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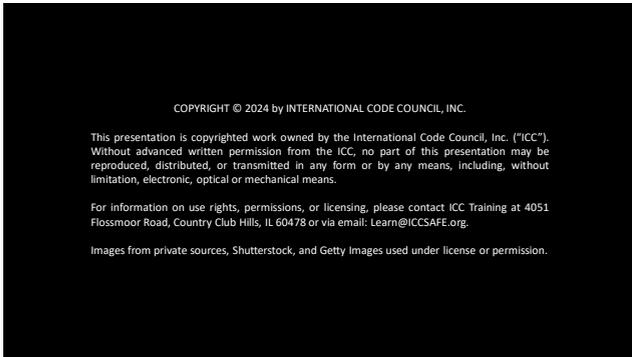
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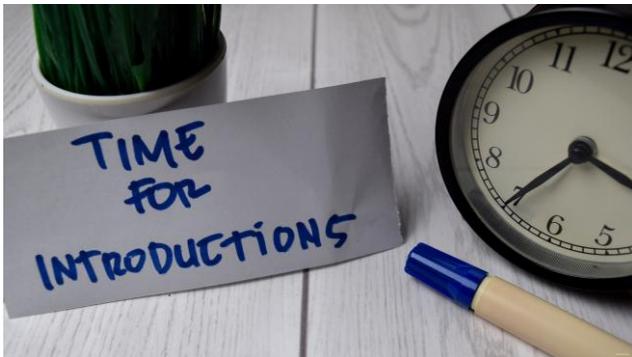
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Introductions

What is your primary job function?

- a. Inspector
- b. Plans Reviewer
- c. Building Official
- d. Fire Official
- e. Designer/Engineer
- f. Contractor/Builder
- g. Permit Technician
- h. Other

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6

Introductions

Where in the World do you work?




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7

Introductions

How many years have you worked in the construction industry?

- a. 0-5
- b. 6-10
- c. 11-20
- d. 21-30
- e. 30+

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8

GOAL & OBJECTIVES

To identify and describe and understand the intent of the key provisions.

- Upon completion, participants will be better able to:
- Recognize how the IEBC offers alternatives and incentives to building owners to maintain safety of their buildings and to continue to initiate upgrades towards compliance with more contemporary editions of the codes.
  - Identify the three different compliance methods offered by the IEBC.
  - Identify fire protection systems that need to be upgraded for greater fire safety.
  - Recognize vertical openings that need partial or complete enclosure for greater fire safety.
  - Determine adequate means of egress, needed accessibility structural and improvements.
  - Identify thresholds that trigger additional requirements for the existing building.




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9

# Code Administration and Enforcement




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10

COURSE OUTLINE

- Introduction to Building Codes
- Legal Aspects, Permits, and Inspections
- History of Rehabilitation Codes




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11

Introduction to Building Codes

- History of the Codes
- Code Development
- Construction Codes
- Existing Building
- Using the IEBC



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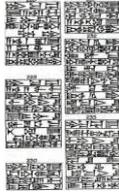
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History of the Codes

1760 BC - First Known Building Code, "Code of Hammurabi" – six rules

- Payment – two shekels for each SAR built
- Poor Quality of Construction, i.e., work is not sound and has fallen:
  - If owner is killed, builder put to death;
  - If owner's son is killed, builder's son put to death;
  - If slave of the owner is killed, builder shall give slave for slave;
  - If caused the loss of goods, builder shall render back what was destroyed and shall re-build the house at his own cost.
- If builder has not keyed his work, and wall has fallen, builder shall make wall firm at his own expense.



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History of Codes

- One of the first modern building codes – "The Building Code", recommended by the National Board of Fire Underwriters
  - Provided uniform language from respected organization
  - Provided a "Model Code" that could be adopted without having to write a "home grown" code
- Starting in 1920's, several organizations started to develop model codes
- By the end of twentieth century there were three model code groups, each with their family of codes: BOCA, ICBO, SBCCI



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## History of Codes

- BOCA, ICBO and SBCCI agreed to develop one model code for the U.S.
  - The first *International Building Code* was published in 2000
  - The "I" Codes are used in every state in the U.S. and many countries.
  - First *International Existing Building Code* was published in 2003




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## Code Development

- The family of "I" Codes is revised, updated and new editions published every three years:
  - To keep updated with construction technology, methods, materials, equipment and processes that are constantly evolving
  - Revised through an open "Governmental Consensus Process" which provides for:
    - Openness
    - Transparency
    - Balance of Interests
    - Due Process
    - Appeals Process
    - Consensus




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## Code Development

### The ICC Code Development Process:

- Committees Created
- Code Changes Submitted – Anyone can submit
- Committee Action Hearings #1 (CAH) – approve, approve/mod, or disapprove
- Committee Action Hearings #2 (CAH) – approve, approve/mod, or disapprove
- Public Comments Hearings (PCH) – Eligible voters discuss and vote on code change proposals. Only Government officials can vote.
- Appeals

New Edition Published

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17

### Construction Codes – International Building Code

- Applies to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal and demolition of every building, or structure, or appurtenances connected to such buildings or structures. Section 101.2 Scope
- Establishes the minimum requirements to provide for safety, public health and general welfare through structural strength, means of egress facilities, stability, sanitation, adequate light and ventilation, energy conservation, and safety to life and property from fire, explosion and other hazards attributed to the built environment. Section 101.3 Intent



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### Construction Codes – IEBC

- Intent to have a comprehensive set of regulations for existing buildings consistent with and inclusive of the scope of the existing legacy codes.
- Technical content from the legacy codes, as well as other rehabilitation codes, was used as the basis for the development



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### Construction Codes – IEBC

- The IEBC is founded on the following principles”
  - To encourage the use and reuse of existing buildings that adequately protect public health, safety and welfare
  - Do not unnecessarily increase construction costs
  - Do not restrict the use of new materials, products, or methods of new construction
  - Do not give preferential treatment to particular types of classes of materials, products or methods of construction



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### Construction Codes – IEBC

- Most existing buildings do not comply with the most currently published codes for new construction
- Intended as an alternative approach to repairs, alterations, additions and changes in occupancy to existing buildings
- To expect compliance with the codes for new construction is unreasonable from both a physical perspective and is cost prohibitive



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### Construction Codes – IEBC

If a building was code compliant when initially constructed, received an occupancy permit or was legally approved and has been properly maintained, it does not become non-compliant or unsafe just because an alteration, an addition, a change of occupancy, or a repair is being initiated.



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### Using the IEBC

- Regulating construction within existing buildings presents opportunities to ensure that renovations comply with currently adopted building codes
- At a minimum, the current level of compliance is maintained or improved, incrementally, to meet basic safety levels
- IEBC allows options for controlled departure from full compliance with the "I" Codes for new construction



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23

## Using the IEBC

- Provides for three main options for the owner/designer when dealing with alterations of existing buildings:
  - Option #1 – Prescriptive Compliance Method – Chapter 5 – This was formerly Chapter 34 of the IBC (2012 and earlier editions)
  - Option #2 – Work Area Compliance Method – Chapters 6-12
  - Option #3 – Performance Compliance Method – Chapter 13 – Was a provided in former chapter 34 of the IBC (2012 and earlier editions)
- Section 301 provides a summary of these options



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## Using the IEBC

### Section 301.3 Exception

- Allows alterations to be done under the code adopted at the time of the original construction of the building or portion of the building
  - New Structural members must comply with IBC
  - Exception does not apply to alterations that constitute substantial improvement in flood hazard areas
  - Does not apply to structural alterations in the Prescriptive Compliance Method or the Work Area Compliance Method.



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## IEBC Arrangement and Format

Chapters	Subjects
1-2	Administrative Requirements and Definitions
3	Provisions for all Compliance Methods
4	Repairs
5	Prescriptive Compliance Method
6-12	Work Area Compliance Method
13	Performance Compliance Method
14	Relocated Buildings
15	Construction Safeguards
16	Referenced Standards
Appendix A	Guidelines for Seismic Retrofit
Appendix B	Supplementary Accessibility Requirements
Appendix C	Guidelines for Wind Retrofit
Appendix D	Board of Appeals
Appendix E	Temporary Emergency Uses
Resource A	Guidelines on Fire Ratings of Archaic Materials and Assemblies

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## Standards used by the IEBC

- The IEBC References approximately 25 separate standards as well as many of the i-Codes
  - Found in Chapter 16
  - Info includes Section numbers where the standard is referenced
- Where there are conflicts between the code and standard, the code applies



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102.4.1

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## Preliminary Meeting

This section mandates that the code official and permit applicant meet if one or the other requests such a meeting, and the work is not a repair or Level 1 alteration.



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104.3.2

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## Modifications

- Instances when there are practical difficulties with complying with the code, so IEBC allows for modifications
  - Based on individual cases – does not set precedent
  - Owners or authorized agents must apply for modification with explanation of practical difficulty
  - Must provide information as to how their modification is in compliance and intent of the code.
  - Modification does not lessen health, accessibility, life and fire safety or structural safety
  - The code official must review and decide if modification is granted



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104.2.4

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## Alternate Materials, Design and Methods

- Alternate materials and methods of construction
- The IEBC is not intended to prohibit any type of material or design
- Responsibility to approve is with the Code Official
  - Must comply with the purpose and intent of code
  - Must be determined to be equivalent to the code in quality, strength, effectiveness, fire resistance, durability, and safety.
  - Accomplished by reviewing testing information and research reports



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104.2.3

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## Permits

- Building permit – obtained when a property owner wants to:
  - repair
  - make alterations
  - relocate
  - build an addition
  - demolish
  - change the occupancy
- Or make changes to an HVAC or plumbing system. To:
  - repair
  - install
  - add
  - alter
  - remove
  - convert



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## Submittal of Construction Documents

- Must include the application, set of construction documents and specifications.
- Construction documents and specifications must show how the project will comply with the applicable portions of the codes
- Requires two or more sets of construction documents, must be sealed by licensed design professional and, at a minimum, must show:
 

Fire Protection Systems	Means of Egress
Exterior Balconies and elevated walking surfaces	Exterior Wall Envelope
	Site Plan
- Construction documents can be submitted in digital format



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### Plan Review

- Code requires plans be reviewed for compliance with the code and applicable laws of the jurisdiction
- Plans must show the designated “work areas”
- If discrepancies are found during the review:
  - Report is generated and provided to the applicant
  - Corrections are made
  - Plans resubmitted
- If changes are made after the permit is issued, revisions must be submitted for approval




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106.2.1,  
106.3

33

### Inspections

- Once the permit is issued:
  - Work is required to be inspected for compliance
- Inspections
 

<ul style="list-style-type: none"> <li>▪ Footing and/or foundations</li> <li>▪ Concrete slab or under floor</li> <li>▪ Lowest floor elevation</li> <li>▪ Frame</li> <li>▪ Lath or gypsum</li> <li>▪ Weather-exposed balconies</li> </ul>	<ul style="list-style-type: none"> <li>▪ Fire and smoke-resistant penetrations</li> <li>▪ Special inspections</li> <li>▪ Flood hazards</li> <li>▪ Final inspections</li> </ul>
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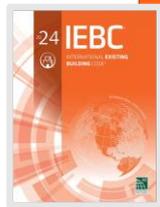
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109.3

34

### Definitions




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## Definitions

- IEBC Chapter 2 contains all definitions
- Defined terms italicized in code text
- Definitions that can create issues:
  - Change of Occupancy
  - Change of Use
  - Substantial Damage
  - Substantial Improvement
  - Substantial Structural Damage
  - Technically Infeasible
  - Work Area
  - Historic Building
  - Dangerous Building
  - Unsafe Building



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## Definition – Change of Occupancy

Any of the following shall be considered as a change of occupancy where the current IBC requires a greater degree of safety, accessibility, structural strength, fire protection, means of egress, ventilation or sanitation than is existing in the current building or structure:

1. Any change in the occupancy classification of a building or structure.
2. Any change in the purpose of, or a change in the level of activity within, a building or structure.
3. A change of use.

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## Definition – Change of Use

A change in the use of a building or a portion of a building, within the same group classification, for which there is a change in application of the code requirements.

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### Definition – Substantial Structural Alteration

An alteration in which the gravity load-carrying structural elements altered within a 5-year period support more than 30% of the total floor and roof area of the building or structure. The areas to be counted toward the 30% shall include mezzanines, penthouses, and in-filled courts and shafts tributary to the altered structural elements.

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### Definition – 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.

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### Definition – 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% 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 of the following:

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 ensure safe living conditions.
2. Any alteration of a historic structure, provided that the alteration will not preclude the structure's continued designation as a historic structure.

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41

### Definition – Substantial Structural Damage

A condition where any of the following apply:

1. The vertical elements of the lateral force-resisting system have suffered damage such that the lateral load-carrying capacity of any story in any horizontal direction has been reduced by more than 33 percent from its predamage condition.
2. The capacity of any vertical component carrying gravity load, or any group of such components, that has a tributary area 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 predamage 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.
3. The capacity of any structural component carrying snow load, or any group of such components, that supports more than 30 percent of the roof area of similar construction has been reduced more than 20 percent from its predamage condition, and the remaining capacity with respect to dead, live and snow loads is less than 75 percent of that required by the IBC for new buildings of similar structure, purpose and location.

For purposes of this definition, work done to implement repairs shall not be considered damage that reduces structural capacity.

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### Definition – Technically Infeasible

An alteration of 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 which are in full and strict compliance with the minimum requirements for new construction and which are necessary to provide accessibility.

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### Definition – 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.

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### Definition – Storm Shelter

A building, structure or portions thereof, constructed in accordance with ICC 500, designated for use during hurricanes, tornadoes or other severe windstorms.

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### Definition - Historic Building

Any building or structure that is one or more of the following:

1. Listed, or certified as eligible for listing, by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, in the National Register of Historic Places.
2. Designated as historic under an applicable state or local law.
3. Certified as a contributing resource within a National Register state designated or locally designated historic district.

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### Definition - 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, has partially collapsed, has moved off its foundation or lacks the necessary support of the ground.
2. There exists a significant risk of collapse, detachment or dislodgement of any portion, member, appurtenance or ornamentation of the building or structure under permanent, routine or frequent loads; under actual loads already in effect; or under snow, wind, rain, flood, earthquake aftershock or other environmental loads when such loads are imminent.

