means-of-egress components is greater than 125 percent of the required capacity.
- All of the means-of-egress components comply with the minimum required widths [e.g., 32-inch (813 mm) clear for doors, corridors that are 44 inches (1118 mm) wide and stairways].
- The minimum number of exits is provided based on the number of occupants on each floor level.

By providing oversized egress capacity and minimum egress width requirements, an existing building has added safety, which is rewarded with a small number of positive points.

Category d is applicable to buildings that provide a greater number of exits than required by Section 1021 of the IBC, which contributes a positive factor based on providing occupants with more available routes for exiting the building. Before credit can be given to an existing building with a greater number of exits, the exits must meet the remoteness criteria for new construction set forth in Section 1015.2 of the IBC.

Category e provides additional credit for existing buildings that have the characteristics of both Categories c and d. Such a building, which has oversized capacities in its egress elements, minimum required clear widths for the egress components and additional exits that are all remotely located from one another, merits additional points in occupancies with high occupant loads. In Group B, F, R and S occupancies, any additional capacity or increased number of exits is not as significant a factor and no positive points are awarded for these occupancies.

TABLE 1301.6.11(1)
EGRESS WIDTH PER OCCUPANT SERVED

OCCUPANCY	WITHOUT SPRINKLER SYSTEM		WITH SPRINKLER SYSTEM[a]	
	Stairways (inches per occupancy)	Other egress components (inches per occupant)	Stairways (inches per occupant)	Other egress components (inches per occupant)
Occupancies other than those listed below	0.3	0.2	0.2	0.15
Hazardous: H-1, H-2, H-3, H-4	Not permitted	Not permitted	0.3	0.2
Institutional: I-2	Not permitted	Not permitted	0.3	0.2

For SI: 1 inch = 25.4 mm.

a. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code*.

❖ The use of this table to determine the minimum required width for existing buildings addresses the concept of determining egress capacity for the components of the means of egress within a building without relying on the installation of an automatic fire sprinkler system. Not all building emergencies are dependent on a fire sprinkler system. Note, however, that the occupancy factors are still unchanged for and Group H and I-2 occupancies since all Group H and I-2 occupancies are required to be protected by an automatic fire sprinkler system.

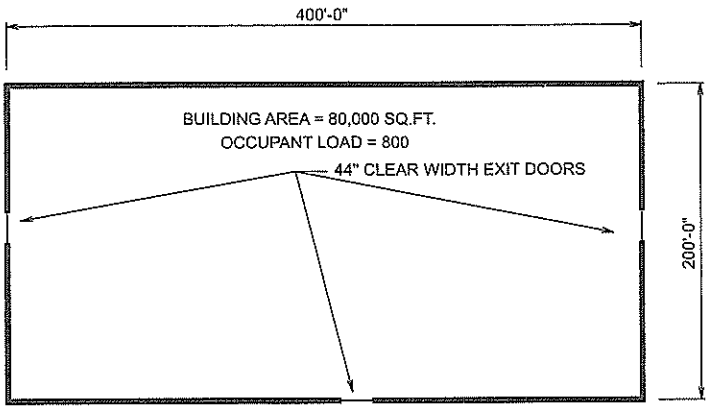
TABLE 1301.6.11(2)
MEANS OF EGRESS VALUES

OCCUPANCY	CATEGORIES				
	a[a]	b	c	d	e
A-1, A-2, A-3, A-4, E	-10	0	2	8	10
M	-3	0	1	2	4
B, F, S	-1	0	0	0	0
R	-3	0	0	0	0

a. The values indicated are for buildings six stories or less in height. For buildings over six stories above grade plane, add an additional -10 points.

❖ Table 1301.6.11(2) assigns values for each occupancy and category from Section 1301.6.11.1. The table gives credit for providing additional numbers of exits and additional exit capacity beyond the minimum required for new construction.

This additional evaluation contributes to the overall assessment of the building's safety and may offset other safety deficiencies [see Figures 1301.6.11(1) and 1301.6.11(2)]. Note a of the table provides a significant penalty for high-rise buildings that use fire escapes as part of the means of egress. In this case, if the building is seven stories or greater in height and uses fire escapes, -10 points must be added to the values already listed for Category a buildings.



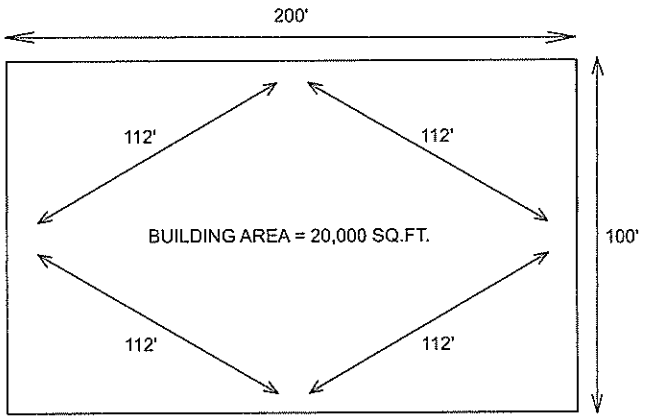
- OCCUPANCY GROUP F
- COMPLETE SPRINKLER SYSTEM
- EGRESS WIDTH PER SECTION 1003.2.3 AND TABLE 1003.2.3 of the IBC
- THE EXIT CAPACITY OF THE THREE 44" CLEAR WIDTH EXIT DOORS = $\frac{3 \times 44"}{0.15}$ = 880 OCCUPANTS

- CLASSIFICATION = CATEGORY b. THE EXIT CAPACITY OF 880 EXCEEDS THE ALLOWABLE CAPACITY OF 800, COMPLYING WITH SECTION 1003.2.3 of the IBC

- SCORE = 0 FROM TABLE 1301.6.11
- ENTER 0 IN TABLE 1301.7

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2.

Figure 1301.6.11(1)
MEANS-OF-EGRESS VALUES—CATEGORY B



- OCCUPANCY GROUP A-3
- BUILDING FULLY SPRINKLERED
- NUMBER OF OCCUPANTS = 400
- TABLE 1005.2.1 of the IBC REQUIRES TWO EXITS, FOUR EXTERIOR DOORS (EXITS) ARE PROVIDED
- THE 1/3 DIAGONAL = $\frac{224'}{3}$ = 75'
- EACH DOOR IS SPACED 112' APART
- CLASSIFICATION = CATEGORY d FROM TABLE 1301.6.11
- ENTER 8 IN TABLE 1301.7

For SI: 1 foot = 304.8, 1 square foot = 0.0929 m^2.

Figure 1301.6.11(2)
MEANS-OF-EGRESS VALUES—CATEGORY A

[B] 1301.6.12 Dead ends. In spaces required to be served by more than one means of egress, evaluate the length of the exit access travel path in which the building occupants are confined to a single path of travel. Under the categories and occupancies in Table 1301.6.12, determine the appropriate value and enter that value into Table 1301.7 under Safety Parameter 1301.6.12, Dead Ends, for means of egress and general safety.

❖ This section is used to evaluate dead-end exit access conditions within the building. This section uses the terminology "confined to a single path of travel." Another way to illustrate the meaning of this is "a single direction of travel to reach an exit." A corridor is typically of a width that provides effectively only one path in which a building occupant can travel in one of two directions to reach exits. A dead end may be a single path, but the key feature of a dead end is that only one direction is available to reach an exit. When building occupants have only one direction of travel available, a potentially hazardous condition is created because they may become trapped if the direction of travel to the exit is blocked by fire or smoke.

This section addresses only dead ends that are a component of exit access travel, which is "that portion of a means of egress that leads to an entrance to an exit." Although a room containing only one egress door has only one way out, it is not considered a dead-end condition. The code takes this condition into account in establishing the limitations under which a room is allowed to have only one means of egress. Dead ends are a concern in passageways and corridors where occupants may not realize that the corridor ends and they may have to retrace their steps in order to remain on a path toward an exit.