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Definition - 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.

48

Handwriting lines for slide 48.



General – Options



49

49

Handwriting lines for slide 49.



General - Options

- Compliance Alternatives
- Essentials



50

Handwriting lines for slide 50.

## Compliance Alternatives

- General Considerations
  - IEBC used only for buildings, or portions thereof, that have been previously used
  - Assumes building is in compliance with IFC and IPMC
    - Any existing violation of the IFC or IPMC should not hold up a permit being issued under the IEBC
    - Corrections should be handled separately



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101.4.2

51

## Compliance Alternatives

- General Considerations
  - Structural considerations treated in more detail because most jurisdictions do not address existing structural conditions
- For Example:
  - Alterations Level 1 has no specific requirements for fire protection and means of egress other than maintaining the current level of safety. However, there are substantial provisions that address various structural items including re-roofing



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## Compliance Alternatives

- General Considerations
  - In addition to the specific compliance options addressed in the IEBC
  - Owners and design professionals always have option of the using the IBC



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## Compliance Alternatives

- Code official can allow original building code to determine compliance, per Section 301.1 Exception
  - When using option:
    1. Determine what code in effect at time of original construction
    2. Building must comply with current IFC and IPMC
    3. Any new work must comply with IBC
    4. Like materials permitted except those no longer permitted by current building code
  - If the owner chooses to do nothing, building is acceptable



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301.3

54

## Compliance Alternatives

- Of five options allowed by IEBC, exception to Section 301.3 could be the most problematic
  - Be aware that occupancy classifications have changed with newer editions of the codes



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301.3  
Exc

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## Compliance Alternatives

### Options for Owners and Their Design Team

- Allows for three options when proposing alterations, additions, or changes of occupancy
  - Prescriptive Compliance Method – Chapter 5
  - Work Area Compliance Method – Chapters 6-12
  - Performance Compliance Method – Chapter 13

### Exception

- Allows for a fourth option, alterations can be made under the code as adopted at the time of the building's original construction



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301.3

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### Compliance Alternatives

- No specific methodology for choosing compliance alternative exists
- These considerations may assist in choosing best approach for a given project:
  - Is the building a relatively new building?
    - If so, the Prescriptive Compliance Method may be useful as the building was built based on more recent editions of IBC or IRC




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301.3

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### Compliance Alternatives

- Is proposed work limited to specific areas in the building?
  - If so and there are items in the building that are not in compliance with recent editions of IBC/IRC, the Work Area Compliance method may be more appropriate.
  - It prescriptively identifies what extent the building must comply with the IBC/IRC and the extent of compliance is proportional to the work proposed.




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301.3

58

### Compliance Alternatives

- Are there significant areas that do not comply with current building code requirements?
  - Of the three options in the IEBC, Performance Compliance Method may be most desirable since it allows some areas to be unchanged while focusing on areas intended to be changed.




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301.3

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### Compliance Alternatives

- Identifies that the applicant has the choice of methods:
  - Not the code official
- Prohibits use of multiple methods used in combination with each other




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301.3

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### General Provisions

#### Bleachers, Grandstands, and Folding and Telescopic Seating

- Must comply with ICC 300

#### Additional Codes

- Alterations, repairs, additions and changes of occupancy shall comply with the IEBC or all other ICC codes respectively

#### Additional Codes in Health Care

- Must also comply with NFPA 99




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301.1.4  
302.2

61

### General Provisions



#### Storm Shelters

- Not triggered with a change of occupancy or alterations
- Required with an addition to Group E with  $\geq 50$  occupants
- In an area w/shelter design speed for tornadoes is  $\geq 250$ mph
- Must comply with IBC Section 423 and ICC 500
  - Even if voluntarily constructed

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303

62

### Structural Provisions

- Structural Conditions are evaluated where additions or alterations take place regardless of the compliance option
  - Snow Loads in accordance with ASCE 7
  - Reference is made to ASCE 7 and ASCE 41 Tier 3 where specific projects trigger compliance with full seismic forces, reference Table 303.3.1




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304

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### Structural Provisions

**TABLE 304.3.1  
PERFORMANCE OBJECTIVES FOR USE IN ASCE 41 FOR COMPLIANCE WITH FULL  
SEISMIC FORCES**

RISK CATEGORY (Based on IBC Table 1604.5)	STRUCTURAL PERFORMANCE LEVEL FOR USE WITH BSE-1N EARTHQUAKE HAZARD LEVEL	STRUCTURAL PERFORMANCE LEVEL FOR USE WITH BSE-2N EARTHQUAKE HAZARD LEVEL
I	Life Safety (S-3)	Collapse Prevention (S-5)
II	Life Safety (S-3)	Collapse Prevention (S-5)
III	Damage Control (S-2)	Limited Safety (S-4)
IV	Immediate Occupancy (S-1)	Life Safety (S-3)

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304.3

64

### Structural Provisions

- Where reduced seismic forces are allowed, conditions must comply with:
- 75% of IBC prescribed forces
  - IEBC Appendix A (A-1 through A-4)
  - ASCE 41, using the performance objective in Table 303.3.2 for the applicable risk category




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304.3.2

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### Accessibility - Additions

- An addition is a new building and must comply with IBC accessibility requirements
- If an addition impacts an area of primary function to an existing building
  - Primary route to that primary function must be made accessible (Section 306.7.1)
  - Limited-use/limited-application elevators installed per ASME A17.1 permitted as component of accessible route (Section 306.7.8)



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306.6

### Accessibility – Alterations

**Scoping for Alterations** – Identifies accessibility requirements for 15 separate elements:

- |  |                                       |
|--|---------------------------------------|
| Entrances                                | Elevators                             |
| Platform Lifts                           | Stairways and Escalators              |
| Ramps                                    | Accessible Dwelling or Sleeping Units |
| Type A Dwelling or Sleeping Units        | Type B Dwelling or Sleeping Units     |
| Jury Boxes and Witness Stands            | Toilet Rooms                          |
| Additional Toilet and Bathing Facilities | Dressing, Fitting and Locker Rooms    |
| Fuel Dispensers                          | Thresholds                            |
| Amusement Rides                          |                                       |

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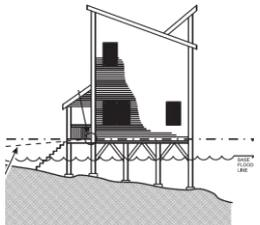
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306.7

### Accessibility - Alterations

- Comply with IBC Chapter 11, ICC A117.1 and Sections 306.7.1 thru 306.7.18 unless technically infeasible
- If determined to be technically infeasible, must comply to the maximum extent that is technically feasible



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306.7

## Accessibility

### Primary Function must maintain a primary route

#### Exceptions:

- Costs are not required to exceed 20% of costs of alterations affecting area of primary function
- Alterations to windows, doors, hardware, M.E.P. systems, fire protection systems, etc.
- Alterations undertaken for sole purpose of increasing accessibility to facility
- Abatement of hazardous materials
- Alterations undertaken for primary purpose of increasing accessibility
- Altered areas limited to Type B dwelling and sleeping units
- Toilet facilities and drinking fountains, including route from area of primary function to these facilities, shall be accessible

306.7.1

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## Accessibility

### Accessible Means of Egress

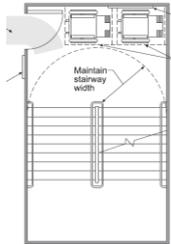
- Are not required to be added in existing facilities to meet IBC Chapter 10

### Alteration of Type A Units

- Individually owned dwelling units in Group R2 occupancies permitted to meet Type B provisions

### Type B Units

- Dwelling or sleeping units not required in existing buildings where the work area is ≤ 50% of aggregate building area



306.7.2-306.7.4

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## Accessibility

### Elevators

- Altered elements meet ASME A17.1
- Communication systems altered or replaced – comply with IBC Section 3001.2
  - Also alter other elevators with same hall control

### Stairways and Escalators

- When added, accessible route is also required



306.7.7, 306.7.10

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## Accessibility

### Dwelling and Sleeping Units

- When added or altered
  - Apply IBC Section 1108 requirements for accessible units
    - Only apply to altered or added units

### Type A

- When 20+ added or altered
  - Apply requirements of IBC Section 1108

### Type B

- If work area > 50% of building
  - Apply requirements of IBC Section 1108



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306.7.11

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## Accessibility

### Toilet and Bathing Facilities

- If facilities can't be altered, OK to add individual, accessible facility on same floor nearby
- Add directional signs from existing facilities to new facility
- When adding additional fixtures, add at least one accessible fixture (Group M and A)
- Recreational facilities add at least one individual facility
- Add adult changing station to new facilities if required by IBC



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306.7.12  
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306.7.16

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## Accessibility

### Historic Structures

- Section gives general guidance for historic buildings when dealing with alterations or changes of occupancy
  - If proposed alteration or change in occupancy will threaten or destroy the historical significance facility related to accessible routes, entrances or toilet facilities – alternatives granted
- Chapter 12 applies to Historic Buildings for the Work Area Method



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306.7.18

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## Accessibility

### Historic Structures

- Address the following
  - Site arrival points
  - Entrances
  - Multi-story buildings
  - Toilet and bathing facilities
  - Type A and B units



306.7.18

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## Smoke Alarms

### Smoke Alarms

- Smoke alarms are required to be provided throughout existing buildings in accordance with IFC and Section 314 of IRC, when alterations, additions, change of occupancy or a relocation are made in Group R or I-1 occupancies
- Exception:**
- Level 1 alterations



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## CO Detection

### Carbon Monoxide Detection –

- Carbon Monoxide detection is required throughout existing buildings per IFC or IRC Section 315
- Exception:**
1. Work involving exterior surfaces of buildings, addition or replacement of windows or doors, or the additions of decks/porches
  2. Work on plumbing and mechanical systems, other than fuel-burning appliances
  3. Level 1 alterations
  4. Group I-2 occupancies - not required in each sleeping unit where detection is provided in each space containing CO source. Requires transmittal of alarm signal to sleeping units.

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### Exterior Wall Covering and Envelope

#### Addition and Replacement – Combustible Covering and Envelope

- Materials and methods must comply with IBC Chapters 14 and 26
- Requirements are triggered for exterior wall covering or envelope being replaced or added
  - More than 2 stories and >15% of total wall area on any one side
- Building must have sprinkler system – if high-rise – to add combustible wall covering



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## Quiz



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APPLICATION

Name the options that the IEBC makes available to the designer when proposing to make alterations to a building or structure:

- ✓ Prescriptive Compliance Method
- ✓ Work Area Compliance Method
- ✓ Performance Compliance Method
- ✓ The Codes that were in use at the time the building was originally constructed if approved by the Code Official
- ✓ The Codes for new construction i.e., the IBC or IRC

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APPLICATION

Can a building take advantage of the more relaxed provisions of the code before construction of the building has begun?

No. A building or portion thereof that has not been occupied previously or used for its intended purpose must comply with the provisions of the IBC.

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APPLICATION

If an addition impacts an area of \_\_\_\_\_ to the existing building then the primary route to that \_\_\_\_\_ must be made accessible.

Primary Function

Who determines the location of the work area?

The Designer

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# Repairs



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## Repairs

- A guiding principle when making repairs is the work cannot make the building less compliant than it was before the repair was made
- Work on nondamaged components necessary for the required repair of damaged components is part of the repair – not subject to requirements for alterations



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401.2

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## Repairs

- Replacement glazing must comply with IBC Section 2406
- Fire Protection – repairs must be done in a manner that maintains the level of fire protection provided
- Repairs must maintain the level of means of egress provided by in the building.



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402-404

88

## Repairs

### Structural

- Structural damage to a building can occur to buildings for a number of reasons, i.e., wind, earthquake, fire, flooding, falling trees, cars running into the building, etc.
- Repairs to buildings with less than substantial structural damage can restore structural elements to pre-damaged condition
- Damage due to snow loading must be repaired in accordance with IBC Section 1608



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405

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### Substantial Structural Damage

One or both of the following apply:

- 1. Vertical elements of LFERS have damage so capacity is reduced > 33% from pre-damaged condition.



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405.2.3,  
405.2.4

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### Substantial Structural Damage

- 2. Vertical gravity load-carrying components, supporting > 30% total area of floor(s) and roof(s) has lost > 20% capacity from pre-damaged condition. And remaining capacity is < 75% for new buildings of similar structure, purpose and location.



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405.2.3,  
405.2.4

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### Substantial Structural Damage

Buildings in SDC A, B or C with damage not caused by earthquakes, do not have to be evaluated for earthquake effects.



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405.2.3,  
405.2.4

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## Repairs



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## Repairs

### ▪ Evaluation by Design Professional determines:

- Building complied with load combinations of the IBC, damaged structural elements can be restored to pre-damaged condition, Section 405.2.3.2
- Building did not comply with the load combinations of IBC, then entire building must be retrofitted to comply, Section 405.2.3.3



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405.2.3.1

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## Repairs

### Repairs for non-compliant buildings

- Wind loads for the repair and retrofit must comply with the building code in effect at the time of the original construction except if damage was caused by wind, then must comply with IBC
- Seismic loads for retrofit design shall be those in effect at the time of the original construction but cannot be less than the reduced seismic forces



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405.2.3.3

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## Repairs

### Substantial Structural Damage to Gravity Load-Carrying Components

- Structural damage to gravity load-carrying components must be rehabilitated to comply with dead and live loads of the IBC.
  - If damage caused by or related to snow load effects, snow load requirements of the IBC must be incorporated into rehabilitation
  - If damage caused by wind or seismic effects, an evaluation must be executed by design professional and submitted to code official



405.2.4

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## Repairs

### Lateral force-resisting system

- If substantial structural damage to gravity load-carrying components them building must be evaluated in accordance with Section 405.2.3.1
- If evaluation determines non-compliance them must comply with Section 405.2.3.3



405.2.4.1

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## Repairs

### Flood Hazard Areas

- Buildings that have sustained substantial structural damage must be brought into compliance with flood loads in IBC Section 1612



405.2.6

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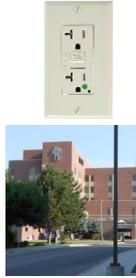
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## Repairs

### Existing electrical wiring and equipment

- May be repaired or replaced with like material
- Receptacles shall comply with NFPA 70 – indicates the various types of receptacles that must be used where mandated by the NEC
- Healthcare facilities must also meet requirements of NFPA 99




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## Repairs

### Mechanical

- Repairs cannot make the building less compliant
- Mechanical draft system used with manually fired appliances and fireplaces:
  - Draft device must be listed and installed per manufacturer's instructions
  - Must provide audible and visible warning upon loss of power or failure of the system. Battery back-up required on warning device
  - Smoke detector or smoke alarm must be installed in the room containing the appliance or fireplace and detection device must have battery backup




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407

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## Repairs

### Plumbing

- Materials and supplies prohibited by IPC cannot be used
- Replacement water closets must have a maximum water consumption of 1.6 gallons per flushing cycle
  - Except for blow-out design water closets having a maximum water consumption of 3.5 gallons per flushing cycle




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408

101

## Work Area Method



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## Work Area Method

- Incorporates the concept of "work area" – reference Definition in Chapter 2
- Work area is that portion of the building which the owner desires to do the work:
  - Must be clearly identified on the construction documents
  - No requirements applied outside of work area (except for supplemental requirements for Alterations level 2 and Alterations level 3)
  - Incidental work outside work area does not trigger additional requirements but work has to comply with IBC

103

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## Work Area Method

*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.*

"Work Area" is a legal term and is defined in the Chapter 2, Definitions

104

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## Work Area Method

- A key word in the definition is “reconfigured”
- Either a space, component or system is being reconfigured in order to apply the work area method
- Any lack of clarity in defining the Work Area can have significant impacts on the level of overall compliance with new construction requirements of the IBC

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## Work Area Method Alterations - Level 1



106

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## Alterations – Level 1

*Work areas that involve 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*

Ch. 7

107

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## Alterations – Level 1

### General Requirements

- The Guiding Principle – Work cannot make building less compliant
- Only involves replacement of components
- Does not include reconfiguration of rooms or spaces
- **No area limitations**
- Alterations, typically, must comply with new construction requirements of IBC/IRC

701

108

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## Alterations – Level 1

### General Requirements

- In flood areas, if alteration constitutes substantial improvement, all work must comply with IBC Section 1612 or IRC Section R322

### Emergency Escape and Rescue Openings (EERO), when required:

- Must be openable from the inside and;
- Security features must be openable from the inside and;
- Require no greater force or tool for normal operations and;
- Such features shall not reduce opening dimensions of EERO

701, 702.5

109

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## Alterations – Level 1

### Building Elements and Materials

- Newly installed interior finish materials and trim must comply with IBC Chapter 8
- Materials must comply with ASTM E84 or UL 723
- Three Categories
  - Class A: Flame spread index 0-25; Smoke Developed index of 0-450
  - Class B: Flame spread index 26-75; smoke developed index of 0-450
  - Class C: Flame spread index 76-200; smoke developed index of 0-450



702

110

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### Alterations – Level 1

#### Foam Plastics, textiles, vinyl, HDPE, polypropylene

- Require additional testing or have additional requirements:
  - Some foam plastics cannot be used as an interior finish except as meet additional testing of NFPA 286, FM 4880, UL 1040, tested on a foam plastic assembly
  - Some textiles can only be used where sprinkler systems are installed




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702

111

### Alterations Level - 1

#### Floor Finishes

- Evaluated using a radiant panel in accordance with NFPA 253
- Traditional floor coverings are exempt from testing requirements
- If building has NFPA 13 or 13R sprinkler system, floor finishes with a reduced rating are approved.




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702

112

### Alterations – Level 1

#### Floor finishes

- Categorized into three levels of radiant flux:
  - Class I:** Critical radiant flux of 0.45 watts/cm<sup>2</sup> or greater – required in most Group I Occupancies unless suppressed.
  - Class II:** Critical radiant flux of 0.22 watts/cm<sup>2</sup> or greater - required in all other occupancies except for Group F, R-3, R-4 and U
  - DOC FF-1** "pill test" (CPSC 16 CFR Part 1630)




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702

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### Alterations – Level 1

#### Replacement Window EERO's

- In Group R-2, R-3; 1 & 2 family dwellings and townhouses, replacement window must be the largest standard size window that will fit within the existing frame or rough opening
- Replacement window is not part of a change of occupancy




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702.5

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### Alterations – Level 1

#### Bars, grilles, covers or screens

- Permitted over EERO's, bulkhead enclosure or window wells serving such openings if:
  1. Minimum net clear opening complies with code in effect at time of construction
  2. Devices must be releasable or removable from inside without use of key, tool, or force greater than needed for normal operation
  3. Where such devices shall not reduce net clear opening of the EERO
  4. Smoke alarms are required to be installed per IBC Section 907.2.11




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702.6

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### Alterations – Level 1

#### Materials and Methods

- All new work must comply with the applicable i-Codes related to material standards, installation details, connections, penetrations, joints and continuity
- IEBC limits level of compliance with IFGC to:
  - Chapter 3, General Requirements except 303.7 & 306
  - Chapter 4, Gas Piping, except 401.8 and 402.3
  - Chapter 5, Chimneys and Vents
  - Chapter 6 Specific Appliances




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702.7

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### Alterations – Level 1

#### Fire Protection

- Any alterations must maintain level of protection provided

#### Means of Egress

- Any alterations must maintain level of protection provided for means of egress



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703,  
704

120

### Alterations – Level 1

#### Locking Arrangements

- Group E, Group B educational occupancies, Group I-4
- Egress doors with locking arrangements designed to keep intruders from entering the room only allowed if meeting IBC Section 1010.1.4.4



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704.3

121

### Alterations - Level 1

#### Reroofing

- Recovering or replacement of existing roof coverings must comply with IBC Chapter 15
- Minimum slope requirements are not required to meet the 2% slope requirement provided they have positive roof drainage
- Existing secondary drainage and scuppers acceptable if they have been properly maintained; if replaced they must comply with IBC Section 1502
- Structural roof components must be capable of supporting replacement covering system and material and equipment loads during installation

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## Alterations – Level 1

### Roof Replacement

- Typically includes removal of all existing layers of coverings, exposing roof deck, except for existing ice barrier. Such ice barrier must be covered with a new ice barrier membrane
- New Roof Covering over an existing roof covering is permitted if any condition is present:
  - New covering is installed per the manufacturer's instructions
  - Complete and separate roofing systems designed to transmit loads directly to building's structural system
  - Metal panels, metal shingles, concrete and clay tile installed over existing wood shakes in accordance with Section 705.4
  - Roof protective coatings



705.2

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## Alterations – Level 1

### Roof cover not permitted

- Where any of the following conditions exist:
  - The existing roof or covering is water soaked or deteriorated to such a point it will not function as the base for additional covering, or
  - The existing roof covering is slate, clay cement, or asbestos-cement tile, or
  - The existing roof has two or more layers of any type of roof covering



705.3

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## Alterations – Level 1

### Roof Recovering over Wood Shakes or Shingles

- Where application of a new roof covering occurs over an existing wood shingle or wood shake creates a concealed combustible space:
  - Existing roof covering surface must be covered with approved noncombustible material securely fastened in place prior to application of new roof covering
  - Can be gypsum board, mineral fiber, glass fiber or similar product



705.3.1

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### Alterations - Level 1

**Structural**

- Applies when work includes replacement of equipment supported by the building or where a reroofing permit is required




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### Alterations - Level 1

**Structural**

- Structural elements shall be replaced in accordance with IBC if any alteration increases design dead, live or snow load > 5%

**Exceptions:**

- Buildings of R occupancies with not more than 5 dwelling or sleeping units meet prescriptive construction requirements in IBC or IRC
- Where increased dead load is due entirely to the addition of a second layer of roof covering weighing < 3 lb/sq.ft.




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### Alterations – Level 1

**Additional Requirements**  
**Bracing for Unreinforced Masonry**  
**Parapets with Reroof Permits**

- Additional analysis is required to evaluate unbraced parapets in SDC D, E, or F:
  - Where > 25% of roof covering is replaced and parapets are unreinforced masonry, work shall include installation of bracing
  - Reduced seismic forces are permitted




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706.3.1

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### Alterations - Level 1

#### Roof Diaphragm and High-winds

- Roofing materials must be replaced or strengthened in accordance with IBC where:
  - > 50% of roofing materials are removed from the roof diaphragm, and
  - The building is located where the ultimate wind design is >115 mph, and
  - The diaphragm and building connections are not capable of resisting 75% of those wind loads



706.3.2

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### Alterations – Level 1

#### Energy Conservation

- Entire building need not comply with IECC
  - Alterations must comply with IECC if applicable, such as replacing windows or replacement of light fixtures.

#### Electrical

- In Group I-2, ambulatory care facilities and outpatient clinics
  - Electrical alterations must comply with NFPA 99 per Federal Req.



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## Work Area Method Alterations - Level 2



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## Alterations – Level 2

- Work areas involve reconfiguration of rooms or areas
- Aggregate area of work areas of Level 2 alterations must be < 50% of the overall building area



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Ch. 8

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## Alterations – Level 2

- Meet any requirements of Level 1 alterations when conducting Level 2 alterations (incremental approach)
- Exception**
- Reconfiguration work that is solely for accessibility compliance only need comply with level 1 alterations



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801

133

## Work Area Method

### Supplemental Requirements Threshold – Level 2:

Work Area > 50% of the floor area on which alterations are done and includes:

- |                            |                            |
|----------------------------|----------------------------|
| ▪ Shaft and Floor Openings | ▪ Door Closing             |
| ▪ Stairway Enclosures      | ▪ Panic Hardware           |
| ▪ Interior Finish          | ▪ Corridor Openings        |
| ▪ Fire Alarm Systems       | ▪ Means of Egress lighting |
| ▪ Door Swing               | ▪ Exit Signs               |

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134

## Alterations - Level 2

- New work will comply with the IBC
- Exceptions:**
- Where windows are added-not required to meet light and ventilation
  - Newly installed electrical equipment shall comply with Section 807
  - Length of dead-end-corridors only required to meet Section 805.7
  - Ceiling height of newly created habitable areas and corridors can be 7'
  - Newly installed escalators in below-grade transportation stations can have a clear width of 32"
  - New Structural members and connections shall be permitted to comply with Section 302



801.4

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## Alterations – Level 2

### Building – Elements and Materials

- **Vertical Openings**
  - All existing vertical openings connecting two or more floors must be enclosed with approved assemblies of one-hour fire-resistance-rated construction and approved protected openings.
- **14 Exceptions:**
  - When not required by IBC
  - Most exceptions for installation of fire protections systems; height and area limitations, etc.
  - 1- and 2-family dwelling and open parking garages and ramps



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## Alterations – Level 2

### Supplemental Requirements

#### Shaft and Floor Opening Enclosure

- If work area on any building story > 50% of the gross floor area:
  - Enclosure requirements of IBC Section 803.2 apply to all vertical openings throughout the entire floor
  - Apply only to portion of vertical openings on the floor where work area is located
- Does not apply to:
  - Stairways
  - Vertical openings in tenant spaces entirely outside the work area



802.2.2

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## Alterations – Level 2

### Supplemental Requirements

#### Stairway Enclosure

- When the work area on any building story > 50% of that gross floor area:
  - Stairways serving means of egress for the work area must:
    - Be enclosed with smoke tight construction
    - Must be enclosed on highest work area story and all stories below
    - Openings must be smoke protected assemblies but not fire protection rated
    - Such protectives must be self closing upon activation of fire alarm system



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802.2.3

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## Alterations – Level 2

### Smoke Compartments

- I-2 Occupancies - long term health care occupancies work areas
- Work area is located on a building story used for sleeping rooms
- More than 30 patients
- Story must be divided into at least two smoke compartments
- Divided with smoke barriers in accordance with IBC Section 407.5



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802.3

139

## Alterations – Level II

### Smoke Compartments

- Area limitations
  - 22,500 sq ft for Group I-2 Condition 1 (long term care)
  - 40,000 sq ft for Group I-2 Condition 2 (acute care facilities)
  - 200 ft travel distance limitation to an exit access door in accordance with IBC



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802.3

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## Alterations – Level 2

### Interior Finish

- Walls and ceilings within exits and corridors in any work area must:
  - Comply with interior finish requirements of the IBC
  - Existing materials that do not comply shall be permitted to be treated with an approved fire-retardant coating
  - Treatment must comply with the manufacturer’s instructions
  - Compliance shall be demonstrated by testing the fire-retardant coating on same or similar material



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802.4

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## Alterations – Level 2

### Supplemental Requirements

#### Interior Finish

- Aggregate of work areas on any building story >50% of the gross floor area of that story.
- Interior finish requirements of IBC Section 803.4 apply to all exits and corridors, throughout the entire story containing the work area.
  - Except for interior finish within occupied tenant spaces on that story that are entirely outside of the work areas.