TABLE 1301.6.12
DEAD-END VALUES

OCCUPANCY	CATEGORIES[a]		
	a	b	c
A-1, A-3, A-4, B, F, M, R, S	-2	0	2
A-2, E	-2	0	2

a. For dead-end distances between categories, the dead end value shall be obtained by linear interpolation.

❖ The table reflects the relative degree of hazard associated with dead-end passageways and corridors. This is shown by the deficiency points that apply where a dead end exceeds 35 or 70 feet (10 668 or 21 336 mm) in an occupancy with a relatively high occupant load, such as an assembly occupancy. Note a allows for the interpolation for actual dead-end lengths between the distances specified in the categories. For example, if a building contains a corridor that has a dead-end length of 10 feet (3048 mm) at each end beyond the exits, the value of 1 is used; this is the midpoint between Categories b and c.

[B] 1301.6.12.1 Categories. The categories for dead ends are:

1. Category a—Dead end of 35 feet (10 670 mm) in nonsprinklered buildings or 70 feet (21 340 mm) in sprinklered buildings.
2. Category b—Dead end of 20 feet (6096 mm); or 50 feet (15 240 mm) in Group B in accordance with Section 1018.4, Exception 2 of the *International Building Code*.
3. Category c—No dead ends; or ratio of length to width (l/w) is less than 2.5:1.

❖ This section defines the categories for dead-end exit access conditions.

Category a allows dead-end conditions of up to 35 feet (10 668 mm) for existing buildings that are not fully sprinklered and up to 70 feet (21 336 mm) for existing buildings that are fully sprinklered. These distances correspond to the absolute maximum allowable dead-end lengths allowed in existing buildings by the IFC. Dead ends greater than these distances are considered an unsafe condition because they are not allowed by the IFC to occur in an existing building and it would, therefore, be inconsistent to allow greater dead-end lengths under this evaluation method. Since these lengths far exceed the allowable lengths permitted for new construction, negative values are associated with this category.

Category b is the classification for buildings that comply with the requirements for new construction. This zero-based category provides no extra credit for complying with new construction requirements.

Category c represents conditions that exceed the requirements for new construction. If there are no dead-end corridors or the "corridor" is more of a "space," Category c can be used. In Category c, the length-to-width ratio of 2.5 to define a space/corridor is the same as Exception 3 in Section 1018.4 of the IBC. Such a space allows the building user a more circular route and full view of the space and, therefore, does not represent as great a potential hazard as a classic dead-end corridor.

These categories and occupancies of the building are used in Table 1301.6.12 to determine the score to be entered in Table 1301.7 for the Safety Parameter of Dead Ends on line 1301.6.12 [see Figures 1301.6.12.1(1), 1301.6.12.1(2) and 1301.6.12.1(3)].

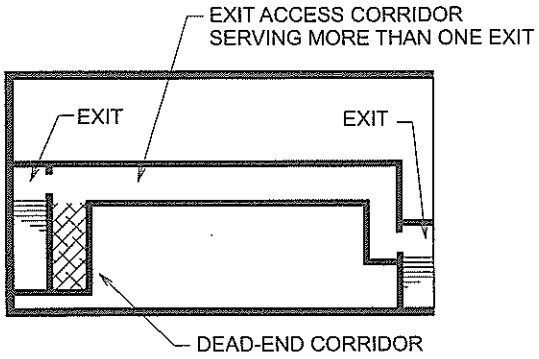
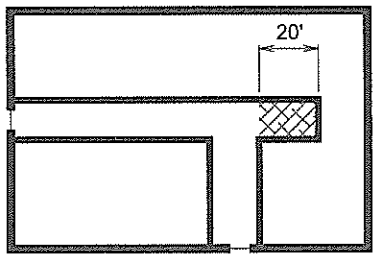


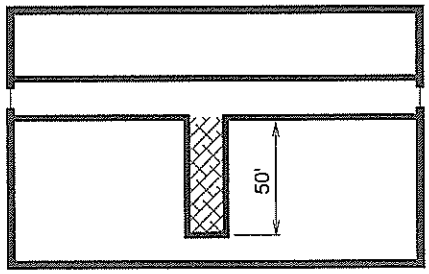
Figure 1301.6.12.1(1)
TYPICAL DEAD-END CORRIDOR



- OCCUPANCY GROUP B WITH MOVABLE PARTITIONS AND FURNITURE 6'-6" HIGH
- DEAD-END PASSAGEWAY IS 20'-0"
- CLASSIFICATION = CATEGORY b
- VALUE = 0 FROM TABLE 1301.6.12
- ENTER 0 IN TABLE 1301.7

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

Figure 1301.6.12.1(2)
DEAD-END VALUES—CATEGORY B



- OCCUPANCY GROUP R
- UNSPRINKLERED BUILDING
- DEAD-END CORRIDOR LENGTH IS 50'-0"
- CLASSIFICATION = CATEGORY a
- VALUE = -2 FROM TABLE 1301.6.12
- ENTER -2 IN TABLE 1301.7

For SI: 1 foot = 304.8 mm.

Figure 1301.6.12.1(3)
DEAD-END VALUES—CATEGORY A

[B] 1301.6.13 Maximum exit access travel distance to an exit. Evaluate the length of exit access travel to an approved exit. Determine the appropriate points in accordance with the following equation and enter that value into Table 1301.7 under Safety Parameter 1301.6.13, Maximum Exit Access Travel Distance for means of egress and general safety. The maximum allowable exit access travel distance shall be determined in accordance with Section 1016.1 of the *International Building Code*.

$$\text{Points} = 20 \times \frac{\text{Maximum allowable travel distance} - \text{Maximum actual travel distance}}{\text{Maximum allowable travel distance}}$$

(Equation 13-6)

❖ The length of exit access travel distance is evaluated in comparison to the travel distance allowed by Table 1016.1 of the IBC for a particular occupancy. The exit access travel distance is measured from the most remote point in the building to the nearest entrance to an exit. Total exit access travel distance in Table 1016.1 of the IBC includes travel within a room or space plus any exit access corridor travel to the exit. Some modifications to the Table 1016.1 of the IBC requirements are listed for certain occupancies and buildings as listed in the notes to that table.

To determine the value to be assigned for maximum travel distances to an exit, the specified equation must be used. This equation allows a graduated scale to be used to evaluate compliance of an existing situation with new construction travel distance requirements. With the equation, a more definite evaluation can occur with a broader range of scores. Any existing building having overall travel distances less than those specified in Table 1016.1 of the IBC will achieve a positive credit. Existing buildings with travel distances greater than those allowed for new construction will be assigned negative points based on the extent the travel distance exceeds the allowable limit.

For example, an existing Group B business building has a travel distance of 150 feet (45 720 mm). The distance is measured from the most remote corner of a partitioned office, down a corridor and to an exit door. Table 1016.1 of the IBC permits an unsprinklered Group B building to have a travel distance of 200 feet (60 960 mm). The equation yields the following:

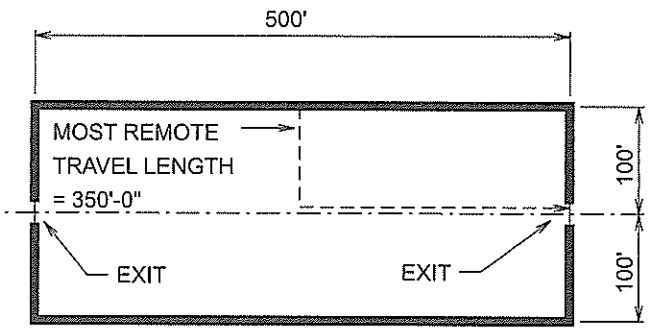
$$\text{Points} = 20\left(\frac{200 \text{ feet} - 150 \text{ feet}}{200 \text{ feet}}\right)$$

$$= 5.0$$

See Figures 1301.6.13(1), 1301.6.13(2) and 1301.6.13(3) for other examples.