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802.4.1

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## Alterations – Level 2

### Guards

- Requirements for guards are found in Section 802.5 & 804.14, Means of Egress
- Guards shall be provided where portions of a Level 2 Alterations work area:
  - Are more than 30 inches above the floor or exterior grade
  - Do not have a guard
  - Existing guards are in danger of failure



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802.5, 804.14

143

## Alterations – Level 2

### Guards

- Guards must comply with the prescriptive requirements of the IBC for new guards, including height, baluster spacing and impact resistance
- Requirements of Section 802.5 are extended to all means of egress paths leading from all work areas to, and including the level of exit discharge



802.5.2, 804.14

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## Alterations – Level 2

### Fire Resistance Ratings (FRR)

- Where a complete automatic, supervised sprinkler system installed in accordance with NFPA 13 or NFPA 13R has been added:
  - Where approved by the code official
  - Required FRR of existing structural elements are deemed to meet the requirements of the current building code
  - Construction documents shall be submitted to indicate which building elements and materials should be evaluated for compliance with IBC FRR requirements



802.6

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## Alterations – Level 2

### Corridor Rating

- Rating of the corridor can be reduced in accordance with IBC if an automatic fire sprinkler system is installed throughout the floor
- Sprinkler coverage throughout the story must also extend coverage to the stairway landings at the floor and intermediate landing immediately below



803.1.1

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## Alterations – Level 2

### Automatic Sprinkler Systems in High-Rise Buildings

- Automatic Sprinkler System shall be added where work areas:
  - Have exits or corridors shared by more than tenant
  - Having exits or corridors serving an occupant load of more than 30
  - Are located on a building story that has an adequate water supply from an existing standpipe or sprinkler riser serving that story



### Supplemental Requirements

- Work Area >50% of aggregate area of floor
- Sprinkler protection must be provided throughout the entire story
- Occupied tenant spaces outside work area are exempt

803.2.1

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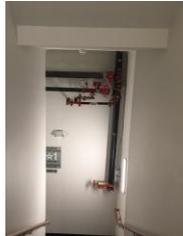
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## Alterations – Level 2

### Groups A, B, E, F-1, H, I-1, I-3, I-4, R-1, R-2, R-4 and S occupancies

- Automatic Fire Sprinkler System required for Alterations level 2, where the work area:
  - Includes work areas involving exits and corridors shared by multiple tenants and having an occupant load of >30
  - Work area is required to have automatic sprinkler protection where required by the IBC for new construction
  - The work area or aggregate of the work areas > 50% of gross floor area of that specific story



803.2.2

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## Alterations – Level 2

### Exception:

- Building does not have adequate water supply available at the floor without installation of a fire pump
- If an automatic fire suppression system cannot be installed, the work area must be provided with a complete automatic smoke detection system
- Automatic smoke detection system must be installed throughout all occupiable spaces - except sleeping or individual dwelling units



803.2.2

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## Alterations – Level 2

### Automatic Sprinkler systems in Mixed Occupancies

- Work areas with different occupancies and one or more are required to be protected with automatic fire sprinkler system in accordance with Section 803.2.2:
- Protection is not required throughout the work areas provided the protected occupancies are separated from the other occupancies not protected with a 1-hour fire resistance rated construction (2 hr for H occupancies)



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## Alterations – Level 2

### Group I-2

- Automatic Sprinkler system required per IFC in the following:
  1. Group I-2, Condition 1, throughout work area
  2. Group I-2, Condition 2, throughout work area where work area is ≤ 50% of smoke compartment
  3. Group I-2, Condition 2, throughout smoke compartment where work occurs and work area > 50% of the smoke compartment



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803.2.3

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## Alterations – Level 2

### Windowless stories

- Work areas in windowless stories that are required to be protected in accordance with the IBC, must be sprinklered provided the building has sufficient water supply without the installation of a fire pump



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803.2.4  
803.2.5

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### Other required automatic sprinkler systems

- References IBC Table 903.2.11.6
- Requires sprinkler with multiple tenants in corridor or exit

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## Alterations – Level 2

### Fire Protection

- Fire suppression systems installed
- Must be supervised by a methods in IBC Section 903.4:
  - Approved central station
  - Approved local alarm service if approved by the code official




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## Alterations – Level 2

### Standpipes

- Standpipe systems are required where work areas:
  - Involve exits or corridors shared by multiple tenants
  - Are located on a building story more than 50 ft above or below the lowest level of FDA
  - The standpipe system must have hose connections from highest story containing a work area down to the lowest level of FDA
  - Conversely the standpipe system must have hose connections from the lowest story containing a work area up to the lowest level of FDA where work areas are more than 50 ft. below lowest level of FDA




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## Alterations – Level 2

### Exceptions:

- Fire pump is not required provided the standpipe installed can:
  1. Accept delivery by fire department apparatus of min.:
    - 250 gpm at 65 psi to topmost floor in buildings with fire sprinkler system
    - 500 gpm at 65 psi to topmost floor
  2. Interconnection of multiple risers shall not be required




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## Alterations – Level 2

### Fire Alarm and Detection

- Fire alarm systems are driven by type of occupancy
- Requirements limited to work areas but may extend beyond the work areas
- Must be installed in accordance with NFPA 72
- Where a sprinkler alarm is connected to the fire alarm system, auto. heat detection is not required



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## Alterations – Level 2

### Fire Alarm and Detection

#### Occupancy Requirements

- Existing previously approved fire alarm systems – OK
- Portion of an existing fire alarm system within work areas must comply with IBC and NFPA 72
- Existing alarm-notification devices automatically activated throughout the building
- When there is no fire alarm system and Section 803.4.1 requires occupant notification
  - Alarm notification devices are provided within work area

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## Alterations – Level 2

### Group E, I-1, I-2, I-3, R-1, and R-2

- Fire Alarm Systems shall be installed in work areas per IFC
- IFC contains retro active requirements in Chapter 11



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## Alterations – Level 2

### Supplemental Requirements

#### Fire Alarm System

- When a fire alarm system is required and aggregate of work areas on a floor > 50% of the gross area
  - Fire alarm system must be provided throughout that entire story

#### Exception:

- Occupied tenant spaces located entirely outside of the work area.



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## Alterations – Level 2

### Means of Egress

- Driven by type of occupancy.
- Requirements limited to work areas that include exits or corridors shared by more than one tenant

#### General

- *NFPA 101 Life Safety Code* allowed as an alternative
- Where permitted by code official, means of egress complying with code under which building was constructed allowed



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## Alterations – Level 2

### Group I-2

- Corridors used for movement of care care recipients in beds, the clear width of ramps and corridors shall be  $\geq 48$  inches



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## Alterations – Level 2

### Refuge Areas

- Where alterations affect configuration of a refuge area, the capacity of the refuge area shall not be reduced below IBC Section 1026.4 minimums
- Where a horizontal exit forms a smoke compartment, the capacity of the refuge area for Group I-1, I-2 and I-3 occupancies and ambulatory care facilities not below requirement in IBC Sections 407.5.3, 408.6.2, 420.6.1 and 422.3.2



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804.4

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## Alterations – Level 2

### Number of Exits

- # of Exits in every story where work areas are located must comply with IBC Chapter 10:
  - Based on Occupancy
  - Occupant load of that story
- Existing conditions outside of work area can remain provided it is an existing approved condition



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804.5

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## Alterations – Level 2

### Single Exit Buildings (Options 1 or 2)

- Permitted from any space, story, or occupied roof where:
  - Complies with Tables 804.5.1.1(1) or (2)
  - Group R-1 or R-2 non-sprinklered occupancies, individual single-story dwelling or sleeping units OK if:
    1. Occupant load is <10 and exit access travel distance within unit is <75 feet
    2. Building is not more than three stories and ...
      - All 3rd story space is part of dwelling unit with an exit access doorway on 2nd story
      - Portion of exit access travel distance from door to any habitable room within unit to unit entrance doors is < 50 ft

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804.5.1.1

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## Alterations – Level 2

### Single Exit Buildings (Option 3)

#### Group R-2 or R-3 occupancies

- Any number of stories
- Nonsprinklered
- Max exit access travel distance is 125 feet
- With sprinkler, exit access travel distance can increase.



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804.5.1.1

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## Alterations – Level 2

### Single Exit Buildings

#### Group R-2 Occupancy

- Basement, 1<sup>st</sup>, 2<sup>nd</sup> or 3<sup>rd</sup> story
- Occupiable roofs over 1 or 2 stories
  - 4 dwelling units per story
  - Max. exit travel distance of 125 feet

#### Other Occupancies

- Basement, 1<sup>st</sup> or 2<sup>nd</sup> story
- Limit to occupant load
- Max. 75 feet travel distance



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Tables  
804.5.1.4

166

## Alterations – Level 2

### Fire Escapes

- Fire escapes are allowed for means of egress (not in Group I-2) –when two or more exits are required
- Not permitted for new construction
- Newly constructed fire escapes only allowed when an exterior stair cannot be constructed due to existing alleys, sidewalks or property lines




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## Alterations – Level 2

### Mezzanines

- Where work areas having an occupant load of > 50 people or where travel distance > 75 ft
  - Must have access to at least two remotely located means of egress
  - IEBC does not have different thresholds for different occupancies like IBC
  - Travel distance can be increased to 100 ft where a sprinkler system is installed




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804.5.2

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## Alterations – Level 2

### Main Entrance – Group A occupancies

- Assembly occupancy with >300 occupant load
  - Main entrance must be capable of providing 50% of total occupant load
  - If main exit is not defined, exits must be distributed around perimeter of building and must provide 100% of required egress width




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804.5.3

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## Alterations – Level 2

### Egress Doorways

- Includes requirements when two exits are required
- Two exits required when work areas include rooms or spaces with an occupant load of more than 50 people or where the travel distance to reach an exit exceeds 75 ft
- Limited to work areas that include exits or corridors shared by more than one tenant
- Storage rooms only require one exit when occupant is <10




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804.6

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## Alterations – Level

### Group I-2 Egress Doorways

- Condition 2 - work areas that include altered care suites comply with IBC Sections 407.4.4 - 407.4.4.7.2




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804.6.1.2

171

## Alterations – Level 2

### Door Swing

- Any doors located in work area and along the path of travel from the work areas to the exit discharge
  - Serves > 50 people
  - Must swing in the direction of egress

### Supplemental Requirements

- Where work area more than 50% of floor, all egress doors swing in direction of travel (w/ > 50 people)




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804.6.2

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## Alterations – Level 2

### Door Closing

- Any doors located in work area and opening into an exit enclosure (exit passageway, exit ramp, or exit stairway) must be self-closing or automatic-closing by listed closing devices
  - Except occupied tenants outside work area

### Supplemental Requirements

- Doors comply throughout exit stairway thru level of exit discharge




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## Alterations – Level 2

### Panic and Fire Exit Hardware

- Group A: Assembly
  - Egress doors with latching devices in work areas or in the path of travel to the exit discharge, with an occupant load > 100 must have panic hardware per IBC Section 1010.2.9



### Supplemental Requirements

- Panic hardware added throughout floor, **except** in tenant spaces outside the work area

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## Alterations – Level 2

### Openings in Corridor Walls

- Requirements are triggered where work areas include exits or corridors shared by more than one tenant
- Doors shall not be constructed of hollow core wood and shall contain louvers
- Doors to dwelling units and sleeping units in work areas in residential occupancies (Group R-1 and R-2) and large assisted living facilities (Group I-1) must not be less than 1¾-inch thick solid wood core door or equivalent construction
- Glazing must be approved glazing or wired glass in metal frames
- Doors must be self closing
- Replacement doors shall be 1¾-inch solid bonded wood core or approved equivalent, unless the existing frame will accommodate only a 1¾-inch door

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804.7

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## Alterations – Level 2

### Openings in Corridor Walls

#### Exceptions:

1. Corridor doors within a dwelling unit or sleeping unit
2. Existing doors meeting the requirements of *Guidelines on Fire Ratings of Archaic Materials and Assemblies* (Resource A) for a rating of 15 minutes or more shall be accepted
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 not more than 15 occupants protected with automatic detection system, closing devices are not required
5. Door assemblies having a fire protection rating of not less than 20 minutes

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## Alterations – Level 2

### Transoms

- In shared exit access corridors – existing transoms in work areas in Group R-1 and R-2 occupancies and large assisted living facilities of Group I-1, and Group I-2 occupancies must do one of the following:
  - Must have fixed glazing with the same fire protection rating as required for corridors
  - Transom opening must be sealed with materials consistent with the corridor construction



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## Alterations – Level 2

### Other Corridor Openings

- In any work area, unless protected per IBC Section 716, any other sash, grille, or opening in a corridor shall be sealed with materials consistent with the corridor construction
- Supplemental requirements apply throughout floor except other tenant spaces



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804.7.3

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## Alterations – Level 2

### Dead end corridors

- Cannot exceed 35 feet unless permitted by IBC
- Group I-2 cannot exceed 30 feet

#### Exceptions:

- In other than A, H and I-2 occupancies:
  - IBC listed maximum length OK
  - Existing dead-end corridor can be ≤ 50 ft if building has fire alarm system per IBC
  - Existing dead corridor can be ≤ 70 ft if the building is equipped with sprinkler system
  - Newly constructed or extended dead end ≤ 50 feet with sprinkler system on that floor



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## Alterations – Level 2

### Means of Egress Lighting

- Work areas must have means of egress lighting per IBC for new construction

### Supplemental Requirements

- Add lighting throughout floor not in other tenant spaces



### Exit Signs

- Work areas must have exit signs per IBC

### Supplemental Requirements

- Add signs throughout floor



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## Alterations – Level 2

### Handrails

- Existing exit stairways that serves as a means of egress from a work area

- ≥3 risers
- Must have a minimum 1 handrail

- Existing stairways without a handrail or handrails in danger of failure

- Add 1 or more complying handrails



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## Alterations – Level 2

### Structural

- Existing structural elements carrying gravity loads

- Any existing element with an **increase** in design dead, live or snow load, including snow drift effects, > 5% shall be replaced or altered to carry IBC design gravity loads
- Any existing element whose load carrying capacity is **decreased** must have capacity to resist IBC design dead, live and snow loads, including snow drift effects



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## Alterations – Level 2

### Structural

- Existing Structural Elements Resisting Lateral Loads
  - Altered portion must meet requirements of IBC wind and seismic requirements, when work areas causes:
    - An increase in design lateral loads
    - Creates a prohibited structural irregularity
    - Decreases the existing capacity of any lateral load-carrying structural element
  - Reduced seismic loads are allowed
- Evaluate demand-capacity ratios



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## Alterations – Level 2

### Voluntary Lateral Force-Resisting System Alterations

- Voluntary structural work to improve existing lateral force-resisting system not required to meet IBC if:
  - Capacity of existing structural systems not reduced
  - New structural elements comply with the IBC
  - New or relocated non-structural elements comply with the IBC
- Alterations do not create a structural irregularity or make any existing structural irregularity worse



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## Alterations – Level 2

### Substantial Structural Alteration

- > 30% of floor and roof area are proposed to be altered (or have been) over 5 years.
- Analysis of the gravity load carrying components.
- Areas to be counted include mezzanines, penthouses, and in-filled courts and shafts tributary to the altered structural elements.