[B] 1301.6.14 Elevator control. Evaluate the passenger elevator equipment and controls that are available to the fire department to reach all occupied floors. Elevator recall controls shall be provided in accordance with the *International Fire Code*. Under the categories an occupancies in Table 1301.6.14, determine the appropriate value and enter that value into Table 1301.7 under Safety Parameter 1301.6.14, Elevator Control, for fire safety, means of egress, and general safety. The values shall be zero for a single story building.

❖ The availability of elevators in the building and their capability for fire department use in an emergency are



- COMBUSTIBLE STORAGE, OCCUPANCY GROUP S-1 WITH AUTOMATIC FIRE SUPPRESSION SYSTEM
- MOST REMOTE LENGTH OF EXIT ACCESS TRAVEL (SECTION 1016.1 of the IBC)
- TRAVEL DISTANCE IN BUILDING = 350'-0"
- TRAVEL DISTANCE LIMIT FROM TABLE 1016.1 of the IBC = 250'-0"
- POINTS = $20 \times \frac{250 - 350}{250} = -8$

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

Figure 1301.6.13(1)
EXIT ACCESS TRAVEL DISTANCE VALUE—OCCUPANCY GROUP S-1

evaluated. This section addresses four different categories of elevator capability in existing buildings. This section does not address the requirements of Chapter 30 of the IBC. Access must be provided to all occupied floors by passenger elevators for the purposes of this evaluation. Freight elevators cannot be considered, since they may be in locations not readily accessible for fire department use. Elevator recall controls must comply with the IFC for either a Phase I or II category. One-story buildings, including those with mezzanines served by an elevator, are awarded zero value.

TABLE 1301.6.14
ELEVATOR CONTROL VALUES

ELEVATOR TRAVEL	CATEGORIES			
	a	b	c	d
Less than 25 feet of travel above or below the primary level of elevator access for emergency fire-fighting or rescue personnel	-2	0	0	+2
Travel of 25 feet or more above or below the primary level of elevator access for emergency fire-fighting or rescue personnel	-4	NP	0	+4

For SI: 1 foot = 304.8 mm.
NP = Not permitted.

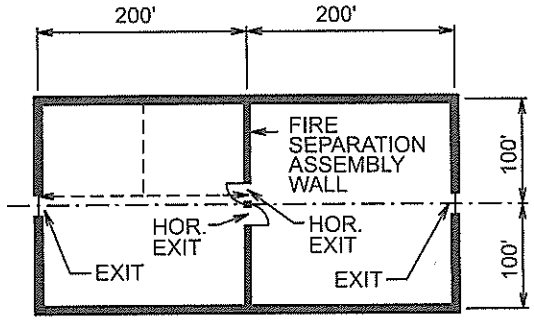
❖ The table assigns values based on the types of controls the elevators have, and the distance the elevators must travel to reach the floors they serve. The 25-foot (7620 mm) threshold of elevator travel is based on the IFC requirements and ASME A17.1. Elevator travel distance is based on the level where the elevator is accessed by the fire department. Usually, this is the ground floor or grade-level floor and corresponds to the level where fire command stations or fire alarm system annunciator panels are located. Any elevator that travels 25 feet (7620 mm) or more must always be provided with Phase I and II recall capabilities.

Example:

Assume a Group B business occupancy, three stories in height. The elevator lobbies are equipped with smoke detectors that recall the elevator to the main floor, or to an alternative floor if the main floor detector is activated. The elevator travels more than 25 feet (7620 mm) above the main floor.

This building must be placed in Category c. Because the elevator travels more than 25 feet (7620 mm) above the main floor, it must be brought into compliance with the IFC, which requires Phase I or II recall. When the elevators are brought into compliance with the IFC, they are placed automatically in Category c. The value from Table 1301.6.14 is zero; therefore, zero must be entered in Table 1301.7 for the Safety Parameter of Elevator Control on line 1301.6.14.

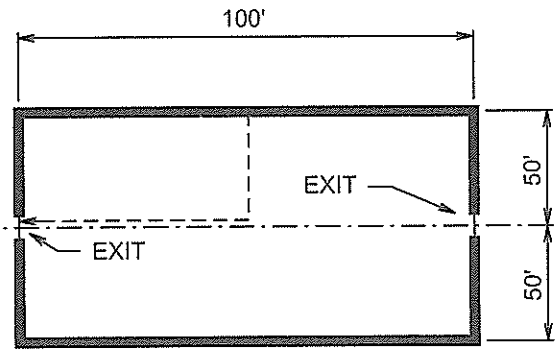
- OCCUPANCY GROUP B WITHOUT FIRE SUPPRESSION SYSTEM
- MOST REMOTE TRAVEL LENGTH = 200'-0"
- TRAVEL DISTANCE IN BUILDING = 200'-0"
- TRAVEL DISTANCE LIMIT FROM TABLE 1016.1 of the IBC = 200'-0"
- POINTS = $20 \times \frac{200 - 200}{200} = 0$



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

Figure 1301.6.13(2)
EXIT ACCESS TRAVEL DISTANCE VALUES—OCCUPANCY GROUP B

- OCCUPANCY GROUP R WITH FIRE SUPPRESSION SYSTEM
- MOST REMOTE TRAVEL LENGTH = 100'-0"
- TRAVEL DISTANCE IN BUILDING = 100'-0"
- TRAVEL DISTANCE LIMIT FROM TABLE 1016.1 of the IBC = 250'-0"
- POINTS = $20 \times \frac{250 - 100}{250} = +12$



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

Figure 1301.6.13(3)
EXIT ACCESS TRAVEL DISTANCE VALUES—OCCUPANCY GROUP R

[B] 1301.6.14.1 Categories. The categories for elevator controls are:

1. Category a—No elevator.
2. Category b—Any elevator without Phase I and II recall.
3. Category c—All elevators with Phase I and II recall as required by the *International Fire Code*.
4. Category d—All meet Category c; or Category b where permitted to be without recall; and at least one elevator that complies with new construction requirements serves all occupied floors.

❖ The categories that a building may be placed into range from buildings with no elevators to buildings with elevators complying with new construction requirements and total elevator recall capability.

Category a is applicable to buildings with no elevators. Without an elevator in a multiple-story building, fire department personnel are required to use the stairs for rescuing people and accessing fire floors. Category a is assigned a negative value.

Category b is applicable to buildings in which elevators are present but have no recall controls. Without recall or fire department control, the elevators are allowed vertical travel distances of less than 25 feet (7620 mm). This approach is consistent with the IFC, which requires controls for elevators reaching 25 feet (7620 mm) or more.

Category c is applicable to buildings with elevators that have automatic recall as required by the IFC.

Category d is applicable to buildings when the elevator controls comply with either Category b or c, and at least one of the elevators in the existing building serves all occupied floor levels. The controls must also comply with all the requirements for new construction. This category recognizes the benefits of having all elevators with Phase I and II controls, as well as having an elevator with all the features required in new construction to facilitate fire-fighting and rescue operations.

Based on the controls provided, or the lack of elevators, the appropriate category is determined. This category and the distance the elevator travels are then used along with Table 1301.6.14 to determine the value score the building will receive for this item. The value is then entered in Table 1301.7.

[B] 1301.6.15 Means-of-egress emergency lighting. Evaluate the presence of and reliability of means-of-egress emergency lighting. Under the categories and occupancies in Table 1301.6.15, determine the appropriate value and enter that value into Table 1301.7 under Safety Parameter 1301.6.15, Means-of-Egress Emergency Lighting, for means of egress and general safety.

❖ Lighting throughout the entire means of egress is evaluated in this section. Illumination of the means of egress is essential in a building during normal occupancy. During an emergency, illumination becomes even more important, because occupants may be under more stress when seeking to evacuate the building and visibility may be reduced by the buildup of smoke from a fire. The relative value of means-of-egress lighting is represented by the positive points assigned by Table 1301.6.15 when reliability of egress lighting is provided beyond the minimum required by the code.