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## Alterations – Level 2

### Electrical

- New electrical equipment and wiring related to work areas must comply with the NEC (NFPA 70)
- Existing wiring in Groups A-1, A-2, A-5, H, and I occupancies shall be upgraded to meet Chapter 7 for materials and methods
- Requirements for 1- and 2-family dwellings and townhouses (use IRC)
  - Enclosed living spaces shall have at least 2 duplex receptacles or 1-duplex receptacle and 1 light fixture
  - Kitchens - at least 2 duplex receptacles
  - Laundry areas - at least 1 duplex receptacle
  - New receptacles have GFCI where required in IRC
  - ≥1 lighting outlet: bathrooms, hallways, stairways, garages with power, storage areas and mechanical areas, and all entrances and exits

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## Alterations – Level 2

### Mechanical

- Work areas where spaces are reconfigured into habitable or occupiable spaces must provide ventilation



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## Alterations – Level 2

### Alteration of Existing Ventilation Systems

- Altered, reconfigured or extended shall provide:
  - Min. 5 cfm per person of outdoor air
  - Min. 15 cfm of ventilation air per person
  - Or the amount of ventilation air determined by the Indoor Air Quality Procedure of ASHRAE 62.1.



807.2

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## Alterations – Level 2

### Plumbing

- Health care facilities – any added portion of a medical gas system must comply with NFPA 99




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## Alterations – Level 2

### Energy Conservation

- Alterations to existing buildings do not require the entire building to comply with the energy requirements
- The work associated with project must comply with the IECC or IRC




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## Work Area – Alterations - Level 3




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### Alterations – Level 3

**General**

- Work areas that are > 50% of the overall building area = Level 3 Alterations
- Requirements are found in Chapter 9
- Additional Building Features are triggered beyond the actual work areas and other parts of the building where no alterations are planned
- Guiding principle is that Alterations will comply with the IBC but remainder of the building can remain as it



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Chapter 9

### Alterations – Level 3

**General**

- Existing building is assumed to be an approved structure
- Requirements of Level 1 Alterations and Level 2 Alterations must also be met
- Requirements of Sections 802 (Building Elements and Materials), 803 (Fire Protection) and 804 (Carbon Monoxide Detection) apply within all Level 3 Alterations work areas regardless of whether they share means of egress with other tenants and regardless of occupant load.



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Chapter 9

### Alterations – Level 3

**Special Uses and Occupancies**

**High Rise Buildings –**

- Recirculating air or exhaust systems with a capacity of >15,000 CFM equipped with smoke or heat detection devices
- Elevators for public use serving work areas –
  - Where a travel distance in excess of 25 feet exists and used for emergency operations
    - Provide with emergency operations in accordance with ASME A17.3.
- New Elevators
  - Provided with Phase I and Phase II operations (emergency recall and emergency in-car operations)




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### Alterations – Level 3

#### Group I-1 Occupancies, Condition 2

- Work area is located on a building story used for sleeping rooms
- More than 30 patients
- Story must be divided into at least two smoke compartments
- Divided with smoke barriers in accordance with IBC Section 420.6



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### Alterations – Level 3

#### Ambulatory Care Facilities

- Work area is located on a building story > 10,000 sq ft
- Story must be divided into at least two smoke compartments
- Divided with smoke barriers in accordance with IBC Section 422.3
- Separate from other areas per Section 422.2 where ≥ 4 patients incapable of self-preservation



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902.3

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### Alterations – Level 3

#### Special Use and Occupancy

##### Boiler and Furnace Equipment Rooms

- Enclose with min. 1 hr. fire resistance rated (FRR) construction in Groups I-1, I-2, I-4, R-1, R-2 and R-4 occupancies

##### Exceptions:

- The following are not required to be enclosed:
  - Steam boiler equipment operating at 15 psi or less
  - Hot water boilers operating at 170 psi or less
  - Furnace and boiler equipment with capacity of 400,000 Btu per hour input rating or less
  - Furnace and boiler rooms with sprinkler system



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### Alterations – Level 3

#### Building Elements and Materials

##### Existing Shafts and Vertical Openings

- Existing stairways part of the means of egress
  - Enclose from the highest story containing a work area down thru the level of exit discharge and all floors below the level of exit discharge
  - Enclosure per Section 802.2.1, Existing Vertical Openings



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903.1

198

### Alterations – Level 3

#### Building Elements and Materials

##### Fire Partitions in Group R-3

- Any attached dwelling unit or townhouse
  - Walls separating dwelling units that are not continuous from foundation to underside of roof sheathing, are extended to provide separation
  - Use construction materials consistent with existing wall or new construction
- Work shall be performed in the work area



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903.2

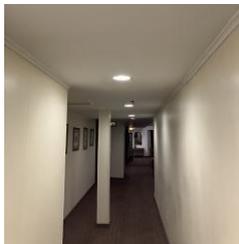
199

### Alterations – Level 3

#### Building Elements and Materials

##### Interior Finish

- In exits serving the work area:
  - Meet requirements of Section 802.4
  - Between highest floor with work area to floor of exit discharge



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903.3

200

### Alterations – Level 3

#### Fire Protection

##### Automatic Sprinkler Systems

- Requirements similar to Section 803.2.2 but more stringent
- Triggered when there is sufficient water supply to the site
- Must have supervision and alarms per IBC Section 903.4

##### Exception

- Allows installation of smoke detection system



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904

201

### Alterations – Level 3

#### Fire Protection

##### Automatic Sprinklers

- Sprinklers required in work areas of:
  - Highrise buildings
  - Rubbish and linen chutes – option for fire-extinguishing system
  - Upholstered furniture and mattresses
    - Group F-1 > 2500 sq ft
    - Group M > 5000 sq ft
    - Group S-1 > 2500 sq ft



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904.1

202

### Alterations – Level 3

#### Fire Protection

##### Automatic Sprinklers

- Sprinklers required in work areas of:
  - Groups A, B, E, F-1, H, I-1, I-3, I-4, M, R-1, R-2, R-4, S-1 and S-2 if required by the IBC
- Group I-2
  - Condition 1 all work areas
  - Condition 2 - where work area is ≤ 50% of smoke compartment
  - Condition 2 - entire smoke compartment where the work area is >50% compartment



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904.1

203

### Alterations – Level 3

#### Fire Protection

##### Automatic Sprinklers

###### Windowless stories

- Sprinklers required in work areas of windowless stories

###### Other locations

- Where required by IBC Table 903.2.11.6



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904.1

204

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### Alterations – Level 3

#### Fire Alarm and Detection

- Fire alarm and detection systems provided per IBC Section 907, Fire Alarm and Detection Systems

##### Manual Fire Alarm Systems

- Provide throughout work areas if required by IBC
- Alarm appliances on floors with auto activation
- Visual alarm appliances not required – unless upgrading or replacing system

###### Exception:

- Existing occupied tenant spaces outside of work area



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904.2

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### Alterations – Level 3

#### Automatic fire detection

- Provide automatic fire detection throughout the work area if required in IBC



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904.2

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### Alterations – Level 3

#### Means of Egress

- All means of egress
- Comply with Section 804
- Add the following where required by the IBC:
  - Lighting within exit enclosure
  - Exit signs
  - Two-way communication (Section 908)



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905

207

### Alterations – Level 3

#### Structural

##### Existing structural elements resisting lateral loads

- Substantial Structural Alterations
  - Lateral load-resisting system of the altered building evaluated
  - Comply with Section 304.3.2 and IBC Section 1609, Wind Loads
  - Reduced seismic forces are allowed to be used as part of the design

##### Exception:

- No evaluation required for residential buildings where <5 dwelling or sleeping units are altered (IRC or IBC Section 2308)
- Alteration only to lowest story of a building
  - Evaluate lateral load-resisting components of lowest story only



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906

208

### Alterations – Level 3

#### SDC F

- Most severe seismic classification
- High risk of damage in earthquake
- Evaluate lateral load-resisting system of the altered building
- Comply with Section 304.3.2 and IBC Section 1609, Wind Loads
- Evaluate nonstructural component attachments and anchorage
- Reduced seismic forces are allowed



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906.3

209

### Alterations – Level 3

#### Anchorage for Concrete and Masonry Buildings

- SDC D, E, or F
- Concrete or reinforced masonry walls with a flexible roof diaphragm
- In work areas install additional anchors at the roof and floor lines



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906.4

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### Alterations – Level 3

#### Anchorage for Unreinforced Masonry Walls, Parapets and Partitions

- SDC C, D, E, or F
- Evaluate using Section 304.3.2 – check adequacy
- If inadequate:
  - Bearing walls – install wall anchors at roof
  - Parapets – install bracing
  - Partitions – in work area and egress paths – remove or anchored



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906.5,  
906.6,  
906.7

211

### Alterations – Level 3

#### Energy Conservation

- Alterations do not require the entire building to comply with the energy requirements
- The work associated with project must comply with the IECC



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907

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### Alterations – Level 3

#### Communications Enhancement

- Existing building with extensive alterations
- Requires evaluation of the emergency responder communication enhancement system coverage
- Comply with IFC



An existing building needs to have sufficient communication area coverage.

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213

213

### Work Area – Change of Occupancy



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214

### Work Area Method – Change of Occupancy

- Not a new concept – from legacy codes
- What is new is the concept of determining the level of risk associated with the various occupancy classifications



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215

## Work Area Method – Change of Occupancy

### Chapter 10

- Contains three risk categories
- Means of Egress (Table 1011.5)**
  - Relative hazard was primarily based on travel distance; further distinction between Levels and 4 based on certain characteristics such as density, familiarity with surroundings, being awake or asleep, age, and potential impairments
- Heights and areas (Table 1011.6)**
  - Original table published in NARRP based on BOCA National Building Code for type 2A construction – Now has five hazard levels

**Means of Egress Hazard Categories**

RELATIVE HAZARD	OCCUPANCY CLASSIFICATION
1 (Highest Hazard)	H
2	I-2, I-3, I-4
3	A, E, I-1, M, R-1, R-2, R-4 Condition 2
4 (Lowest Hazard)	B, F-1, R-3, R-4 Condition 1, S-1
	F-2, S-2, U

(Ref. Table 1011.5)

**Heights and Areas Hazard Categories**

RELATIVE HAZARD	OCCUPANCY CLASSIFICATION
1 (Highest Hazard)	H
2	A-1, A-2, A-3, A-4, I, B-1, B-2, B-4 Condition 2
3	E, F-1, S-1, M
4 (Lowest Hazard)	B, F-2, S-2, A-5, B-3, B-4 Condition 1, U

(Ref. Table 1011.6)

1011.5,  
1011.6

216

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## Work Area Method – Change of Occupancy

- Exterior Walls (Table 1011.7)**
  - Relative hazard based on the exterior wall requirements contained in IBC Chapter 6
    - Based on a comparable table in NARRP
  - Also based on the fire resistance ratings in the BOCA National Building Code at a fire separation distance of 5 feet

**Exterior Wall Hazard Categories**

RELATIVE HAZARD	OCCUPANCY CLASSIFICATION
1 (Highest Hazard)	H
2	F-1, M, S-1
3	A, B, E, I, R
4 (Lowest Hazard)	F-2, S-2, U

(Ref. Table 1011.7)

1011.7

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## Work Area Method – Change of Occupancy

- Understand the difference between “Change of Use” vs. “Change of Occupancy Classification”



Group B to Amb Care =  
Change of Use



1001.2

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### Work Area Method – Change of Occupancy

- Understand the difference between “Change of Use” vs. “Change of Occupancy Classification”

Group B to Group A-2 =  
Change of Occupancy




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### Definition – Change of Use

A change in the use of a building or a portion of a building, within the same group classification, for which there is a change in application of the code requirements.

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220

### Definition – Change of Occupancy

Any of the following shall be considered as a change of occupancy where the current IBC requires a greater degree of safety, accessibility, structural strength, fire protection, means of egress, ventilation or sanitation than is existing in the current building or structure:

1. Any change in the occupancy classification of a building or structure.
2. Any change in the purpose of, or a change in the level of activity within, a building or structure.
3. A change of use.

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221

## Change of Occupancy

### General

- The requirements of Chapter 10 are in addition to the requirements of Chapters 7, 8, and 9
- Change of Use - typically repurposing a space within same occupancy group
  - Comply with Sections 1002 - 1010
- Change of Occupancy Classification or Group
  - Comply with Sections 1002 - 1011




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Chapter 10

222

## Change of Occupancy

### Change of Occupancy

- Where different fire protection system requirements exist for new construction (IBC Chapter 9)
  - Approval of the Code Official is required
  - New Certificate of Occupancy issued once requirements are met




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1001.2.2

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## Change of Occupancy

### Certificate of Occupancy

- A new CO is issued once requirements associated with the **new occupancy** classification are met




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1001.2

224

## Change of Occupancy

### Special Use and Occupancy

- The IEBC requires compliance with the IBC for any building or portion of a building that goes to an occupancy of a special use per IBC Chapter 4

### Incidental Uses

- Any change of occupancy to an incidental use must comply with IBC Section 509



1002.1,  
1002.2

225

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## Change of Occupancy

### Change of Occupancy in Health Care

- Change of Occupancy to Group I-2 or I-1, work area must comply with IBC

#### Exception:

- A change in use or occupancy does not need to meet the IBC in the following cases:
  1. Group I-2, Condition 2 to Group I-2 Condition 1
  2. Group I-2 to ambulatory healthcare
  3. Group I-2 to Group I-1
  4. Group I-1, Condition 2 to Group I-1 Condition 1



1002.3

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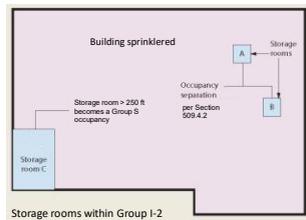
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## Change of Occupancy

### Storage

- Group I-2, work area changing to a storage room shall:

- Have an existing automatic sprinkler system per IBC Section 903.3.1.1
- Storage room be less than <250 square feet
- Separate room with construction capable of resisting smoke per IBC Section 509.4.2



1002.4

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## Change of Occupancy

### Building Elements and Materials

- Buildings or portions thereof, undergoing a Change of Occupancy Classification must comply with Section 1011.

### Fire Protection

- With a change of occupancy - comply with Section 1011
- With a change of occupancy and there is a different fire protection threshold in IBC Chapter 9 - comply with Section 1011

### Means of Egress

- With a change of occupancy - comply with Section 1011



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1003,  
1004,  
1005

228

## Change of Occupancy

### Live Loads

#### Structural Elements

- Must comply with design live loads of the IBC Section 1607 for new occupancy
- Design live loads for remainder of building continue as previously approved
- Where demand-capacity ratio change is < 5% more than the demand-capacity ratio based on the previously approved design live loads
  - May remain as is – no need to comply with IBC Section 1607



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1006.1

229

## Change of Occupancy

### Snow and Wind Loads

- Where change results in a building assigned to a higher risk category, building structure must comply with IBC snow and wind loads for new risk category

#### Exception:

- Where the area of the new occupancy is < 10% of the building area
  - Existing building structure allowed to remain as is



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1006.2

230

## Change of Occupancy

### Seismic Loads

- With a higher risk category, structure must comply with IBC seismic loads for new risk category

#### Exception:

- Building doesn't need to comply with current IBC loads if:
  - Where building moves from Risk Category I or II to Risk Category III **and** the seismic coefficient  $S_{DS} < 0.33$
  - Where building isn't assigned to RC IV, the area of new occupancy is < 10% of building area, and original occupancy not Group S or U
- URM bearing wall buildings in Risk Category III and SDC A or B
  - Can use IEBC Appendix A1



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1006.3

231

## Change of Occupancy

### Concern:

- Group S or U buildings becoming event centers with large numbers of attendees

### Seismic Loads

- Where change is from a Group S or U occupancy to any other occupancy, must comply with IBC seismic loads

#### Exception:

- Change from Group S or U without change of risk category
  - Section 304.3.2 (reduced seismic loads) permitted



Big Sky Barn – Montgomery, TX

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1006.3

232

## Change of Occupancy

### Concern:

- Driveways into hospitals blocked after earthquake

### Access to Risk Category IV

- Operational access to an adjacent structure assigned to RC IV shall itself comply with Section 304.3.1
- Where access to building is < 10 feet from an interior lot line or another structure
  - Access protection from potential falling debris required



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1006.4

233

## Change of Occupancy

### Electrical

- Comply with NEC (NFPA 70) where a change to a special use or occupancy category:

- |  |  |
|--|--|
| 1. Hazardous Locations                               | 8. Places of Assembly  |
| 2. Commercial Garages, repair and storage            | 9. Theaters, audience areas of motion picture and television studios and similar locations |
| 3. Aircraft Hangers                                  | 10. Motion picture and television studios and similar locations                            |
| 4. Gasoline Dispensing and Service Stations          | 11. Motion picture projectors  |
| 5. Bulk Storage plants                               | 12. Agricultural Buildings   |
| 6. Spray Applications, dipping and coating processes |  |

1007

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## Change of Occupancy

### Electrical

- Health Care Facilities - Group I-2, ambulatory health care facilities and outpatient clinics
  - Comply with NFPA 99 and NEC



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## Change of Occupancy

### Unsafe conditions

- All unsafe electrical conditions shall be corrected per NFPA 70

### Service Upgrades

- Service shall be upgraded to meet NFPA 70

### Number of Electrical Outlets

- Number of electrical outlets shall comply with NFPA 70 for the new occupancy



1007.2,  
1007.3,  
1007.4

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## Change of Occupancy

### Mechanical

- Change of Occupancy classification – comply with IMC
- Change of Occupancy with an increased kitchen exhaust requirement or an increased mechanical ventilation requirement - comply with IMC



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1008

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## Change of Occupancy

### Plumbing

- Comply with intent of IPC if:
  - Plumbing fixture account is increased
  - Plumbing fixture account is different
  - Water supply requirements are increased
- Where occupancy load of story is increased > 20% - plumbing fixtures quantity must meet IPC



Holman, Inc

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1009.1

238

## Change of Occupancy

### Plumbing

#### Food-handling facility

- All existing sanitary waste lines located above preparation or storage areas must be panned or otherwise protected
- Prevent leaking or condensation from contaminating food or drink



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1009.2

239

## Change of Occupancy

### Plumbing

#### Interceptor Required

- If the facility will produce grease or oil-laden wastes - interceptors required per IPC

#### Chemical Waste

- Options:
  - Piping may be compatible with the chemical waste
  - Waste may be neutralized prior to entering drainage system



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1009.3,  
1009.4

240

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## Change of Occupancy

### Plumbing

#### Change to Group I-2

- Plumbing system and medical gas system comply with IPC



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1009.5

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## Change of Occupancy

### Light and ventilation

- Comply with IBC



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## Change of Occupancy Classification

### Change of Occupancy Classification

- Change of Occupancy classification in this section includes:
  - Change within a group
  - Change from one group to another group
  - Change within a space where there is a different fire protection system threshold in IBC Chapter 9
- All other changes of occupancy DO NOT need to meet the requirements of this section



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1011

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## Change of Occupancy Classification

### Fire Protection Systems

- Building or portion of a building must comply with the fire protection thresholds required by IBC Chapter 9
- Install throughout new occupancy



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1011.2

244

## Change of Occupancy Classification

### Fire Sprinkler system

- Install in area of the change of occupancy and all areas not separated vertically and horizontally by one of the following:
 

1. Non-rated permanent partition and horizontal assemblies	4. Smoke Barrier
2. Fire partition	5. Fire Barrier
3. Smoke Partition	6. Fire Wall

#### Exceptions:

- Automatic Sprinkler Systems are not required where:
  - 1&2 family dwellings constructed with IRC
  - Townhouses constructed with IRC and separated with 2-hour walls

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1011.2.1

245

## Change of Occupancy Classification

### Fire Alarm and Detection

- With change of occupancy and different threshold in IBC Chapter 9
- Add fire alarm and detection systems throughout area where there is a change of occupancy
- Existing fire alarm appliances must be automatically activated throughout building




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1011.2.2

246

## Change of Occupancy Classification

### Interior Finish

- Interior wall and ceiling finishes and floor finishes comply with IBC Chapter 8




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1011.3

247

## Change of Occupancy Classification

### Means of Egress

- Occupancy classifications are grouped based on relative risk
- Must comply with IEBC Table 1011.5
- Occupancies with hazardous materials and defend-in-place protocols are the greatest risk
- Non-residential occupancies with minimal fuel loads are and low-density occupant loads are considered the lowest risk

Relative Hazard	Occupancy Classification
1 (Highest Hazard)	H
2	I-2, I-3, I-4
3	A, E, I-1, M, R-1, R-2, R-4 Condition 2
4	B, F-1, R-3, S-1 R-4 Condition 1
5	F-2, S-2, U

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1011.5

248

## Change of Occupancy Classification

### Means of Egress

#### Change of Classification to a Higher Hazard

- Means of egress requirements must comply with IBC Chapter 10 for the new occupancy



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1011.5

249

## Change of Occupancy Classification

### Means of Egress

#### Change of Classification to a Higher Hazard

##### Exceptions

- Stairways
  - Enclosure – use Section 903.1
  - Existing Stairways, including guards and handrails – meet Chapter 9 with approval from Code Official to continue as is
  - New stairways – slope and pitch, rise and tread, when restricted by existing construction, remain as is



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1011.5

250

## Change of Occupancy Classification

### Means of Egress

#### Change of Classification to a Higher Hazard

##### Exceptions

- Corridors
  - Existing walls of wood lath and plaster can remain or add 1/2" gypsum board
  - Existing openings can remain where permitted by Section 805.5
  - Existing dead-end corridors – meet requirements of Section 805.6
- Operable windows comply with Section 1011.5.6



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1011.5

251

### Change of Occupancy Classification

#### Means of Egress

##### Equal or Lesser Hazard

- Existing means of egress components
  - Meet Section 905 requirements
- Newly constructed or reconfigured means of egress
  - Comply with IBC Chapter 10

##### Exception:

- Stairways
  - Pitch and slope cannot be made code compliant – remain as is
  - Stair riser heights and tread depths – remain as is



1011.5.2

252

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### Change of Occupancy Classification



#### Rooftop Exception

- Occupied roofs of Group I-1 and Group I-2 facilities
- Permitted to have guards > 48 inches above the roof deck in some cases

1011.5.3

253

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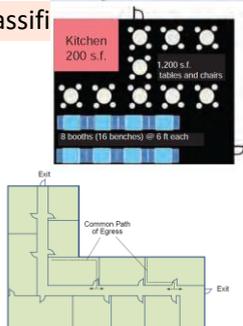
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### Change of Occupancy Classifi

#### Egress Capacity

- Egress capacity – meet or exceed calculated occupant load of the new occupancies and the existing occupancies using IBC



1011.5.3

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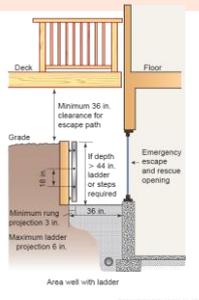
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## Change of Occupancy Classification

### Existing Emergency Escape and Rescue Openings

- Change requires an EERO
  - Operable windows shall comply with:
    1. Existing operable window has:
      - a) Net clear opening of  $\geq 4$  sq. ft. of clear opening
      - b) Opening height  $\geq 22$  in.
      - c) Width of and  $\geq 20$  in.
 can continue as an EERO
    2. Replacement window complies with both of the following:
      - a) Meets requirements of Item #1
      - b) Is manufacturer's largest standard size that will fit in existing frame
        - Same or different operating style



1011.5.6

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## Change of Occupancy Classification

### Height and Areas

- Hazard categories meet Table 1011.6 requirements

**TABLE 1011.6**  
Heights and Areas Hazard Categories

RELATIVE HAZARD	OCCUPANCY CLASSIFICATION
1 (Highest Hazard)	H
2	I, A-1, A-2, A-3, A-4, R-1, R-2, R-4 Condition 2
3	E, M, F-1, S-1
4 (lowest hazard)	B, U, A-5, F-2, S-2, R-3, R-4 Condition 1

1011.6

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## Change of Occupancy Classification

### Height and Area

#### Higher Hazard Category

- Building height and area requirements for new occupancy areas
- Comply with IBC Chapter 5 (General Building Heights and Areas)



1011.6.1

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## Change of Occupancy Classification

### Height and Area

#### Higher Hazard Category

#### Exception #1

- High-rise buildings constructed with previously issued permit and equipped with sprinkler system:
  - Type of construction reduction in IBC Section 403.2.1 is permitted
  - Column reduction is permitted.



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1011.6.1

258

## Change of Occupancy Classification

### Height and Area

#### Higher Hazard Category

#### Exception #2

- Buildings constructed with a previously issued permit with:
  - Floor assemblies with 1.5 hour fire resistance rating do not need to meet IBC Ch 5 when:
    - IBC requires Type IB construction
    - No Group H occupancies
    - Building has sprinkler system



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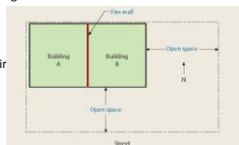
1011.6.1

259

## Change of Occupancy Classification

### Fire Wall Alternative

- Group A, B, E, F-2, M, R, S-2 and U occupancies:
  - Fire Barriers and horizontal assemblies per IBC Sections 707 and 711
  - Permitted in lieu of structurally independent fire walls to create building separations
  - Building must be:
    - Sprinkler protected per NFPA 13
    - Maximum areas between rated fire barriers or horizontal assemblies less than allowable area
    - Fire resistance ratings of barriers and assemblies equal to IBC fire walls




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1011.6.1.1

260

### Change of Occupancy Classification

#### Height and Area

##### Equal or Lesser Hazard

- Existing height and area of building is considered code compliant



1011.6.2

261

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### Change of Occupancy Classification

#### Fire Barriers

##### Higher Hazard

- Fire barriers in separated mixed occupancies must have IBC level fire resistance

##### Exception:

- Where required to have a 1-hour fire resistance rating
  - Existing wood lath and plaster, in good condition or existing 1/2 inch thick gypsum board are acceptable



1011.6.3

262

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### Change of Occupancy Classification

#### Exterior Wall Fire-resistance Ratings

- Fire resistance ratings of exterior walls meet Table 1011.7

**TABLE 1011.7**  
**EXPOSURE OF EXTERIOR WALLS HAZARD CATEGORIES**

RELATIVE HAZARD	OCCUPANCY CLASSIFICATION
1 (Highest Hazard)	H
2	F-1, M, S-1
3	A, B, E, I, R
4 (Lowest Hazard)	F-2, S-2, U

1011.7

263

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## Change of Occupancy Classification

### Exterior Wall Rating

#### Higher-Hazard Category

- New occupancy areas must comply with IBC
- Includes openings in exterior walls

#### Exception:

- Group B, E, M or S; Group A-2 and A-3 with occupant load < 300
  - 2-hour FRR allowed when building ≤ 3 stories



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1011.7.1

264

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## Change of Occupancy Classification

### Exterior Wall Rating

#### Equal or Lesser Hazard

- Existing exterior walls, including openings within those walls, are code compliant



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1011.7.2

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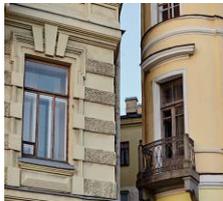
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## Change of Occupancy Classification

### Opening Protectives – Openings in Exterior Walls

#### Higher Hazard Category

- Protected per IBC Section 705.8
- Where required to be protected due to fire separation distance:
  - Sum of opening areas must be ≤ 50% of respective wall area for each story



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1011.7.3

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## Change of Occupancy Classification

### Opening Protectives

#### Higher Hazard Category

##### Exceptions:

- IBC Table 705.8 allows more openings than 50%, match percentage of IBC
- Residential buildings
  - Max. 3 stories and ≥ 3 feet from lot line
- Buildings with NFPA 13 sprinkler system



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1011.7.3

267

## Change of Occupancy Classification

### Enclosure of Vertical Shafts

#### Higher Hazard Category

##### 2 options:

1. Vertical shafts meet IBC atriums requirements
  - IBC Section 404 provides requirements
2. Sections 1011.8 apply
  - Interior stairways enclosed
  - Other interior shafts enclosed



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1011.8

268

## Change of Occupancy Classification

### Enclosure of Stairways

#### Higher Hazard Category

##### Exceptions:

- Interior stairways
1. An enclosure not required for openings serving one adjacent floor
    - May not connect to corridors or stairways serving other floors
    - Does not apply to Group I
  2. Unenclosed existing stairways need not be enclosed if all apply:
    - Each story is separated with 1-hour FRR construction or approved wired glass set in steel frames
    - All exit corridors sprinklered
    - Openings between corridor and tenant space have min. one sprinkler above opening on tenant side
  3. Existing penetrations of stairway enclosures are OK if protected per IBC