TABLE 1301.6.15
MEANS-OF-EGRESS EMERGENCY LIGHTING VALUES

NUMBER OF EXITS REQUIRED BY SECTION 1015 OF THE *INTERNATIONAL BUILDING CODE*	CATEGORIES		
	a	b	c
Two or more exits	NP	0	4
Minimum of one exit	0	1	1

NP = Not permitted.

❖ This table is used to assess the relative risk to the occupants of the building when reliable sources of power are provided for egress lighting. The table correlates with the power source requirements of the IBC for new construction.

Example:

A Group A-3 church building with a number of classrooms that will accommodate up to 60 people has at least 1 footcandle (11 lux) of illumination at the floor level throughout the entire means of egress. The means-of-egress lighting in the sanctuary, corridors and stairs is provided with battery backup power that is sized to provide lighting for 1 hour. The classroom lighting is wired to the main switch panel in the building and has no emergency power source.

Category a is applicable because the classrooms are part of the means of egress (exit access) and the lack of emergency power does not comply with Section 1006 of the IBC. The classroom will accommodate up to 60 occupants; therefore, in accordance with the requirements for new construction in Section 1021.1 and Table 1021.1 of the IBC, the occupancy would be required to have two means of egress. The lighting must be provided with an emergency power source complying with Section 2702 of the IBC. The value determined from Table 1301.6.15 is NP (not permitted). Emergency power must be added to the lighting in the classrooms. The resulting Category b has a value of zero. Enter zero in Table 1301.7.

[B] 1301.6.15.1 Categories. The categories for means-of-egress emergency lighting are:

1. Category a—Means-of-egress lighting and exit signs not provided with emergency power in accordance with Section 2702 of the *International Building Code*.
2. Category b—Means-of-egress lighting and exit signs provided with emergency power in accordance with Section 2702 of the *International Building Code*.
3. Category c—Emergency power provided to means-of-egress lighting and exit signs, which provides protection in the event of power failure to the site or building.

❖ There are three categories of egress lighting. These categories are consistent with the requirements established by the IFC.

Category a is applicable when there is no emergency power source provided for the lighting in the means of

egress. Without an emergency power source to ensure continued illumination of the means of egress, the means-of-egress lighting and exit signs would not provide as reliable a level of safety to the building occupants. For buildings in which only one exit is required, this category represents the zero-based criteria, which is the level required for new construction.

Category b is applicable to buildings that are provided with an emergency power source for means-of-egress illumination. For buildings in which a minimum of two exits are required, this category represents the zero-based criteria, which is the level required for new construction.

Category c is applicable when emergency power is provided for means-of-egress lighting and exit signs in excess of the minimum requirements for new construction. The emergency power requirements for new construction assume a power failure occurs within the building or somewhere within the building site. It does not assume that the power failure occurs at the source of power to the site (i.e., from the provider). If the emergency power provides full protection to the site or building during power failure, Category c is applicable. Campus-type complexes or buildings that require extra security may have a power plant available to provide complete backup power for indefinite periods. This will qualify for the positive points of this category.

These categories, along with the number of required exits, are used to determine the appropriate value from Table 1301.6.15. The value determined from Table 1301.6.15 is then entered in Table 1301.7.

[B] 1301.6.16 Mixed occupancies. Where a building has two or more occupancies that are not in the same occupancy classification, the separation between the mixed occupancies shall be evaluated in accordance with this section. Where there is no separation between the mixed occupancies or the separation between mixed occupancies does not qualify for any of the categories indicated in Section 1301.6.16.1, the building shall be evaluated as indicated in Section 1301.6, and the value for mixed occupancies shall be zero. Under the categories and occupancies in Table 1301.6.16, determine the appropriate value and enter that value into Table 1301.7 under Safety Parameter 1301.6.16, Mixed Occupancies, for fire safety and general safety. For buildings without mixed occupancies, the value shall be zero.

❖ This section is used to evaluate mixed occupancies within an existing building and whether the method of separating mixed occupancies conforms to the requirements of Section 508 of the IBC. If Section 508 of the IBC is not completely understood, see the associated commentary before proceeding with the evaluation of the existing building in this section. Also, refer to the commentary to Section 1301.6.

This section is applicable only to separated mixed occupancies. If a building is a single occupancy, the applicable value for this section is zero. If an existing mixed occupancy building has no fire-resistance-rated separation between the different uses, or the separation is fire-resistance rated for less than 1 hour, the applicable value is also zero. The building must also be evaluated in accordance with Section 1301.6. The zero-based category for this section is equivalent to full compliance with Section 508 of the IBC, which is the requirement for new construction.

TABLE 1301.6.16
MIXED OCCUPANCY VALUES[a]

OCCUPANCY	CATEGORIES		
	a	b	c
A-1, A-2, R	-10	0	10
A-3, A-4, B, E, F, M, S	-5	0	5

a. For fire-resistance ratings between categories, the value shall be obtained by linear interpolation.

❖ This table addresses the relative risk of a building in or close to compliance with the provisions for separated mixed occupancies. When mixed occupancies are not separated from each other, the risk from hazards is greater in high-density occupancies, such as Groups A-1 and A-2. This risk is also greater in residential occupancies, because occupants may be sleeping and may not be fully alert. For this reason, inadequate separation is given greater negative values. In buildings with lower occupant loads, and where the occupants are alert, the risks are relatively lower.

Note a permits linear interpolation of the corresponding values in each category. For example, an unsprinklered, Group B/Group F-2 mixed occupancy building is separated with a 1-hour fire-resistance-rated assembly. From Table 508.4 of the IBC, the required fire-resistance rating of the separation between a Group B and a Group F-2 occupancy for Category b is 3 hours. Since the rating that is provided is only 1 hour, an interpolation halfway between Category a and Category b can be used. The resulting points are -2.5.

Example 1:

A three-story building has a Group M mercantile occupancy on the first floor and the upper two stories are Group R residential occupancies. The building is Type VB construction, 9,000 square feet (836 m^2) per floor. It is fully sprinklered, and only 25 percent of the perimeter is accessible. Although Type VB construction is not required to be protected, the Group M occupancy on the first floor is separated from the Group R occupancy on the second floor with a 2-hour fire-resistance-rated floor/ceiling assembly. In this case, the exception to Section 508.4 of the IBC permits the required rating of 2 hours from Table 508.4 of the IBC requires a 1-hour fire-resistance rating because the building is equipped throughout with an automatic sprinkler system in accordance with Section 903 of the IBC. The 2-hour rating provided is twice that required; therefore, this building qualifies for Category c. A value of 10 points is assigned to the residential portion of the building, and a value of 5 points is assigned to the mercantile portion (see Section 1301.6 for commentary about mixed uses).

Example 2:

A four-story building is Type IIB construction and is fully sprinklered. It has 15,000 square feet (1394 m²) per floor with a 25-percent open perimeter. The building is to be a Group R-1 hotel, except for a portion of the first floor, which will be used as a Group A-2 nightclub, occupying 1,000 square feet (93 m²). Although the building is unprotected Type IIB construction, the floor/ceiling assemblies of the first and second floors are 3 hours and the fire barrier assembly at the first floor between the Group R-1 occupancy and the Group A-2 occupancy is also 3 hours. Considering these building characteristics, the following determinations are made:

Because of the presence of an automatic sprinkler system, Table 302.3.2 of the IBC requires a fire-resistance rating of 1 hour. Although this building is required to have 1-hour separation, it has a 3-hour separation, which is more than double the minimum. This building is classified as Category c. A value of 10 points is awarded to both occupancies.

[B] 1301.6.16.1 Categories. The categories for mixed occupancies are:

1. Category a—Occupancies separated by minimum 1-hour fire barriers or minimum 1-hour horizontal assemblies, or both.
2. Category b—Separations between occupancies in accordance with Section 508.4 of the *International Building Code*.
3. Category c—Separations between occupancies having a fire-resistance rating of not less than twice that required by Section 508.4 of the *International Building Code*.