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1011.8.2

269

## Change of Occupancy Classification

### Enclosure of other Vertical Shafts

#### Higher Hazard Category

#### Exceptions:

- Other shafts
  1. Existing 1-hour interior shaft enclosures acceptable when higher rating is required
  2. Vertical openings – other than stairways
    - When connecting < 6 stories
      - No enclosure required with sprinkler system
      - Not in Group I



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1011.B.3

270

## Change of Occupancy Classifications

### Openings

- In existing shaft enclosures
  - Protect with min. 1-hour fire protection rated assemblies
    - Must be either:
      - Self-closing
      - Automatic-closing upon actuation of a local smoke detector
  - Existing fusible link-type automatic door-closing devices permitted
    - Fusible link rating ≤ 135°F
    - Not allowed in stairway enclosures



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1011.B.4

271

## Additions



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272

## Additions

### General Requirements

- Additions comply with the IBC
- Existing building doesn't require alteration unless addition impacts existing building
- An addition project cannot create or extend any code deficiency in the existing building



© J. Smith & Company Spelling Regional Hospital Addition 4/18/16

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Chapter 11

273

## Additions

### Height and Areas

- An addition cannot increase the height of an existing building beyond IBC Chapter 5 limits
- An addition cannot increase area of existing building beyond IBC Chapter 5, unless fire separation is constructed per IBC
- In-filling of existing floor openings and non-occupiable appendages, such as elevator hoistways and stairway shafts, is permitted beyond IBC Chapter limits



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1102

274

## Additions

### Example

- Church in photo constructed in 1972
- Building exceeds current height and area limitations
- Addition of elevator and stair way allowed due to no existing exit stairway connected the sanctuary on the upper level to the parish hall on the lower level



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1102

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## Additions

### Fire Protection Systems

- Existing fire areas increased by an addition
  - Resulting fire area complies with fire protection requirements in IBC Chapter 9



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1102.3

276

## Additions

### Structural

- Where alterations occur in the existing building
  - With increase in design dead, live or snow load, including snow drift effects, of > 5%
  - Existing affected gravity load-carrying elements must be replaced or modified to carry new loads per IBC
- Existing gravity load-carrying elements with decreased capacity are considered an altered structural element
  - Meet requirements in Section 806.2



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1103.1

277

## Additions

### Structural

- Existing elements that form a lateral load path for the addition
  - Considered an existing lateral load-carrying structural element
  - Subject to Section 1103.3
- Exception:
  - No need to evaluate for:
    - Existing Group R occupancies with ≤ 5 dwelling or sleeping units
      - Comply with IRC or IBC Section 2308



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1103.1

278

## Additions

### Lateral Force-Resisting Systems

- Addition structurally independent
  - Existing lateral load-carrying elements remains as is
- Not structurally independent of the existing building
  - Existing building and addition evaluated as single structure
    - Meet IBC Sections 1609 (Wind Loads) and 1613 (Earthquake Loads) using full seismic forces



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1103.2

279

## Additions

### Exceptions

- Existing Group R occupancies with < 5 dwelling or sleeping units
  - Designed to comply with IRC or IBC Section 2308
- Existing lateral load-carrying structural elements
  - Demand-capacity ratio with addition is < 10% greater without addition remains as is



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1103.2

280

## Additions

### Flood Hazard Areas

- Additions and foundations in flood hazard areas
  - Horizontal additions – structurally connected
    - Comply with IBC Section 1612 or IRC Section R306 when change qualifies as substantial improvement
  - Horizontal additions – not structurally connected
    - Addition must comply with IBC Section 1612 or IRC Section R306
    - Existing building must comply with IBC Section 1612 or IRC Section R306 when change qualifies as substantial improvement
  - Vertical addition
    - Comply with IBC Section 1612 or IRC Section R306 when change qualifies as substantial improvement
  - Foundation changes
    - Comply with IBC Section 1612 or IRC Section R306
- May not create or extend a nonconformity



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1103.3

281

## Additions

### Energy Conservation

- Additions to existing buildings comply with IECC



1104

282

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## Relocated Buildings



283

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## Relocated Buildings

### Bleachers, Grandstands and Folding and Telescopic Seating

- Comply with ICC 300

### Building

- Comply with IFC and IPMC

### Field Fabricated Construction

- Comply with IBC or IRC



Chapter 14

284

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## Relocated Buildings

### Requirements

- Location on the lot – IBC or IRC
- Foundation
  - New foundation and connection to structure
  - Comply with IBC or IRC



Courtesy of Wolfe Movers

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1402

285

## Relocated Buildings

### Wind loads

- Comply with the IBC or IRC at new location

### Exceptions:

- Need not comply:
  - 1 & 2 family dwellings, Group U
    - Loads  $\leq$  previous location
  - Structural elements where stress increase  $\leq$  10%



Courtesy of Wolfe Movers

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1402.3

286

## Relocated Buildings

### Seismic Loads

- Comply with seismic provisions of IBC or IRC

### Exceptions:

- Need not comply
  - Structures in SDC's A and B
    - Loads  $\leq$  previous location
  - Structural elements where stress increase  $\leq$  10%
  - One- and two-family dwelling in SDC's A, B, and C



Courtesy of Wolfe Movers

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1402.4

287

## Relocated Buildings

### Snow Loads

- Comply with snow provisions of IBC or IRC

#### Exceptions:

- Snow loads  $\leq$  previous location
  - Structural elements where stress increase due to snow  $\leq$  5%



Courtesy of Wolfe Movers

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1402.5

288

## Relocated Buildings

### Flood Hazard Areas

- Comply with IBC Section 1612 or IRC Section R306
  - Any building or structure moved into a flood hazard area



Courtesy of Wolfe Movers

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1402.6

289

## Relocated Buildings

### Required Inspection and Repairs

- Code official may add inspections of structural elements of the relocated building to ensure that no damage occurred during relocation
- Any structural repairs must be completed prior to receiving Certificate of Occupancy



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1402.7

290

### Construction Safeguards

- Regulated by both IBC and IFC
- The IEBC contains same requirements as the IBC
- Construction safeguards during rehab projects are more complex due to the fact that portions of the building are occupied



Ch 15

291

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### Quiz



292

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APPLICATION

Reconfiguration work that is solely to meet accessibility compliance only need to comply with \_\_\_\_\_.

[Level 1 alterations](#)

Supplemental Requirements only apply to which level of alterations?

[Level 2 alterations](#)

293

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Supplemental Requirements are triggered when the work area exceeds \_\_\_\_\_.

50% of the story on which the work area is located

Explain the three types of Change of Occupancy.

1. A Change of Occupancy Classification
2. A Change from one group to another group within an occupancy classification
3. Any change in use within a group for which there is a change in application of the requirements of the code

294

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## Prescriptive Compliance Method



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## Prescriptive Compliance Method

- Not included in original rehabilitation codes
- Originally placed in IBC Chapter 34
- Retained as an optional compliance method in IEBC
- Not coordinated with Work Area Compliance method



296

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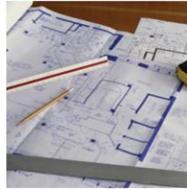
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### Prescriptive Compliance Method

- When using this method, the level of work being performed is critical
- The following areas are addressed with this method
  - Additions – Section 502
  - Alterations – Section 503
  - Fire Escapes – Section 504
  - Windows and Emergency Escape Openings – Section 505
  - Changes of Occupancy – Section 506
  - Historic Buildings – Section 507



Courtesy of Koffel Associates

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### Prescriptive Compliance Method – Additions

- Existing Structural elements carrying gravity loads, increase in design dead, live or snow load of >5% shall comply with IBC
- Existing Structural elements carrying lateral loads- if addition is structurally independent of existing structure, structural elements can remain unaltered.
- If not, must comply with IBC



Photo - Josef Weichenberger Architects

Courtesy of Koffel Associates

502

298

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### Prescriptive Compliance Method – Alterations

- All alterations shall comply with the IBC
- The question is to what extent does the alteration need to comply with the IBC?
- This question can be more clearly determined if using the work area method



Courtesy of Koffel Associates

Courtesy of Koffel Associates

503

299

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### Prescriptive Compliance Method – Change of Occupancy

- Changes of Occupancy requirements of the IBC apply to the extent the code official determines the level of safety
- Work Area method utilizes the concept of risk and not all changes of occupancy classification need comply with the IBC



506

300

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### Temporary Emergency Uses

Appendix E



301

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### Temporary Emergency Uses

- Covers basics on buildings used temporarily during unusual circumstances
  - Permits for 180 days
  - Code official can extend use



302

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### Temporary Emergency Uses

- Requirements include:
  - Submittal
  - Conformance
  - Permits
  - Inspection
  - Practice drills
  - Evacuation plans
  - Fire watch
  - Means of egress
  - Maintenance




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303

### Performance Compliance Method

	FIRE SAFETY (FPF)	MEANS OF EGRESS (MNC)	
A-1	35	31	31
A-2	21	32	32
A-3	22	33	33
A-4, E	25	40	45
B	30	40	40
F	24	34	34
I-2	19	34	34
M	23	40	40
RE	21	38	38
	19	26	26
	29	38	38

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304

### Performance Compliance Method

- Is a point-based system
- Evaluates 21 safety parameters for equivalency to the IBC
- Was included in Chapter 34 of the IBC
- Was removed in the 2015 Edition of the IBC
- Dates back to BOCA National Building Code and incorporated in the 2000 IBC when the three legacy organizations merged into ICC




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305

### Performance Compliance Method

#### General

- Point based system with twenty-one safety parameters
- Intended to determine equivalency of existing building with prescriptive requirements of IBC
- Evaluates observable features critically important to fire protection and life safety
- Provides both designers and code officials with a rational means of establishing safety

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### Performance Compliance Method

#### General

- Applies alterations, additions, and change of occupancy
- May be used with historic buildings
- Method will maintain or increase the current safety of building
- Does not require full compliance or equivalence with Work Area or Prescriptive Method



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### Performance Compliance Method

#### Applicability

- Work involving additions, alterations, or changes of occupancy
  - Conform to performance requirements or the Work Area method requirements
- Does not apply to Group H, I-1, I-3, or I-4 occupancies



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### Performance Compliance Method

#### Partial change in occupancy

- With separation, only changed portion must comply with Chapter 13
- Without proper separation, entire building must comply with Chapter 13 using the most stringent requirement for the occupancies



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1302.1.2

309

### Performance Compliance Method

#### Additions

- Comply with IBC
- When a fire wall is constructed per IBC Section 706,
  - Addition is considered a separate building
- Fire wall not provided
  - Total area of both the existing building and addition must comply with height and area calculations



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1302.1.3

310

### Performance Compliance Method

#### Alterations

- Cannot reduce current level of safety and sanitation
- If alteration proposed to reduce the level of safety, must comply with IBC

#### Plumbing Fixtures

- Meet Sections 808 and 1009
- Comply with IPC



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1302.1.4, 1302.1.5

311

### Performance Compliance Method

#### Acceptance

- Any structure evaluated shall:
  - Comply with IFC and IPMC
  - All unsafe condition be abated
  - Flood hazard area
    - If work amounts to substantial improvement, comply with IBC Section 1612



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1303

312

### Performance Compliance Method

#### Investigation and Evaluation

- Structural evaluation must be done
  - Completed building must resist IBC Chapter 16 loads
- Results of structural and performance evaluation with compliance alternatives submitted to the Code Official
- Code Official determines compliance



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1304

313

### Performance Compliance Method

#### Performance Evaluation

##### Fire Safety (FS)

- Structural fire-resistance, automatic fire detection, fire alarm, automatic sprinkler system and fire suppression system features of the facility

##### Means of Egress (ME)

- Configuration, characteristics, and support features for means of egress in the facility

##### General Safety (GS)

- Fire safety parameters and means of egress parameters

NATIONAL FIRE PROTECTION ASSOCIATION			
FACILITY SAFETY EVALUATION FORM			
SECTION	DESCRIPTION	COMPLIANCE	REMARKS
1	GENERAL SAFETY (GS)		
2	FIRE SAFETY (FS)		
3	MEANS OF EGRESS (ME)		
4	STRUCTURAL SAFETY (SS)		
5	HAZARDOUS MATERIALS (HM)		
6	ENVIRONMENTAL SAFETY (ES)		
7	PLUMBING SAFETY (PS)		
8	ELECTRICAL SAFETY (ES)		
9	Mechanical Safety (MS)		
10	Other (Specify):		
TOTAL SCORE			
EVALUATOR			
DATE			

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1305

314





## Performance Compliance Method

### Area Formula

#### Non-Separated Mixed Occupancies

- Based on smallest fraction of actual area/allowable area of occupancies present in building
  - That value is used for entire building, consistent with non-separated mixed-use approach of the IBC

Area value, =

$$\text{area} = \frac{\text{IBC allowable area}}{1200 \text{ sq ft}} \times \left( 1 - \frac{\text{actual area}}{\text{IBC allowable}} \right)$$

If the area value is positive, it must be ≤ 50% of the mandatory fire safety score in IEBC Table 1301.8 for the respective occupancy type

1305.2.2

321

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## Performance Compliance Method

### Compartmentation

- Creating fire areas is beneficial and limits spread of a fire
  - Based on use of min. 2 hr. rated walls and floors complying with IBC Sections 707 and 711
  - Openings must be protected per IBC
  - Smaller fire area = greater benefit with larger point value



1305.2.3

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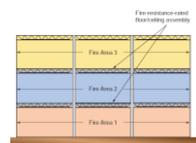
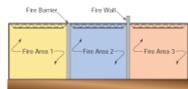
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## Performance Compliance Method

### Tenant and dwelling unit separations

- Looks at separation of tenants not evaluated in Sections 1305.2.3 and 1305.2.5
- Recognizes fire separation with <2 hr rated assemblies
- Openings must be protected
- Separation between patient sleeping rooms in Group I-2 evaluated



1305.2.4

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## Performance Compliance Method

### Corridor Walls

- Fire-resistance rated corridor walls
  - paramount for safe and protected egress from building
  - Protected openings per IBC
- Penalty for no FRR enclosure of exit access corridors significant
- Some existing substantially constructed corridors exceed corridor requirements for new construction
- Others have no protection



1305.2.5

324

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## Performance Compliance Method

### Vertical Openings

- Vertical openings include stairs, multi-story ramps, hoistways, escalators, atria, and other shaft enclosures
- Look at enclosure multiplied by construction type factor
- Penalty for no FRR enclosure (unenclosed) is significant
- Enclosed with <1 hr. rating also a negative value



1305.2.6

325

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## Performance Compliance Method

### Vertical Opening Formula

vertical openings = protection value x construction type factor

$$VO = PV \times CF$$



1305.2.6

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### Performance Compliance Method

#### HVAC Systems

- Addresses limiting spread of smoke and fire to remainder of building
- Does not evaluate smoke control systems
- Must be protected
- When there are multiple HVAC system arrangements,
  - Evaluate separately
  - Lowest point value used



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1305.2.7

327

### Performance Compliance Method

#### Automatic Fire Detection

- Addresses location and operation of smoke detectors
- Detectors required to connect to audible alarms
  - Installed per IBC Section 907 and IMC Section 606
- Emphasis on complete smoke detection throughout building
- Negative points for lack of protection in higher occupancy concentrations and higher fuel loads



Daniel P. Finnegan, Siemens Industry



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1305.2.8

328

### Performance Compliance Method

#### Fire Alarm Systems

- Capability of fire alarm system
- Includes manual initiation of alarm and dedicated circuits for notification appliances
  - Horns, bells, speakers and strobes
- Installed per IBC
- Emphasis on emergency voice/alarm communication systems,
  - Particularly in occupancies with higher fuel load
- Penalty for Groups A, B, E, R with no fire alarm system



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1305.2.9

329

### Performance Compliance Method

#### Smoke Control

- Address ability of natural or mechanical venting, exhaust or pressurization system to control movement of smoke
- Due to the defend-in-place nature of health care facilities, there is need to vent or exhaust smoke
- Emphasis placed on need for sprinkler protection to limit fire growth and associated smoke production



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1305.2.10

330

### Performance Compliance Method

#### Means of Egress Capacity and Number

- Does not address
  - Dead-end-corridors, common path of travel, or travel distance
- Emphasizes having above minimum IBC requirements for higher occupant load densities
- Penalizes use of fire escapes even though recognized by IBC



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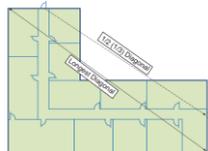
1305.2.11

331

### Performance Compliance Method

#### Means of Egress Capacity and Number

- To take credit for exits in Category d, must meet remote requirements of IBC
  - Not less than half distance of greater diagonal dimension of building story
- Sprinkler protected existing buildings
  - Remoteness of exits in Category d can be reduced to 1/3 distance of greater diagonal dimension of story



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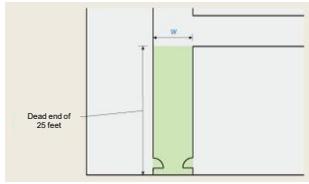
1305.2.11

332

### Performance Compliance Method

#### Dead Ends

- Addresses presence of and length of dead-end corridors
- Places equal emphasis on dead-end corridors regardless of occupancy type
- Penalizes presence of excessively long dead-end corridors,
  - Especially for Group I-2



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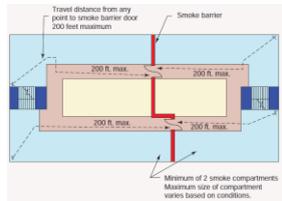
1305.2.12

333

### Performance Compliance Method

#### Maximum Exit Access Travel Distance to Exit

- Addresses length of exit access travel
- Places equal emphasis on travel distance
- Penalizes exit access travel distance that exceeds IBC requirement



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1305.2.13

334

### Performance Compliance Method

#### Maximum Exit Access Travel Distance to Exit

- Equation used to determine value for exit access travel distance based on IBC maximum allowable travel distance

$$\text{Points} = 20 \times \frac{(\text{IBC maximum allowable travel distance} - \text{maximum actual travel distance})}{\text{IBC maximum allowable travel distance}}$$

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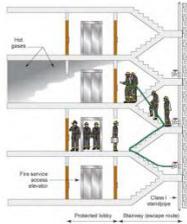
1305.2.13

335

### Performance Compliance Method

#### Elevator Control

- Addresses presence of Phase I emergency elevator recall and Phase II emergency in-car operation for passenger elevators
- Freight elevators not evaluated
  - May not be readily accessible by emergency responders
- Elevators with a travel distance  $\geq 25$  ft above or below access for emergency responders
  - Must have Phase I and Phase II emergency operation



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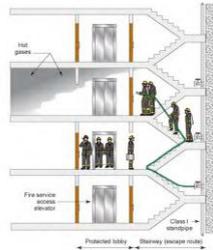
1305.2.14

336

### Performance Compliance Method

#### Elevator Control

- Penalizes multi-story buildings with no elevators
- Emphasizes the presence of at least one elevator complying with IBC
- Baseline value for elevators with  $< 25$  ft travel distance – Category b
- Baseline value for elevators with  $\geq 25$  ft travel distance – Category c



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1305.2.14

337

### Performance Compliance Method

#### Means of Egress Emergency Lighting

- Addresses presence of emergency power for illumination of means of egress and exit signs
- Emphasizes need for emergency power for illumination of means of egress and exit signs when the required number of exits  $\geq 2$



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1305.2.15

338

### Performance Compliance Method

#### Means of Egress Emergency Lighting

- Permitted to have a single exit – base line value is Category a
- Requires two or more exits – base line value is Category b




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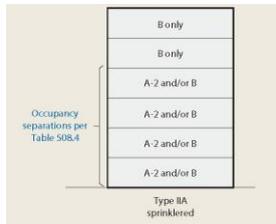
1305.2.15

339

### Performance Compliance Method

#### Mixed Occupancies

- Addresses presence of rated vertical and horizontal separations between occupancy types
- Bonus points for FRR separation that is 2x rating required by the IBC for occupancy separation
- Penalizes building with FRR occupancy separations that are 1-hour rated




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1305.2.16

340

### Performance Compliance Method

#### Automatic Sprinklers

- Addresses ability to suppress a fire with sprinkler system
- Based on applicable occupancy type requirements of IBC §903.2 and building height and area
- Positive values given to existing building with sprinkler protection
- IEBC strongly encourages installation of **complete** building automatic sprinkler (NFPA 13)




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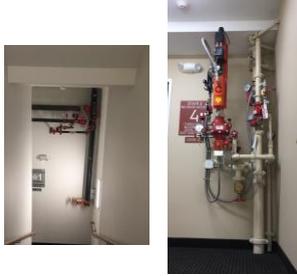
1305.2.17

341

### Performance Compliance Method

#### Standpipes

- Addresses ability to initiate interior firefighting operations by providing readily available source of water per NFPA 14




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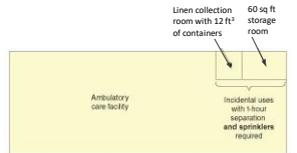
1305.2.18

342

### Performance Compliance Method

#### Incidental uses

- Addresses protection
  - Passive (enclosure), active (automatic sprinkler) or in combination in incidental use areas
- No positive points are possible
  - Incidental use areas are generally considered more hazardous




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1305.2.19

343

### Performance Compliance Method

#### Smoke compartments

- Group I-2 requires defend-in-place
- Addresses presence of smoke barriers on each story
- Smoke compartments must meet requirements of IBC Section 407.5




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1305.2.20

344

## Performance Compliance Method

- Patient Ability**
- Patient Concentration**
- Smoke Compartment Location**
- Ratio to Attendant**



- Group I-2 only
  - Enter the values of each of the safety parameters into Table 1301.7
  - Multiply the three safety factors together
  - If the sum is < 6, compliance has failed

1305.2.21

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## Performance Compliance Method

- Patient Ability for Self Preservation**

- Patient ability – 3 categories
  - Category a – 3 pts – Patients mobile, capable of self-preservation without assistance
  - Category b – 2 pts – Patients nonmobile, rely on assistance for evacuation or relocation
  - Category c – 1 pt – Patients cannot be evacuated or relocated



1305.2.21.1

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## Performance Compliance Method

- Patient Concentration**

- Patient concentration – 3 categories
- More patients in a space give fewer points
  - Category a – 3 pts – Smoke compartment has 1 – 10 patients
  - Category b – 2 pts – Smoke compartment has 11 – 40 patients
  - Category c – 1 pt – Smoke compartment has more than 40 patients



1305.2.21.2

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## Performance Compliance Method

### Attendant-to-Patient Ratio

- Attendant-to-patient ratio – 3 categories
- Category a – 3pts – Attendant-to-patient ratio ≤ 1:5
- Category b – 2 pts – Attendant-to-patient ratio is 1:6 to 1:10
- Category c – 1 pt – Attendant-to-patient ratio > 1:10



1305.2.21.3

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## Performance Compliance Method

### Building Score

- 21 Safety Parameter scores entered on summary sheet
- Point values for each safety category are added to provide overall building safety score
  - Fire Safety
  - Means of Egress
  - General Safety

SAFETY PARAMETERS	FIRE SAFETY (FS)	MEANS OF EGRESS (ME)	GENERAL SAFETY (GS)
1405.6.1 Building Height	1	1	1
1405.6.2 Building Area	6	6	6
1405.6.3 Compartmentation	6	6	6
1405.6.4 Escalator and Stairing Unit Separations	0	0	0
1405.6.5 Gender Walls	0	0	0
1405.6.6 Vertical Openings	0	0	0
1405.6.7 HVAC Systems	5	5	5
1405.6.8 Automatic Fire Detection	0	0	0
1405.6.9 Fire Alarm System	-10	-10	-10
1405.6.10 Smoke control	****	0	0
1405.6.11 Means of Egress	****	0	0
1405.6.12 Dead ends	****	2	2
1405.6.13 Maximum Self Access Travel Distance	****	16	16
1405.6.14 Staircase Control	0	0	0
1405.6.15 Means of Egress Emergency Lighting	****	***	10
1405.6.16 Hazard Occurrences	-10	***	10
1405.6.17 Automatic Sprinklers	0	+2	0
1405.6.18 Handrails	0	0	0
1405.6.19 Incidental Use	0	0	0
1405.6.20 Smoke Compartmentation	0	0	0
<b>Building Score—Total Value</b>	<b>-4</b>	<b>22</b>	<b>22</b>

1306

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## Performance Compliance Method

TABLE 1306.2 MANDATORY SAFETY SCORES

OCCUPANCY	FIRE SAFETY (FS)	MEANS OF EGRESS (MME)	GENERAL SAFETY (GS)
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
I-2	19	34	34
M	23	40	40
R	21	38	38
S-1	19	29	29
S-2	29	39	39

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## Performance Compliance Method

### Evaluation of Building Safety

Restaurant: Group A-2		
21	32	32

- Final scores determined using evaluation formulas in Table 1301.9

Fire Safety:	FS – MFS =	FS – MFS =	-4 – 21 =	-25	Fail
Means of Egress:	ME – MME =	ME – MME =	22 – 32 =	-10	Fail
General Safety:	GS – MGS =	GS – MGS =	12 – 32 =	-20	Fail

1307

351

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## Performance Compliance Method

### If final score fails:

- Choose one or more of 21 safety parameters to bring into compliance
- Do alteration to achieve a positive score
- Remainder of building remains as is

SAFETY PARAMETERS	FIRE SAFETY	MEANS OF EGRESS (ME)	GENERAL SAFETY (GS)
IBC 4.10.1 Building Height	4	4	4
IBC 4.10.2 Building Area	4	4	4
IBC 4.10.3 Compartmentation	4	4	4
IBC 4.10.4 Fire-rated and fireproofing (Fire Separations)	0	0	0
IBC 4.10.5 Corridor Walls	0	0	0
IBC 4.10.6 Vertical Openings	0	0	0
IBC 4.10.7 Stairways	0	0	0
IBC 4.10.8 Elevator Shafts	0	0	0
IBC 4.10.9 Escalator Shafts	0	0	0
IBC 4.10.10 Stairway Enclosures	0	0	0
IBC 4.10.11 Stairway Doors	0	0	0
IBC 4.10.12 Stairway Landings	0	0	0
IBC 4.10.13 Stairway Enclosures	0	0	0
IBC 4.10.14 Stairway Control	0	0	0
IBC 4.10.15 Stairway Enclosures	0	0	0
IBC 4.10.16 Stairway Enclosures	0	0	0
IBC 4.10.17 Stairway Enclosures	0	0	0
IBC 4.10.18 Stairway Enclosures	0	0	0
IBC 4.10.19 Stairway Enclosures	0	0	0
IBC 4.10.20 Stairway Enclosures	0	0	0
IBC 4.10.21 Stairway Enclosures	0	0	0
Building Score - Total Value	0	22	12
Restaurant: Group A-2	21	32	32

1307

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## Performance Compliance Method

### Mixed Occupancies

- Where no rated separation present (Section 1302.5.16)
  - Mandatory safety score for occupancy with the lowest **General Safety** score (Table 1306.1) must be used
- Existing occupancy separation per Section 1302.5.16 – includes 1-hr barriers or assemblies
  - Mandatory Safety scores for **each** occupancy is used
    - A total building score for **each** occupancy determined
    - Each occupancy must pass, alterations may be needed in some occupancies to meet scores

### Exception:

- Existing occupancy separation meeting or exceeding IBC Table 508.4 **AND** no alterations or change of occupancy in the occupancy
  - No changes required/needed in these building areas

1307.1

353

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# Quiz

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APPLICATION

Which occupancies does the Performance Compliance Method not apply to ?

H, I-1, I-3, I-4

The Performance Compliance Method is intended to determine the equivalency of the existing building with the prescriptive requirements of \_\_\_\_\_.

the IBC

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APPLICATION

If any alteration is proposed to reduce the level of safety, such alteration shall comply with \_\_\_\_\_.

the IBC

The Performance Compliance Method consists of what three safety categories?

- Fire Safety
- Means of Egress
- General Safety

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What is the basic intent of the Compartmentation Category?  
Create fire areas to limit the spread of the fire

What is the basic intent of the HVAC safety parameter?  
Addresses limiting the spread of smoke and fire to remainder of building

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## Discussion



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As a result of their Authorized Provider accreditation status, ICC is authorized to offer IACET CEUs for its programs that qualify under the ANSI/IACET Standard.

You will obtain full CEUs for this course, if you actively participate in the training activities and stay for the entire session. Evidence of this will be the sign out sheet.

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