❖ This section addresses three different conditions:

Category a is applicable when the rating between mixed occupancies is less than specified in Section 508.3.3 of the IBC but is a fire barrier with a minimum 1-hour fire-resistance rating.

Category b is applicable when the separation of Section 508.4 of the IBC for fire-resistance ratings.

Category c is applicable when the fire-resistance rating that separates occupancies in an existing building is no less than twice the rating required by Section 508.4 of the IBC. Category c gives bonus points or increased credits to existing buildings that have higher fire-resistance ratings.

Section 1301 does not require full compliance with all of Section 508.4 of the IBC. Section 1301.6.16 evaluates whether the existing building's compliance with Section 508.4 of the IBC provides relative safety within the building. If the building does comply with Section 508.4 of the IBC, Section 1301.6.16 acknowledges that there is no basis for assigning negative points, nor is there any basis for assigning positive points for safety; therefore, a neutral zero value is assigned. The appropriate value is entered in Table 1301.7 for the Safety Parameter of Mixed Occupancies on line 1301.

[B] 1301.6.17 Automatic sprinklers. Evaluate the ability to suppress a fire based on the installation of an automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Building Code*. "Required sprinklers" shall be based on the requirements of this code. Under the categories and occupancies in Table 1301.6.17, determine the appropriate value and enter that value into Table 1301.7 under Safety Parameter 1301.6.17, Automatic Sprinklers, for fire safety, means of egress divided by 2, and general safety. High-rise buildings defined in Section 403.1 of the *International Building Code* that undergo a *change of occupancy* to Group R shall be equipped throughout with an automatic sprinkler system in accordance with Section 403.2 of the *International Building Code* and Chapter 9 of the *International Building Code*.

❖ These provisions are used to determine the amount of credit that can be applied to the evaluation for the installation of an automatic sprinkler system in an existing building.

The value of sprinkler protection is reflected in the the additional credit available in this parameter over and above the basic credits that are provided for building height in Section 1301.6.1, building area in Section 1301.6.2 and maximum travel distance to an exit in Section 1301.6.13. Throughout the code, additional credits are offered for the use of an automatic sprinkler system.

The evaluation of sprinklers in an existing building is based on whether an automatic sprinkler system is both required and installed. The criteria used to determine when an automatic sprinkler system is required are tied to the same requirements for new construction in Section 903.2 of the IBC. The thresholds listed in Sections 903.2.1 through 903.2.12 of the IBC must be used to evaluate whether those characteristics and occupancies are present and whether a sprinkler system would be required for new construction. The exception to Section 903.2 of the IBC, and the additional requirements cross referenced in Section 903.2.11.6 of the IBC must also be considered. The determination of whether sprinklers are required in a building or a portion of a building must be done to correctly determine the category applicable to the existing building.

These parameters for sprinklers allow for a more equitable evaluation of the contribution of that feature to overall building safety. This factor encourages the installation of automatic sprinkler systems in existing buildings by providing substantial negative and positive points.

The values for sprinklers are given in Table 1301.6.17. The appropriate credit values from Table 1301.6.17 are entered in Table 1301.7 for the Safety Parameter of Automatic Sprinklers on line 1301.6.17, for both fire safety (FS) and general safety (GS), but only one-half the value is entered under the means of egress (ME). The one-half credit for egress is allowed because some credits for

sprinklers are incorporated into the parameters for means-of-egress capacity (see Section 1301.6.11), dead ends (see Section 1301.6.12) and maximum travel distance to an exit (see Section 1301.6.13).

TABLE 1301.6.17
SPRINKLER SYSTEM VALUES

OCCUPANCY	CATEGORIES					
	a[a]	b[a]	c	d	e	f
A-1, A-3, F, M, R, S-1	-6	-3	0	2	4	6
A-2	-4	-2	0	1	2	4
A-4, B, E, S-2	-12	-6	0	3	6	12

a. These options cannot be taken if Category a in Section 1301.6.18 is used.

❖ This table lists the credit values for the respective categories of Section 1301.6.17.1, based on the occupancy being evaluated in the existing building. The assembly occupancies containing large combustible fuel loads with large occupant loads are included with those occupancies containing large fuel loads. These occupancies represent buildings where experience has shown that adequate sprinkler systems save lives and where an on-site sprinkler system is necessary to supplement the local fire department capabilities.

Group A-2 buildings are contained in a separate line in the table for determining sprinkler system values. This occupancy with its densely packed high occupant loads, ill-defined seating and aisle arrangements, and facilities services must be separately evaluated to adequately match its hazards with sprinkler system requirements. Churches and schools, which have high occupant loads but low fuel loads, are combined with other low fuel-load occupancies in the last line item in the table. Category c is the zero-based category. The categories to the left of this column contain negative values that define buildings and occupancies that would be required to be sprinklered as new construction, but are not sprinklered or are provided with inadequate sprinkler systems. The three categories to the right of this column contain positive values that represent buildings and occupancies with sprinkler systems that are deemed adequate or comply with current standards and requirements.

[B] 1301.6.17.1 Categories. The categories for automatic sprinkler system protection are:

1. Category a—Sprinklers are required throughout; sprinkler protection is not provided or the sprinkler system design is not adequate for the hazard protected in accordance with Section 903 of the *International Building Code*.
2. Category b—Sprinklers are required in a portion of the building; sprinkler protection is not provided or the sprinkler system design is not adequate for the hazard protected in accordance with Section 903 of the *International Building Code*.
3. Category c—Sprinklers are not required; none are provided.
4. Category d—Sprinklers are required in a portion of the building; sprinklers are provided in such portion; the system is one that complied with the code at the time of installation and is maintained and supervised in accordance with Section 903 of the *International Building Code*.
5. Category e—Sprinklers are required throughout; sprinklers are provided throughout in accordance with Chapter 9 of the *International Building Code*.
6. Category f—Sprinklers are not required throughout; sprinklers are provided throughout in accordance with Chapter 9 of the *International Building Code*.

❖ Six categories are defined in this section for evaluating the automatic sprinkler system in an existing building. These categories address all aspects, from existing buildings that are unsprinklered but are required to be sprinklered if new construction, to existing buildings that are sprinklered and are not required to be sprinklered if new construction. These categories reduce the impact of providing sprinkler protection required by Chapter 9 of the IBC to be sprinklered in new construction. This greater range of points increases the flexibility in the use of this evaluation method.

Category a includes buildings or occupancies that would be required by the new construction criteria of Section 903 of the IBC to be sprinklered throughout the building. Category a buildings are provided with either no sprinkler system, or one that is inadequate and does not provide the required level of protection. To evaluate the existing sprinkler system, a trained fire protection engineer should evaluate the system's design against the applicable referenced standards. This is not the same type of consideration needed in Category d, where the existing system actually meets all of the requirements of any earlier edition of the applicable referenced standards. This category is considered the lowest acceptable level of compliance and is, therefore, associated with the largest negative values in Table 1301.6.17.

Category b is applicable when only a portion of the existing building is required by the provisions of Section 903 of the IBC to be sprinklered. For example, a multiple-story building may have two of its stories qualify as windowless stories that require sprinklers, or a mercantile building may have one fire area exceeding 12,000 square feet (1115 m^2) and require sprinklers. In both cases, the buildings are without an automatic sprinkler system, or the sprinkler systems that are in place are inadequate and do not comply with the technical provisions of the code. Since only portions of the buildings are required to be sprinklered, the negative sprinkler system values for this category in Table 1301.6.17 are exactly half of the Category a values.

Category c is the zero-based category for this safety parameter. The existing building is not required by Section 903 of the IBC to be sprinklered and no sprinkler system is provided. Such buildings are neither penalized nor rewarded by Table 1301.6.17.

Category d is similar to Category b because only a portion of the existing building is required by Section 903 of the IBC to be sprinklered. In this case, there is a sprinkler system in place in that portion of the building and the system was designed at the time of its installation to comply with the requirements of an earlier edition of the applicable standards in Section 903 of the IBC. An example of this is a sprinkler system designed to comply with the hydraulic design criteria of the 1989 edition of NFPA 13 for an ordinary Group 2 hazard. As long as this existing sprinkler system is still properly maintained and supervised, the building qualifies for the small positive values listed in Table 1301.6.17.

Category e includes existing buildings that are required by the provisions of Chapter 9 of the IBC to be sprinklered throughout, and are protected throughout by a properly designed, installed and supervised sprinkler system. Although this category more closely represents the requirements for new construction, moderate positive values are awarded by Table 1301.6.17. The evaluation rewards existing buildings that are sprinklered with higher points.

Category f is the highest level of protection and is rewarded with maximum positive points in the accompanying table. Existing buildings, which are not required by Section 903 of the IBC to be sprinklered but are voluntarily provided with a fully designed, installed and supervised system, provide an added level of protection that justifies substantial bonus points that may ultimately determine whether an existing building meets its mandatory safety scores.

[B] 1301.6.18 Standpipes. Evaluate the ability to initiate attack on a fire by making a supply of water available readily through the installation of standpipes in accordance with Section 905 of the *International Building Code*. "Required Standpipes" shall be based on the requirements of the *International Building Code*. Under the categories and occupancies in Table 1301.6.18, determine the appropriate value and enter that value into Table 1301.7 under Safety Parameter 1301.6.18, Standpipes, for fire safety, means of egress, and general safety.

❖ These provisions are used to determine the amount of credit that can be applied to the evaluation for the installation of a standpipe system in an existing building. Standpipes are provided as a tool for use by fire fighters to aid their fire-fighting operations. The general consensus is that they are not recommended or intended for use by untrained building occupants.

The evaluation of standpipe systems in an existing building, much like that for automatic sprinker systems, is based on whether a standpipe system is both required and installed. The criteria used to determine when a standpipe system is required are tied to the same requirements for new construction in Section 905.3 of the IBC. The thresholds listed in Sections 905.3.1 through 905.3.7 of the IBC must be used to evaluate whether those characteristics and occupancies are present and whether a standpipe system would be required for new construction. These parameters for standpipes encourage the installation of standpipe systems in existing buildings by providing substantial negative and positive points.

The values for standpipe systems are given in Table 1301.6.18. The appropriate values from Table 1301.6.18 are entered in Table 1301.7 for the Safety Parameter of Standpipes on line 1301, for fire safety (FS), means of egress (ME) and general safety (GS).

TABLE 1301.6.18
STANDPIPE SYSTEM VALUES

OCCUPANCY	CATEGORIES			
	a[a]	b	c	d
A-1, A-3, F, M, R, S-1	-6	0	4	6
A-2	-4	0	2	4
A-4, B, E, S-2	-12	0	6	12

a. This option cannot be taken if Category a or Category b in Section 1301.6.17 is used.

❖ This table lists the credit values for the respective categories of Section 1301.6.18.1, based on the occupancy being evaluated in the existing building. The grouping of occupancies is the same as provided for the sprinkler system parameter since the need for and value of a standpipe system, like sprinkler systems, is a function of the likelihood and potential severity of a fire that the various occupancies present.

Category a contains negative values that define buildings and occupancies that would be required to have a standpipe system as new construction but are not provided with one, or are provided with a standpipe system that is not designed and installed in accordance with the design and installation requirements of Section 905 of the IBC for new construction. Category b is the zero-based category.

Categories c and d contain positive values that represent buildings and occupancies with a standpipe system that are deemed adequate or comply with current design standards and installation requirements.

[B] 1301.6.18.1 Standpipe catagories. The categories for standpipe systems are:

1. Category a—Standpipes are required; standpipe is not provided or the standpipe system design is not in compliance with Section 905.3 of the *International Building Code*.
2. Category b—Standpipes are not required; none are provided.
3. Category c—Standpipes are required; standpipes are provided in accordance with Section 905 of the *International Building Code*.
4. Category d—Standpipes are not required; standpipes are provided in accordance with Section 905 of the *International Building Code*.

❖ Four categories are defined in this section for evaluating the standpipe system in an existing building. These categories address all aspects from existing buildings

that do not have standpipes but would be required to have standpipes if new construction, to existing buildings that have standpipes and would not be required to have standpipes if new construction.

Category a is applicable to buildings or occupancies that would be required by the new construction criteria to be provided with a Class I, II or III standpipe system. Category a buildings are provided with either no standpipe system, or one that is inadequate and does not comply with the applicable design and installation criteria of Section 905 of the IBC. To evaluate the existing standpipe system, a trained fire protection engineer should evaluate the system's design against the applicable referenced standards. This category is considered the lowest acceptable level of compliance and is, therefore, associated with the largest negative values in Table 1301.6.18. Category a is not an option in unsprinklered or inadequately sprinklered buildings that would be required to be partially or fully sprinklered as new construction. This is reflected in Note a to Table 1301.6.18, which indicates that Category a cannot be used if Category a or b is used in the automatic sprinkler parameter in Section 1301.6.17. The effect of this provision is that the absence of both sprinklers and standpipes is unacceptable in buildings that would be required to provide both sprinklers and standpipes. One or the other system must be provided in order to complete this evaluation method. If only one of the required systems is provided, negative points will be accrued in the parameter for the other system, but it is still possible to have an overall passing score for the building. This reflects the concept that when both systems would be required for new construction, it is permissible to only have one or the other system in an existing building because the absence of the other system will have other positive attributes or features that offset the negative points accrued because of the absence of the other system.

Category b is the zero-based category for this safety parameter. The existing building is not required by Section 905 of the IBC to have a standpipe system and no standpipe system is provided. Such buildings are neither penalized nor rewarded by Table 1301.6.18.

Category c is applicable to buildings that are required by the Section 905 to have a standpipe system, and are provided with the class standpipe system that would be required for new construction, and is designed and installed in accordance with Section 905.2 of the IBC. Although this category more closely represents the requirements for new construction, moderate positive values are awarded by Table1301.6.18. The evaluation rewards existing buildings that have a contemporary, reliable standpipe system with higher points.

Category d is the highest level of protection and is rewarded with maximum positive points in the accompanying table. Existing buildings, which are not required by Section 905 of the IBC to be have a standpipe system but are voluntarily provided with a fully designed and installed system, provide an added level of protection that justifies substantial bonus points.

[B] 1301.6.19 Incidental accessory occupancy. Evaluate the protection of incidental accessory occupancies in accordance with Section 508.2.5 of the *International Building Code*. Do not include those where this code requires suppression throughout the building including covered mall buildings, high-rise buildings, public garages and unlimited area buildings. Assign the lowest score from Table 1301.6.19 for the building or floor area being evaluated and enter that value into Table 1301.7 under Safety Parameter 1301.6.19, Incidental Accessory Occupancy, for fire safety, means of egress and general safety. If there are no specific occupancy areas in the building or floor area being evaluated, the value shall be zero.

❖ This section includes an evaluation system for the separation and protection requirements indicated for incidental accessory occupancies in an existing building. This evaluation is based on the requirements for new construction in Table 508.2.5 of the IBC. The designer is required to comply with this section or to treat these use areas as a mixed occupancy. If the building designer chooses to separate or protect these rooms or areas in accordance with this table, the building is classified according to its main use. Because some existing buildings may have been designed in this fashion, an evaluation procedure has been added to account for the level of protection provided. The lowest score must be assigned to the building or fire area for the specific occupancy areas. For example, an existing Group B building has six separate storage rooms. Each room is more than 100 square feet (9.3 m^2) in area. If five of the storage rooms are protected with an automatic fire-extinguishing system and separated with smoke partitions complying with Section 508.2.5.1 of the IBC, and the sixth room is not protected in the same manner, the lowest score for all the storage rooms is determined by the single unprotected storage room. If the building designer chooses to treat the incidental accessory occupancies as a separate occupancies, the provisions of Section 1301.9.1 are applicable and a zero is inserted in Table 1301.7 for the Safety Parameter of Incidental Accessory Occupancies.

TABLE 1301.6.19. See page 13-34.

❖ This table provides a matrix of characteristics arranged in a format of rows and columns for determining values for incidental occupancy areas. The left-hand column of the table is arranged for the separation or protection specified by IBC Table 508.2.5 for a particular occupancy room or area. IBC Table 508.2.5must first be consulted to determine the level of separation or protection required by the code for new construction. This same entry is then found in the left-hand column of Table 1301.6.19. The top row represents the actual level of separation or protection that is provided in the existing building. The corresponding

TABLE 1301.6.19
INCIDENTAL ACCESSORY OCCUPANCY VALUES[a]

PROTECTION REQUIRED BY TABLE 508.2.5 OF THE *INTERNATIONAL BUILDING CODE*	PROTECTION PROVIDED						
	None	1 hour	AFSS	AFSS with SP	1 hour and AFSS	2 hours	2 hours and AFSS
2 hours and AFSS	-4	-3	-2	-2	-1	-2	0
2 hours, or 1 hour and AFSS	-3	-2	-1	-1	0	0	0
1 hour and AFSS	-3	-2	-1	-1	0	-1	0
1 hour	-1	0	-1	-1	0	0	
1 hour, or AFSS with SP	-1	0	-1	-1	0	0	0
AFSS with SP	-1	-1	-1	-1	0	-1	0
1 hour or AFSS	-1	0	0	0	0	0	0

a. AFSS = Automatic fire suppression system; SP = Smoke partitions (See IBC Section 508.2.5).

occupancy area value is read and then inserted into Table 1301.7 under Safety Parameter 1301.6.19, Incidental Use Area Protection. Values of zero are assigned to all arrangements that represent compliance with the requirements for new construction. Negative values are assigned based on the degree of noncompliance with the requirements for new construction.

[B] 1301.7 Building score. After determining the appropriate data from Section 1301.6, enter those data in Table 1301.7 and total the building score.

❖ This section is the tally sheet for all of the 19 safety parameters evaluated in Sections 1301.6.1 through 1301.6.19, which determine the building's overall safety profile for fire safety, means of egress and general safety.

This section also directs the data and values of the 19 safety parameters of Sections 1301.6.1 through 1301.6.19 to be entered in Table 1301.7 for totaling the building scores.

TABLE 1301.7. See page 13-35.

❖ Table 1301.7 is the summary sheet containing all the relative attributes of the building. The summary sheet also contains a complete listing of the 19 safety parameters that have been evaluated. The upper portion of the summary sheet serves as a guide to the user to catalog and highlight existing building elements that relate to the 19 safety parameters and to the evaluation. The lower portion of the summary sheet is used to record the results of the 19 safety parameters that have been evaluated. These are added to produce the building score total values for fire safety, means of egress and general safety.

[B] 1301.8 Safety scores. The values in Table 1301.8 are the required mandatory safety scores for the evaluation process listed in Section 1301.6.

❖ This section lists the minimum scores for fire safety, means of egress and general safety that must be obtained from the evaluation of the 19 safety parameters to be acceptable as a building meeting the code's objectives for public safety and health. This section summarizes the mandatory values of Table 1301.8 that must be met from the evaluation program.

TABLE 1301.8. See page 13-36.

❖ The table lists the minimum mandatory safety scores for the evaluation of various occupancies for the three major mandatory safety scores of fire safety, means of egress and general safety. The mandatory safety values are based on the scores considered to provide an overall acceptable level of safety in an existing building upon which approval of the alterations, repairs, change of occupancy or addition can be based. This is the zero-based concept. The scores have been determined as representing one level of compliance higher than the code's minimum requirements for new construction. The mandatory safety scores are consistent with the idea of establishing an equivalent level of safety, even though the existing building is evaluated only for the 19 safety parameters.

[B] 1301.9 Evaluation of building safety. The mandatory safety score in Table 1301.8 shall be subtracted from the building score in Table 1301.7 for each category. Where the final score for any category equals zero or more, the building is in compliance with the requirements of this section for that category. Where the final score for any category is less than zero, the building is not in compliance with the requirements of this section.

❖ The sections and table that follow are the final steps in the evaluation process. This section also discusses how mixed occupancies must to be treated during the final step of the evaluation process.

This section compares the three building scores from Table 1301.7 to the three mandatory safety scores from Table 1301.8. If the values in all three categories from Table 1301.7 exceed the corresponding mandatory safety scores in Table 1301.8, the building passes and is in compliance with the code. If the score in any one category is less than the mandatory safety score, the building is deemed to have failed and addi-

tional measures must be taken to bring the scores to a point that will at least equal the mandatory safety scores.

TABLE 1301.9. See page 13-36.

❖ Table 1301.9 shows in simple equations whether a building passes the evaluation by subtracting the mandatory safety score from Table 1301.7. This is done for each of the three general categories of evaluation: fire safety, means of egress and general safety. If the difference for each category is zero or greater, the existing building passes and is considered to comply with the code objectives for public safety.

Example:

A Group M mercantile occupancy receives evaluations for the 19 safety parameters which results in total building scores in Table 1301.7 as follows:

Fire safety (FS) = 21

Means of egress (ME) = 40

General safety (GS) = 36

These scores are compared to the mandatory safety scores for a Group M occupancy from Table 1301.8.

Mandatory fire safety (MFS) = 23

TABLE 1301.7
SUMMARY SHEET—BUILDING CODE

Existing occupancy _____ Proposed occupancy _____

Year building was constructed _____ Number of stories _____ Height in feet _____

Type of construction _____ Area per floor _____

Percentage of open perimeter increase _____%

Completely suppressed: Yes _____ No _____ Corridor wall rating _____

Compartmentation: Yes _____ No _____ Required door closers: Yes _____ No _____

Fire-resistance rating of vertical opening enclosures _____

Type of HVAC system _____, serving number of floors _____

Automatic fire detection: Yes _____ No _____, Type and location _____

Fire alarm system: Yes _____ No _____, Type _____

Smoke control: Yes _____ No _____, Type _____

Adequate exit routes: Yes _____ No _____ Dead ends: _____ Yes _____ No _____

Maximum exit access travel distance _____ Elevator controls: Yes _____ No _____

Means of egress emergency lighting: Yes _____ No _____ Mixed occupancies: Yes _____ No _____

SAFETY PARAMETERS	FIRE SAFETY (FS)	MEANS OF EGRESS (ME)	GENERAL SAFETY (GS)
1301.6.1 Building Height 1301.6.2 Building Area 1301.6.3 Compartmentation			
1301.6.4 Tenant and Dwelling Unit Separations 1301.6.5 Corridor Walls 1301.6.6 Vertical Openings			
1301.6.7 HVAC Systems 1301.6.8 Automatic Fire Detection 1301.6.9 Fire Alarm System			
1301.6.10 Smoke control 1301.6.11 Means of Egress 1301.6.12 Dead ends	* * * * * * * * * * * *		
1301.6.13 Maximum Exit Access Travel Distance 1301.6.14 Elevator Control 1301.6.15 Means of Egress Emergency Lighting	* * * * * * * *		
1301.6.16 Mixed Occupancies 1301.6.17 Automatic Sprinklers 1301.6.18 Standpipes 1301.6.19 Incidental Accessory Occupancy		* * * * ÷ 2 =	
Building score — total value			

* * * *No applicable value to be inserted.

Mandatory means of egress (MME) = 40

Mandatory general safety (MGS) = 40

The mandatory score is subtracted from the building score.

Conclusion:

The building fails the overall evaluation because, in the fire safety category, the building fire safety score of 21 is less than the mandatory fire safety score of 23. The means-of-egress category was just barely satisfactory because the building means-of-egress score of 40 equals the mandatory means-of-egress score of 40. The passage of the general safety category by four points does not compensate for the failure by two points in the fire safety category. Each category must individually have a building score equal to or greater than the respective mandatory safety score for the building to pass the overall evaluation. In this case, modification of the design must be made so that at least two additional points are accrued in any one or more of the 14 parameters that affect the building fire safety score.

[B] 1301.9.1 Mixed occupancies. For mixed occupancies, the following provisions shall apply:

1. Where the separation between mixed occupancies does not qualify for any category indicated in Section 1301.6.16, the mandatory safety scores for the occupancy with the lowest general safety score in Table 1301.8 shall be utilized. (See Section 1301.6.)
2. Where the separation between mixed occupancies qualifies for any category indicated in Section 1301.6.16, the mandatory safety scores for each occupancy shall be placed against the evaluation scores for the appropriate occupancy.

❖ This section explains how to determine whether a mixed occupancy building passes or fails the process of evaluation. It restates the information in Sections 1301.6 and 1301.6.16. The mixed occupancy evaluation is based on the requirements of Section 508 of the IBC. The two procedures described are:

Procedure 1:

For unseparated occupancies in accordance with Section 508, or for occupancies that are separated with a fire-resistance rating of less than 1 hour, mandatory safety scores for the occupancy with the lowest general safety score of Table 1301.8 apply.

Procedure 2:

For separated occupancies in accordance with Section 508.4 of the IBC, or one of the categories listed in Section 1301.6.16, mandatory safety scores for each occupancy are compared to the evaluation scores for

TABLE 1301.8
MANDATORY SAFETY SCORES[a]

OCCUPANCY	FIRE SAFETY (MFS)	MEANS OF EGRESS (MME)	GENERAL SAFETY (MGS)
A-1	20	31	31
A-2	21	32	32
A-3	22	33	33
A-4, E	29	40	40
B	30	40	40
F	24	34	34
M	23	40	40
R	21	38	38
S-1	19	29	29
S-2	29	39	39

a. MFS = Mandatory Fire Safety
MME = Mandatory Means of Egress
MGS = Mandatory General Safety

TABLE 1301.9
EVALUATION FORMULAS[a]

FORMULA	T1201.7	T1201.8		SCORE	PASS	FAIL
FS - MFS > 0	_____ (FS) -	_____ (MFS)	=	_____	_____	_____
ME - MME ≥ 0	_____ (ME) -	_____ (MME)	=	_____	_____	_____
GS - MGS ≥ 0	_____ (GS -	_____ (MGS)	=	_____	_____	_____

a. FS = Fire Safety MFS = Mandatory Fire Safety
ME = Means of Egress MME = Mandatory Means of Egress
GS = General Safety MGS = Mandatory General Safety

the appropriate occupancy. The total building score of Table 1301.7 is computed for each appropriate occupancy.

This section does not include a category or condition for a third option for mixed occupancies, and that is the separation of multiple occupancies within a single building or structure with one or more fire walls. Likewise, this option is not addressed in Section 508 of the IBC. A fire wall creates separate and independent buildings; therefore, a separate evaluation must be done for each building that is created by fire walls.

Example:

A 40-foot (12 192 mm), three-story building has an open perimeter of 25 percent. It is Type IIB unprotected construction, unsprinklered. The building has 9,000 square feet (836 m^2) per floor. A Group A-2 assembly is on the first floor, with Group B business occupancies on the second and third floors. Although the building is unprotected Type IIB construction, there is a 2-hour fire-resistance-rated floor/ceiling assembly separating the first and second floors. An analysis of this building will result in the following: In accordance with Section 508.4 and Table 508.4 of the IBC, the mixed occupancies are separated by the required fire-rated assembly of 2 hours.

This building qualifies for Category b in Section 1301.6.16.1. A separate summary sheet for tabulating the building score in Table 1301.7 has to be completed for each of the two occupancies. The values of the building scores for fire safety, means of egress and general safety for the Group A-2 assembly occupancy and the Group B business occupancy must be calculated. The assembly building scores are compared to the mandatory safety scores of 21, 32 and 32, and the business building scores are compared to the mandatory safety scores of 30, 40 and 40. If any one of the three building scores from either of the two occupancies does not equal or exceed the applicable safety score, the entire building fails the evaluation. For the building to pass, the safety parameters that are less than the mandatory safety score must be upgraded until a passing score is achieved in each of the three categories.

Bibliography

The following resource materials are referenced in this chapter or are relevant to the subject matter addressed in this chapter.

36 CFR, Parts 1190 and 1191, Draft, *The Americans with Disabilities Act Accessibility Guidelines* (ADAAG), Washington, DC: Architectural and Transportation Barriers Compliance Board, April 2, 2002.

42 USC 3601-88, *Fair Housing Amendments Act* (FHAA). Washington, DC: United States Code, 1988.

Accessibility and Egress for People with Physical Disabilities. Falls Church, VA: CABO Board for the Coordination of the Model Codes Report, October 5, 1993.

ASME A17.1-00, *Safety Code for Elevators and Escalators*. New York: American Society of Mechanical Engineers, 2000.

ASME A17.3-96, *Safety Code for Existing Elevators and Escalators*. New York: American Society of Mechanical Engineers, 1996.

ASME 18.1-99, *Safety Standard for Platform Lifts and Stairway Chairlifts—with Addenda A18.1a-2001*. New York: American Society of Mechanical Engineers, 1999.

DOJ 28 CFR, Part 36-91, *Americans with Disabilities Act* (ADA). Washington, DC: Department of Justice, 1991.

DOJ 28 CFR; Part 36-91(Appendix A), *ADA Accessibility Guidelines for Buildings and Facilities* (ADAAG). Washington, DC: Department of Justice, 1991.

FED-STD-795-88, *Uniform Federal Accessibility Standards.* Washington, DC: General Services Administration; Department of Defense; Department of Housing and Urban Development; US Postal Service, 1988.

"Final Report, Recommendations for a New ADAAG." Washington DC: ADAAG Review Federal Advisory Committee, September 30, 1996.

ICC A117.1-05, *Accessible and Usable Buildings and Facilities*. Washington, DC: International Code Council, 2003.

IBC-09, *International Building Code*. Washington, DC: International Code Council, 2009.

IFC-09, *International Fire Code*. Washington, DC: International Code Council, 2009.

IMC-09, *International Mechanical Code*. Washington, DC: International Code Council, 2009.

IPMC-09, *International Property Maintenance Code*. Washington, DC: International Code Council, 2009.

NFPA 13-02, *Installation of Sprinkler Systems*. Quincy, MA: National Fire Protection Association, 2002.

NFPA 13D-02, *Installation of Sprinkler Systems in One- and Two-family Dwellings and Manufactured Homes*. Quincy, MA: National Fire Protection Association, 2002.

NFPA 13R-02, *Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height*. Quincy, MA: National Fire Protection Association, 2002.

NFPA 72-02, *National Fire Alarm Code*. Quincy, MA: National Fire Protection Association, 2002.

NFPA 101-03, *Alternative Approaches to Life Safety*. Quincy, MA: National Fire Protection Association, 2003.

Rehabilitation Guidelines/1980. Washington, DC: National Institute of Building Science for the US Department of Housing and Urban Development, 1980.

1. Guideline for Setting and Adopting Standards for Building Rehabilitation;
2. Guideline for Approval of Building Rehabilitation;
3. Statutory Guideline for Building Rehabilitation;
4. Guideline for Managing Official Liability Associated with Building Rehabilitation;
5. Egress Guideline for Residential Rehabilitation;
6. Electrical Guideline for Residential Rehabilitation;
7. Plumbing DWV Guideline for Residential Rehabilitation; and
8. Guideline on Fire Ratings of Archaic Materials and Assemblies.

UL 555-99, *Fire Dampers*. Northbrook, IL: Underwriters Laboratories Inc., 1999.